"Profitability Dynamics and Credit Risk Exposure: An Empirical Study of Bangladeshi State-owned Banks"

An Internship Report submitted in partial fulfillment of the requirements for the Degree of Bachelor of Business Administration (BBA)

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20th April, 2026

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Letter of Transmittal

20th April,2026

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Subject: Submission of internship report titled **“Profitability Dynamics and Credit Risk Exposure: An Empirical Study of Bangladeshi state-owned Banks**

Honorable Sir,

This is a great pleasure and honor for me to submit the internship report titled **“Profitability Dynamics and Credit Risk Exposure: An Empirical Study of Bangladeshi state-owned Banks”** as per your guideline and instructions. This report has been prepared as a partial requirement to complete BBA program.

I have endeavored to analyze the relationship between profitability and credit risk exposure of Bangladeshi state-owned banks. I have used relevant financial indicators and empirical analysis. I hope this report will provide clear understanding of the topic.

Therefore, I would be grateful if you kindly accept my internship report and oblige thereby.

Sincerely yours,

____

Usmita Afrose

ID/ Reg. no: 12117002

Session: 2020-2021

Department of Finance and Banking

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Acknowledgment

I would like to express my deepest gratitude to all those who have supported me in the completion of this internship report titled **“Profitability Dynamics and Credit Risk Exposure: An Empirical Study of Bangladeshi state-owned Banks.”**

Firstly, I would like to thank almighty **Allah** for answering our prayers and giving me the strength, courage, and patience to finish this task within reasonable time.

I would like to express my gratitude to **Associate Professor Dr. Md. Amdadul Hoque** sir who has been my supervisor since the beginning of my report. He provided me with important advice, helpful suggestions and constant encouragement throughout the course of this work. Without his help and support, this study would not have been completed.

I am also immensely grateful to **Sonali Bank Limited** for providing me the opportunity to complete my internship program in their esteemed organization. This internship provided me with practical knowledge of banking sector valuable insights. Sincere thanks to the officers and staffs for their immense support and cooperation during my internship period.

I would like to convey my deepest appreciation to the faculty members of **Finance and Banking Department, Comila University,** for their valuable guidance, inspiration, support and sharing their knowledge and practical insights throughout my journey. They nurtured my core foundation of BBA journey.

Finally, I would like to thank my family members and my well-wishers for their constant encouragement and moral support throughout the preparation of the report.

Student's Declaration

I, Usmita Afrose, a student of finance and Banking, Comilla University, hereby declare that the internship report titled **"Profitability Dynamics and Credit Risk Exposure: An Empirical Study of Bangladeshi state-owned Banks."** is my original work and has been prepared as a part of the requirements for completing Bachelor of Business Administration (BBA) program under the supervisor, **Dr. Md. Amdadul Hoque, Associate Professor**, Department of Finance and Banking, Comilla University.

This report is the outcome of my own work and reflects the research that is conducted by me under my supervisor during the internship program at **Sonali Bank Limited** using publicly available information. I confirm that this report has not been submitted to any other University/ College/ institution for any academic certificate/ degree/ diploma. It does not break any existing copyright.

I also declare that all sources of information that I have extracted have been properly acknowledged with appropriate references.

Sincerely yours,

____

Usmita Afrose

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Session: 2020-2021

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Certificate of Supervisor

20th April 2026

This is to certify that the internship report titled **“Profitability Dynamics and Credit Risk Exposure: An Empirical Study of Bangladeshi state-owned Banks.”** submitted by **Usmita Afrose, ID No: 12117002, Session: 2020-2021** as a student of Bachelor of Business Administration (BBA) degree from Department of Finance and Banking at Comilla University, is an authentic piece of work carried out under my supervision.

I confirm that the content of the report is based on the research and analysis performed during the internship period, and I endorse its submission for academic purposes.

____

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সোনালী ব্যাংক পিএলসি

বিশ্বস্ত ও স্মার্ট

SBL/COM/CORP/INTERNSHIP/ 606 DATE: 16 April, 2026

TO WHOM IT MAY CONCERN

This is to certify that **USMITA AFROSE, Reg no-12117002 BBA-FIN-15,** student of Comilla University, Department of Finance & Banking under BBA program has completed her internship from 25/01/2026 to 16/04/2026 in Sonali Bank PLC, Cumilla Corporate Branch, Cumilla.

During her internship period she undergoes a thorough internship program on analysis of **Profitability Dynamics and Credit Risk Exposure: An Empirical Study of Bangladeshi State-Owned Banks**. She maintained all the rules & provided the services as an employee of the organization.

On the way of accomplishing the task we found her very sincere in work area and performed all duties & responsibilities accordingly. She always engaged herself in work instructed by the personnel of the branch.

We wish every success in her life.

(Kazi Syedur Rahman)
Assistant General Manager
Sonali Bank PLC
Cumilla Corporate Branch
Cumilla.

Executive Summary

A well-functioning banking industry plays a crucial role in developing an economy and sustaining in the long run. It flourishes economic growth, facilitates trade and industry and nurtures entrepreneurship as well. State-owned banks are exposed to various risks specially they are quite vulnerable to credit risk. Credit risk drastically reduces the profitability. Credit risk accelerates when the borrowers of banks fail to repay the loan at the specified period of time. This study aims to provide a better understanding of the relationships of profitability and credit risk.

The study aims to investigate the relationship between profitability and credit risk. In this internship report 6 state-owned banks of Bangladesh have been taken into consideration for the purpose of the analyzing the relationship of profitability and credit risk. Some firm specific and macro factors are taken into consideration for the purpose of detecting their impact on explained variables such as return on asset (ROA) and non-performing loan (NPL). Explanatory variables are bank size, capital adequacy ratio, loan to deposit ratio, liquidity ratio, GDP growth and inflation.

The panel data analysis includes the financial data of these state-owned banks over a decade, from 2015-2024. Secondary data is collected from the annual reports of these state-owned banks. Panel data regression model is implemented here. For empirical evidence of the analysis, fixed effect model and pooled OLS model is depicted in the analysis. Bivariate relationship is also tried to be identified and analyzed to have a better understanding of the impacts. From the analysis it is shown that non-performing loan has significant negative impact on return on asset (ROA). Other financial indicators such as bank size, capital adequacy ratio, loan to deposit ratio, liquidity ratio, inflation have their significant impact on both profitability and credit risk.

The state-owned banks of Bangladesh should manage credit risk more efficiently through appointing competent authority and offering various incentive to the borrowers such as expanding repayment duration and lowering interest rates and providing interest exemption. If needed, government and the competent authority should take corrective actions to address this problem. This way it can be prevented and financial performance can be maintained and long-term sustainability can be ensured.

Acronyms

Abbreviation	Amplification
ROA	Return on asset
NPL	Non-performing loan
CAR	capital adequacy ratio
LDR	Loan to Deposit Ratio
LQR	Liquidity Ratio
SMEs	small and medium enterprises
BDBL	Bangladesh Development Bank Limited
DFIs	development financial institutions
BSB	Bangladesh Shilpa Bank
BSRS	Bangladesh Shilpa Rin Sangstha
NIM	net interest margin
OLS	Ordinary Least Squares
GLS	Generalized Least Squares
GMM	Generalized Method of Moments
VAR	Vector Autoregression

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CHAPTER 1

Introduction

Introduction

Banking occupies a pivotal position in the modern economic world. It plays a great role in facilitating trade and industry. It is one of the great agencies of commerce. Its presence is very helpful to a country's economic activity and industrial progress. For Bangladesh to prosper sustainably, a seamless and well-equipped banking sector is significant. A well-structured banking system enables the economy to develop appropriately, and an efficient and productive banking lending process supports this development. State-owned commercial banks play a crucial role in the financial system through the mobilization of funds and savings. It boosts economic growth by mobilizing capital funds.

Profitability is one of the key financial indicators which is used for performance evaluation, and it must be maintained for long term sustainability. However, non-performing loans (NPLs), which are acknowledged as a sign of ineffective and unproductive lending practices, are a terrible problem facing our nation's banking industry today. Even if some steps have been taken to improve the banking sector, the issue is getting worse every day. Thus, profitability and financial stability are required to be ensured for a smooth economic system.

As a developing nation like Bangladesh, banks are truly the foundation of the financial system and a major force behind economic development. Hence, the study of factors affecting the profitability and NPL of banks is important for policymakers, regulators, and bank managers. Meanwhile, these banks face different types of risk, where credit risk is considered the most critical one. Credit risk deteriorates the development and decreases the profitability. State-owned banks in Bangladesh have witnessed various difficulties due to high levels of non-performing loans and operational inefficiency, which not only influences these banks' financial stability but also have a significant influence on the banking system of Bangladesh, which hinders the economic growth. Thus, the relationship between profitability and credit risk is considered an increasingly vital ingredient.

This study tries to explore the dynamics between profitability and credit risk exposure of certain state-owned banks in Bangladesh over a specified time period. Through analyzing financial parameters such as Return on Assets (ROA), Non-Performing Loans (NPL), Capital Adequacy Ratio (CAR), Loan to Deposit Ratio (LDR), Liquidity Ratio (LQR), etc., and macroeconomic indicators such as inflation and GDP growth, this study aims to explore how credit risk influences the profitability of these banks. The findings of this study are anticipated to submit valuable insights and will help understand the financial performance of state-owned banks in Bangladesh, and may inform optimization of current credit risk management practices in the banking sector.

1.1 Background of the Study

Banks play a vital role in the financial and economic growth of Bangladesh. Banks work as financial intermediaries by collecting deposits from savers and providing loans to borrowers, which supports industrial growth, trade and commerce, investment, and overall economic stability. Among the various types of banks in Bangladesh, state-owned commercial banks contribute significantly and carry out government financial policies. State-owned banks in Bangladesh often face various operational and financial challenges. One of the major challenges is the high level of credit risk or NPL. Some financial indicators such as Return on Assets (ROA) are often used to evaluate bank profitability. Moreover, indicators such as bank size, capital adequacy ratio (CAR), loan-to-deposit ratio (LDR), liquidity ratio (LQR), and macro factor such as GDP growth and inflation also affect bank performance.

In recent years, the growing concern over non-performing loans and financial efficiency has captured the attention of many researchers, policymakers, and regulatory authorities in Bangladesh. by understanding the connection between profitability and credit risk exposure is significant for enhancing banking performance and ensuring financial stability. This study tries to investigate this connection by analyzing selected state-owned banks in Bangladesh over a specific time period and it provides valuable insights into how credit risk and other financial indicators affects bank profitability.

1.2 Problem statement

Bank is an appreciable source of financing. Credit risk in Bangladeshi state-owned banks is considerably increasing day by day, which is affecting the overall development of the bank over the years. When the borrowers are unable to repay the loan within the specified time period the banks lose its income or it reduces the profitability ultimately leading to inefficient performance. Keeping the balance between credit risk and profitability is extremely crucial for state-owned banks of Bangladesh. The profitability of banks depends on credit risk and multiple internal and external factors which include bank size and capital adequacy ratio (CAR) and loan-to-deposit ratio (LDR) and liquidity ratio (LQR) and macroeconomic conditions which include GDP growth and inflation. Although these factors are important, researchers need to study how credit risk plus other financial metrics impact the profitability of state-owned banks in Bangladesh. The study will examine how credit risk exposure impacts profitability in state-owned banks that operate across Bangladesh. The study will analyze various financial indicators from a designated time frame to determine what drives bank profitability while assessing how credit risk impacts their financial results. This study will help understand credit risk exposures as well as its corrective measures.

1.3 Significance of the Study

This research holds significance due to its potential benefits that it offers to various stakeholders of the financial market as well as the state-owned banks. The research demonstrates its importance through its investigation of how credit risk and other bank-specific and macroeconomic factors impact the financial performance of Bangladeshi state-owned banks. The research identifies bank profitability determinants through its examination of non-performing loans bank size capital adequacy ratio loan-to-deposit ratio liquidity ratio GDP growth and inflation. The findings of this study may be useful for bank management in designing effective risk management strategies and improving financial performance. The study provides assistance to policymakers and regulatory authorities in developing policies that will enhance banking sector strength while minimizing credit risk. The study expands existing banking performance research in Bangladesh and provides future researchers and students with a resource to study banking finance and risk management.

1.4 Scope of the Study

The study incorporates state-owned banks of Bangladesh. The analysis will fixate on a range of financial indicators, including return on Assets (ROA) which indicates profitability, non performing loan (NPL) indicating credit risk, bank size, capital adequacy ratio (CAR), loan-to-deposit ratio (LDR), liquidity ratio (LQR), and macro factor such as GDP growth and inflation. This study is limited to state-owned banks of Bangladesh and specified time period. moreover, the study will utilize quantitative data from financial statements of state-owned banks and relevant market reports over the past decade. This focused scope allows for an in-depth exploration of bank-specific and macro factors affecting profitability and credit risk, offering valuable insights into Bangladeshi state-owned banks.

1.5 Research Questions

✓ what is the impact of non-performing loan on profitability of state-owned banks of Bangladesh?

✓ What are the crucial financial indicators that significantly impact the profitability and credit risk?

✓ Is there any significant relationship between return on asset (ROA) and bank-specific indicators including NPL, bank size and capital adequacy ratio (CAR) and loan-to-deposit ratio (LDR) and liquidity ratio (LQR) and macroeconomic indicators like GDP growth and inflation for state-owned banks?

1.6 Objective of the study

1.6.1 Primary Objectives:

✓ To investigate the relationship between credit risk exposure and profitability of state-owned banks of Bangladesh.

1.6.2 Specific Objectives:

✓ To investigate the impact of non-performing loan on profitability of state-owned banks.

✓ To examine the relationship between bank size and profitability and credit risk.

✓ To analyze the impact of capital adequacy ratio on profitability and credit risk.

✓ To evaluate the impact of loan to deposit ratio on profitability and credit risk.

✓ To assess the effect of liquidity ratio on profitability and credit risk.

✓ To examine the influence of macroeconomic indicators such as inflation and GDP growth profitability and credit risk.

CHAPTER 2

Literature Review

Literature Review

Profitability of banks and credit risk exposure have been studied widely in financial and banking literature. Various profitability factors such as return on asset (ROA), net interest margin (NIM), return on equity (ROE) commonly used to measure the financial performance of banks. Through the efficient management of profitability indicators, the organizational resources can be utilized appropriately. For long term sustainability these indicators should be analyzed comprehensively.

In Bangladesh several studies have been conducted analyzing the profitability of banks and credit risk exposure and financial indicators affecting these profitability and credit risk factors. Abu Hanifa Md. Noman and Banna,(2015) analyzed the impact of bank specific and macroeconomic variables on profitability of banks which is shown significantly and found that capital adequacy, credit risk, and bank size significantly affect the performance of banks. Islam and Rana,(2022) studied the profitability determinants of developing economies and found that capital adequacy and liquidity management influence financial performance significantly.

More recently, several empirical studies have been conducted which have emphasized the significance of credit risk management. For instance, Bhuiya et al.,(2023) analyzed the effect of credit risk on the profitability on Bangladeshi commercial banks and found that high non-performing loans (NPL) significantly has negative impact on profitability. The study concluded with the emphasis of taking credit risk management into consideration in order sustain in the long run.

Early studies several determinants of profitability and credit risk exposure. Molyneux and Thornton,(1992) analyzed European banks and found that macroeconomic indicators such as inflation and economic growth significantly affect the profitability of banks. Kamarudin et al.,(2016) focused on the performance of banks and concluded that bank size, efficiency, and credit risk have significant effect on profitability.

Anik et al.,(2019) conducted research on the relationship between profitability and credit risk and found that credit risk, capital adequacy, and liquidity management have significant effect on profitability. Furthermore, several recent research studies have given their emphasis on managing credit risk efficiently for sustainability. For example, Bhowmik et al.,(2024) investigated the financial performance of commercial banks of Bangladesh. In the study it is found that asset quality and credit risk have significant effect on financial performance of commercial banks. Also Bhowmik et al.,(2025) reported in the study that capital adequacy and bank size have significant impact on the profitability of banks in Bangladesh.

Moreover, numerous recent empirical studies have contributed significantly in determining the impacts of financial indicators and macroeconomic indicators on the performance of banks. Chowdhury et al.,(2025) reported in the study about macroeconomic indicators and credit risk and concluded that GDP growth, inflation, and credit risk have significant effect on profitability in developing economies.

Furthermore, another study by Chowdhury,(2025) investigated and emphasized on the credit control techniques which can help mitigate the classified loan and management of profitability efficiently. In addition, Hossain,(2025) conducted research study and found that both internal and external indicators influence the profitability including capital adequacy and economic growth. Hosna et al.,(2009) concluded in her report that efficient credit risk management is compulsory for long term sustainability of banks.

Subsequent research studies have emphasized the need for maintaining credit risk efficiently in order to balance profitability. Rogge and Schönbucher,(2003) investigated and reported that operational efficiency and cost management have significant influence on performance of banks. Trabelsi and Trad,(2017) analyzed banking sector of developing economies and the study emphasized the need for risk management practice and the imposition of regulatory frameworks.

Ben-Ahmed et al.,(2023) focused on financial indicators that affect the profitability and found that higher credit risk and poor asset quality have negative significant impact on profitability. Additionally, Lalon,(2022) found that liquidity management, capital adequacy, and asset quality is significant for profitability. Zheng et al.,(2024) found that capital adequacy, credit risk exposure, and bank size have significant impact on profitability. Similarly, Iqbal and Suhong,(2024) discovered that efficient credit control techniques and regulatory practices can help reduce classified loan and maintain profitability.

Mondal and Mim,(2024) discovered that liquidity, capital adequacy, and credit risk have significant impact on profitability. Likewise, Das and Pati,(2024) found that asset quality and operational efficiency these factors play crucial role influencing the profitability of commercial banks. Zabin et al.,(2024) emphasized on the macroeconomic factors such as inflation and GDP growth that significantly affect profitability of banks.

Akter,(2025) found that higher non-performing loans negatively affect profitability and long-term sustainability. Similarly, Sutanto and Ariefianto,(2024) discovered that efficient credit control techniques and regulatory practices can help minimize classified loan and balancing profitability. Moreover, Ma'aji et al.,(2026) analyzed the relationship between credit risk and profitability and found that credit risk negatively impact profitability concluded with the emphasis on the credit risk management.

Afriyie and Akotey,(2012) analyzed and found that higher non-performing loan has significant negative impact on profitability. Likewise, Curak et al.,(2012) discovered that bank-specific and macroeconomic indicators play crucial role in financial performance of European economy. Zidan,(2014) discovered that efficient credit control techniques and regulatory practices can help mitigate classified loans and mange profitability. Waemustafa and Sukri,(2015) found that capital adequacy and asset quality have significant impact on the profitability of Islami banks. (Tuladhar,2017) found that credit risk and capital management have significant impact on profitability.

Jreisat,(2020) and Manu et al.,(2020) discovered that efficient asset quality and credit risk management is crucial for long term sustainability and improve profitability. Abdelaziz et al.,(2022) investigated and found that credit risk management and capital adequacy is crucial and affects profitability and stability significantly in the long run. Abel et al.,(2023) found that asset quality and credit risk management is crucial for profitability. Magar,(2024) and Mithila and Kengatharan,(2024) found that capital adequacy, liquidity management, and bank size have significant influence on profitability. Ardelia and Rahadi,(2025) found that mitigating classified loans requires effective credit risk management.

Ayieko and Aluoch,(2025) discovered appropriate credit control techniques and proper regulatory practice can help balance profitability and long term sustainability. Ogboi and Unuafe,(2013) examined the credit risk and found that in order to maintain long term sustainability effective credit control techniques need to be applied and classified loans should be minimized. Brown and Moles,(2014) discovered that for the purpose of enhancing profitability and minimizing classified loan appropriate credit monitoring and evaluation practice should be implemented.

Ganic,(2014) investigated and discovered that, credit risk is a crucial factor for emerging economies. Hallunovi and Berdo,(2018) found that both internal and external factors have significant impact on profitability of banks. Furthermore, the study revealed that asset quality and operational excellence are vital for financial performance.

In essence, the literature shows both internal and external indicators effect the profitability and stability. Internal factors such as size, non-performing loan, capital adequacy ratio, liquidity ratio, loan to deposit ratio and external factors such as inflation, GDP growth have their significant influence on financial performance of banks.

2.1 Research Gap

The banking sector of Bangladesh has been studied by multiple research projects which explore how credit risk affects bank profitability. The studies consider private commercial banks while researching the entire banking sector and they don't take state-owned banks. Bangladeshi state-owned banks impact financial market greatly and they face specific challenges including high credit risk and they try to manage non-performing loans or credit risk and balance operational efficiency. In addition, in many earlier studies the researcher considered short time period and fewer indicators. The study evaluated how the profitability of state-owned banks is influenced by the bank specific and macro factors. Many bank-specific indicators including bank size and capital adequacy ratio (CAR) and loan-to-deposit ratio (LDR) and liquidity ratio (LQR) and macroeconomic indicators like GDP growth and inflation have been used. There persists a research gap since earlier studies uses private commercials and short time period as well as the indicators. This study tries to address this gap by a comprehensive analysis of state-owned banks. This study attempts to fill this gap by considering selected state-owned banks in Bangladesh over the period 2015–2024 using relevant bank specific financial and macroeconomic variables.

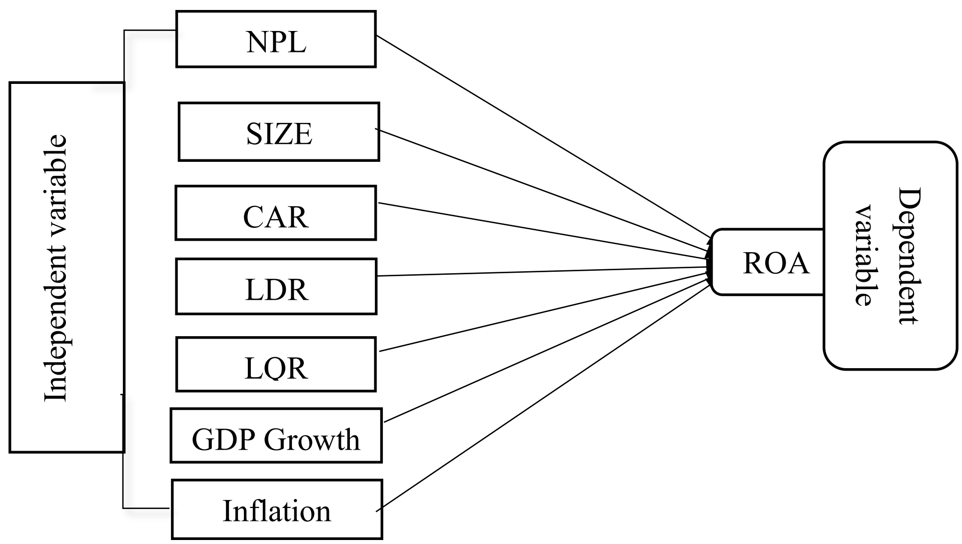
2.2 Development of Hypothesis

1. There is no significant relationship between profitability and credit risk.
2. There is no significant relationship between bank size and profitability.
3. There is no significant relationship between capital adequacy ratio and profitability
4. There is no significant relationship between loan to deposit ratio and profitability
5. There is no significant relationship between liquidity ratio and profitability
6. There is no significant relationship between GDP growth and profitability
7. There is no significant relationship between inflation and profitability.
8. There is no significant relationship between credit risk and bank specific factors
9. There is no significant relationship between credit risk and GDP growth.
10. There is no significant relationship between credit risk and inflation

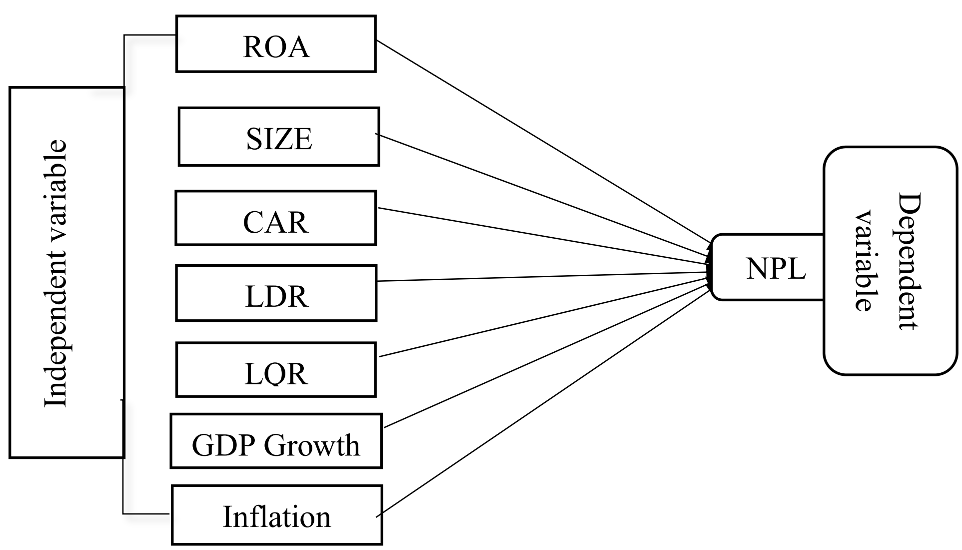
2.3 Conceptual Framework

It is a major analytical tool that identifies the relationship among the selected variables of banks. Here the frameworks are given below:

Model 1:



Model 2:



Notes: The above figures show the financial factors influencing both profitability and credit risk.

2.4 Description of Variables

The selection of variables in this study is based on both theoretical considerations and evidence from previous literature. Among explained variables, Return on Asset (ROA) is a profitability ratio that expresses that how effectively the bank converts its assets into profit (Ganic,2014) and (Curak et al.,2012). Asset quality, proxied by non-performing loans, is generally thought to depress bank performance because of credit risk (Klein,2013) and (Beck et al.,2013). Among explanatory variables, capital adequacy (CAR) is one of the most important determinants, as higher capital levels reinforce banks' capability of staying solvent and are deemed to positively relate to profitability and stability (Berger,1995) & (de Abreu,2002). Size is included for banks to account for possible scale effects: whereas in some cases evidence for economies of scale is found (Demirgüç-Kunt & Huizinga,1999), in others larger banks are seen as bearing diseconomies and having incentives for risk leadership (Mishkin,1999). Liquidity measures become important as the loan-to-deposit ratio and liquid asset ratio may affect the income-generating capacity and solvency (Bourke,1989); (Diamond & Rajan,2001).

At the macroeconomic level, GDP growth has always served to improve bank profitability and stability by raising credit demand and reducing default risks (Abreu & Mendes, 2002; (Demirgüç-Kunt & Detragiache,1998). Inflation seems to have a divided role; moderate inflation can create benefits for banks through higher interest margins, but if inflation runs wild, it will erode the value of assets and ruin stability (Athanasoglou et al.,2008).

Table 1: Variable Measurement

Serial No.	Variable	Measurement/Proxy	Sources
Dependent variables			
1	Return On Asset (ROA)	(Net Income ÷Average Total Assets) × 100	(Ganic,2014);(Curak et al.,2012)
2	Non-performing loan (NPL)	Ratio of non-performing loans to total loans	(Klein,2013) and (Beck et al.,2013)
Independent variables			
3	Capital Adequacy Ratio (CAR)	Tier 1 & Tier 2 capital ÷ Risk-weighted assets	(Berger,1995) & (de Abreu,2002)
4	Bank Size	Natural logarithm of total assets	(Demirgüç-Kunt & Huizinga,1999); (Mishkin,1999)
5	Loan-to-Deposit Ratio (LDR)	Total loans ÷ Total deposits	Bourke (1989); Diamond & Rajan (2001)
6	Liquidity Ratio (LQR)	Liquid assets ÷ Total assets	Bourke (1989) Abreu & Mendes (2002);
7	GDP Growth	Annual percentage change in real GDP	Demirgüç-Kunt & Detragiache (1998)
8	Inflation	Annual consumer price index (CPI) inflation rate	Athanasoglou et al. (2008)

CHAPTER 3

Organizational profile

3.1 Overview of Sonali bank limited

Sonali Bank Limited is one of the largest Bangladeshi state-owned commercial banks. It plays a crucial role in economic development and develops the banking sector as well. The bank was created in 1972 when the Bangladeshi government took control of the National Bank of Pakistan and Bank of Bahawalpur and Premier Bank branches that operated in Bangladesh after the country gained independence.

The Government of Bangladesh owns the bank that delivers financial solutions to private customers and commercial enterprises and public sector organizations. It operates its various branches across the country and maintains multiple international branches as well, which accelerates the economic progress. It contributes by providing multiple banking services including acceptance of deposit, advancing loan, creation of credit, foreign exchange services and remittance services and digital banking facilities, etc. It executes the government financial program and facilitates various sectors such as agriculture, trade and finance, small and medium enterprises and focuses on industrial development as well. It has modernized the banking system by using technologically advanced devices and software resulting in customer satisfaction.

- **Vision & Mission:** The vision of Sonali bank limited is to become a leading trusted state-owned bank of Bangladesh through financial inclusion and developing the economy of Bangladesh. The mission is to serve the customers efficiently, also supporting economic growth, ultimately ensuring sustainable growth through technological advancement and skilled financial management.

3.2 Overview of Janata Bank Limited

Janata Bank Limited is another state-owned bank which was established in 1972 after the nationalization of many commercial banks. It offers a wide range of banking services including acceptance of deposit, advancing loan, creation of credit, foreign exchange services and remittance services and digital banking facilities, etc.

- **Vision & Mission:** The vision is to become an efficient commercial bank through appropriate strategy and financial services. The mission is to ensure long term sustainable growth and operational efficiency and contributing in the national economy.

3.3 Overview of Agrani Bank Limited

Agrani Bank Limited is also a nationalized commercial state-owned bank established in 1972 after the independence. It provides a range of banking facilities including acceptance of deposit, advancing loan, creation of credit, foreign exchange services and remittance services and digital banking facilities, etc.

- **Vision & Mission:** To become a leading commercial state-owned bank through customer satisfaction and long term sustainable financial growth. The mission is to facilitate financial stability and contributing to economic growth and modernizing the banking system through innovation.

3.4 Overview of Rupali Bank Limited

Rupali Bank Limited is a partially state-owned commercial bank established through nationalization after liberation in 1972 since three bank which were operating in east Pakistan including Muslim Commercial Bank Limited, Australasia Bank Limited and Standard Bank Limited. It provides various banking facilities such as acceptance of deposit, advancing loan, creation of credit, foreign exchange services and remittance services and digital banking facilities, etc.

- **Vision & Mission:** the mission is to offer reliable financial services through innovation and the mission is to serve with discipline, giving quality banking facilities and contribute in the development of the country.

3.5 Overview of BASIC Bank Limited

BASIC Bank Limited (Bangladesh Small Industries and Commerce Bank Limited) is a specialized state-owned bank established in 1989, earlier for financing small scale industries. It includes diverse set of activities such as development of SME, general commercial banking, international trade & foreign exchange, microfinance and rural development.

- **Vision & Mission:** Its vision is to be one of the leading state-owned banks in Bangladesh and to promote industrial growth. The mission is to facilitate SMEs and contributing in the national economy.

3.6 Overview of Bangladesh Development Bank Limited (BDBL)

Bangladesh Development Bank Limited (BDBL) is a state-owned commercial bank which started its journey in 2010. It was formed with the amalgamation of two development financial institutions (DFIs) including Bangladesh Shilpa Bank (BSB) and Bangladesh Shilpa Rin Sangstha (BSRS). It offers long term financing for industrial development.

- **Vision & Mission:** the vision is to become a leading development bank through facilitating industrialization and accelerating economic growth. The mission is to finance various development projects and ensure sustainable growth.

CHAPTER 4

Methodology of the Study

4.1 Research Methodology

This study analyzes the relationship between profitability and credit risk. The report also tried to determine the influence of firm-specific factors including non-performing loan, bank size, capital adequacy ratio, liquidity ratio, loan to deposit ratio and macroeconomic factors including GDP growth and inflation on both profitability and credit risk as well as the bidirectional relationship. The study also employed the fixed Effects (FE) model for panel regression due to its suitability for handling unobserved heterogeneity across banks and assuming the relationship of credit risk and profitability more efficiently.

4.2 Research Design

The study uses quantitative research design and analyzes the relationship between profitability and credit risk. The study uses financial data of 6 state-owned banks. The analysis time period is 10 years, from 2015-2024 and the research contains balanced data which helps captivate the fluctuation in these relationships over time and maintain long term sustainability. The research study utilizes the following two regression models:

$$ROA_{it}=\beta_0+\beta_1 NPL_{it}+\beta_2 SIZE_{it}+\beta_3 CAR_{it}+\beta_4 LDR_{it}+\beta_5 LQR_{it}+\beta_6 GDPGrowth_t+\beta_7 Inflation_t +\epsilon_{it} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (i)$$

$$NPL_{it}=\beta_0+\beta_1 ROA_{it}+\beta_2 SIZE_{it}+\beta_3 CAR_{it}+\beta_4 LDR_{it}+\beta_5 LQR_{it}+\beta_6 GDPGrowth_t+\beta_7 Inflation_t +\epsilon_{it} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (ii)$$

Here,

$\beta 0$= Constant term

ROA_{it}= Return on Asset of firm i of year t

NPL_{it}= Non performing loan of firm i of year t

$SIZE_{it}$= Total asset of firm i in year t

CAR_{it}= capital adequacy ratio of firm i of year t

LDR_{it}= loan to deposit ratio of firm i of year t

LQR_{it}= liquidity ratio of firm i of year t

$GDPGrowth_t$= GDP growth of year t

$Inflation_t$= inflation of year t

Regression coefficients (b1, b2, b3, b4, b5, b6, b7) represent the proportionate change in return on asset and non-performing loan, due to unit change in independent variables.

4.3 Data Collection Procedure

The data for this study is taken from the annual reports, financial statements of state-owned banks. The data is collected manually from these sources in order to ensure accuracy, reliability, transparency. For the purpose of cross verification multiple sources are applied during the data collection procedure.

4.4 Sample Unit

The unit of analysis is each state-owned bank of Bangladesh observed for 10 years. Here a balanced panel data is maintained where each company has a complete set of observations for each variable over the period of 2015-2024.

4.5 Sample Size

The research sample size consists of 6 state-owned banks of Bangladesh. With a observation period of a decade, the resulting data set of the research study incorporates 60 observations (6 banks × 10 years).

4.6 Research Instrument

To investigate the impact of independent variables on dependent variables such as return on asset (ROA) and Non-performing loan (NPL). Here, in this study panel regression analysis is conducted using fixed effect model (FE). The fixed effect model is preferred due to its suitability for handling unobserved heterogeneity across banks and assuming the relationship of credit risk and profitability more efficiently.

4.7 Statistical Software and Tests

Statistical analysis will be conducted using Stata 18.0, where the following tests and diagnostic checks will be implemented:

- **Outliers:** It will be identified and managed by using winsorization.
- **Pearson Correlation Test:** This test is used to measure the strength and direction of the linear relationship between two continuous variables.
- **Breusch-Pagan LM Test:** To check for heteroscedasticity this test will be used.
- **Wooldridge Test:** To test for autocorrelation in panel data this test will be conducted.
- **VCE Robust**: Here, robust standard errors is applied to address the problem of heteroscedasticity.
- **Variance Inflation Factor (VIF):** To detect multicollinearity between the independent variables this is used.
- **Breusch-Pagan LM (Lagrange Multiplier):** This Test is used to decide between the OLS and Random Effects (RE) models.

These tests and diagnostic checks will ensure the robustness of the model, that will boost the reliability and validity of the research's findings.

CHAPTER 5

Analysis & Findings

5.1 Descriptive Statistics

The following table represents the descriptive statistics for the variables that are analyzed in the study through using the data of 6 state-owned banks of Bangladesh over the decade. The statistics incorporate the mean, standard deviation, median, minimum, maximum, skewness, and kurtosis for each variable of the study.

From the following table it is seen that the mean of return on asset is -.157 while the standard deviation is .899 which reveals the variability of return on asset or profitability of banks. Here, the minimum is -2.39 and maximum is 1 which is noticeable difference. The skewness of return on asset is -1.388 which indicates the negative skewed distribution also the kurtosis is 3.998 which means leptokurtic. The mean of non-performing loan is 30.875 while the standard deviation is 15.413 which indicates the variability among the state-owned banks. Minimum of non-performing loan is 13.23 and maximum is 59.8 which indicates some banks has lower NPL while some banks have higher NPL and skewness and kurtosis are respectively .626 and 1.95.

Bank size is the natural logarithm of total assets this is applied for enhancing normality. The mean, standard deviation, minimum, maximum, skewness and kurtosis are respectively 9.303, 8.236, -7.55, 25.76, .227 and 3.266. it implies that it has significant variability and quite normal distribution. The mean, standard deviation, minimum, maximum of loan to deposit ratio are respectively 71.308, 15.632, 42.43, 100.25 which shows the differences of lending behavior of banks. The skewness and kurtosis are -.003, 2.287 which indicate the quite symmetric and relatively normal distribution. The liquidity ratio also implies a symmetric distribution and the kurtosis indicates flat distribution. The macroeconomic factor GDP growth indicates a negatively skewed distribution and kurtosis implies a peaked distribution. Finally, inflation shows right skewed and kurtosis indicates quite a normal distribution.

Table 5.1: Descriptive statistics

Variables	Obs	Mean	Median	Std. Dev.	Min	Max	Skewness	Kurtosis
Return on asset	60	-.157	.09	.899	-2.39	1	-1.388	3.998
Non-performing loan	60	30.875	25.505	15.413	13.23	59.8	.626	1.95
size	60	11.855	11.835	1.88	8.67	14.35	-.313	2.053
Capital adequacy ratio	60	9.303	10.02	8.236	-7.55	25.76	.227	3.266
Loan to deposit ratio	60	71.308	71.17	15.632	42.43	100.25	-.003	2.287
Liquidity ratio	60	5.675	5.725	1.28	4.04	7.9	.082	1.684
GDP Growth	60	6.474	6.765	1.174	3.45	7.88	-1.526	4.825
Inflation	60	6.79	5.7	1.836	5.5	10.5	1.184	2.695

Notes: The table shows the mean, median, standard deviation, minimum, maximum, skewness, and kurtosis of the return on asset (ROA), non performing loan (NPL), firm size, capital adequacy ratio (CAR), loan to deposit ratio (LDR), GDP growth and inflation for 6 state-owned banks using the data of 2015-2024. Here, natural logarithmic data is used for bank size to improve the normality. This is also mentioned here that firm size is measured by the total assets of state-owned banks.

5.2 Correlation Analysis

The presence of collinearity between the explanatory variables and the analysis of the linear connection between the variables is identified by using the correlation matrix. The correlation matrix shows that there is highly significant negative correlation between return on asset and non-performing loan which indicates that higher non-performing loan reduces the banks profitability. From the matrix, it is shown that capital adequacy ratio has significant positive relationship with return on asset that means it increases the profitability. Bank size has negative significant relationship with NPL. CAR has significant relationship with size. LDR has significant relationship with ROA, NPL, SIZE, CAR. LQR has significant relationship with LDR. Finally, inflation has significant relationship with LDR and LQR.

Table 5.2: Correlation Matrix

Variables	ROA	NPL	Size	CAR	LDR	LQR	GDP growth	inflation
Return on asset	1.000							
Non-performing loan	-0.575***	1.000						
size	-0.083	-0.237*	1.000					
Capital adequacy ratio	0.671***	-0.206	-0.520***	1.000				
Loan to deposit ratio	-0.568***	0.666***	-0.235*	-0.245*	1.000			
Liquidity ratio	0.066	-0.160	0.189	-0.019	-0.531***	1.000		
GDP Growth	0.042	0.051	-0.028	0.045	-0.063	0.103	1.000	
Inflation	-0.040	0.201	0.055	-0.199	0.307**	-0.626***	-0.202	1.000

Notes: Statistically Significant *p<0.10, **p<0.05, *** p<0.01; t statistics are enclosed in parentheses. The table shows the results of Pearson's pairwise correlation coefficients between the examined variables. Data from 6 state-owned banks in Bangladesh from 2015 to 2025 is utilized.

5.3 Test of Heteroscedasticity

5.3.1 Model 1

The Breusch-Pagan/Cook-Weisberg test for heteroskedasticity provided a Chi-square value of 7.72 with a p-value of 0.0055 which implies that it has significance level of 1% which means that null hypothesis is rejected and there is presence of heteroskedasticity problem to solve this problem robust standard errors is applied. Also, Feasible Generalized Least Squares has been applied for addressing this problem.

Table 5.3.1: Breusch–Pagan/Cook–Weisberg test for heteroskedasticity

Breusch–Pagan/Cook–Weisberg test for Heteroscedasticity in dataset	
chi2(1)	7.72
P-value	0.0055

Source: Based on results generated by STATA 18.0

5.3.2 Model 2

The Breusch-Pagan/Cook-Weisberg test for heteroskedasticity provided a Chi-square value of 0.51 with a p-value of 0.4742 which implies that it exceeds the significance level of 1% which means that null hypothesis is failed to be rejected and there is no presence of heteroskedasticity problem.

Table 5.3.2: Breusch–Pagan/Cook–Weisberg test for heteroskedasticity

Breusch–Pagan/Cook–Weisberg test for Heteroscedasticity in dataset	
chi2(1)	0.51
P-value	0.4742

Source: Based on results generated by STATA 18.0

5.4. Test of autocorrelation

Model 1

The Wooldridge test for autocorrelation in panel data yielded a p-value of 0.8384 which exceeds the 5% level of significance implying that null hypothesis of first-order autocorrelation cannot be rejected. Therefore, this regression model has no autocorrelation problem.

Table 5.4.1: Output of Wooldridge test for autocorrelation

Wooldridge test for autocorrelation in panel data	
H0: no first order autocorrelation	
F (1, 5)	0.046
P value	0.8384

Source: Based on results generated by STATA 18.0

Model 2

The Wooldridge test for autocorrelation in panel data yielded a p-value of 0.0027 which doesn't exceed the 5% level of significance or it is significant at 1% level of significance implying that null hypothesis of first-order autocorrelation can be rejected. Therefore, this regression model has autocorrelation problem. To solve this problem robust standard errors has been applied. Also, Feasible Generalized Least Squares (GLS) has been applied for addressing this problem.

Table 5.4.2: Output of Wooldridge test for autocorrelation

Wooldridge test for autocorrelation in panel data	
H0: no first order autocorrelation	
F (1, 5)	30.452
P value	0.0027

Source: Based on results generated by STATA 18.0

5.5 Test of Multi-Collinearity

The following table 4.5 shows the Output of Variance Inflation Factor (VIF). This analysis is conducted with the purpose of identifying the multicollinearity problem for explanatory variable of the regression model. After analyzing it is found that the mean VIF is 2.11 which implies that the regression model should not face any necessary issue or challenge regarding this.

Table 5.5: Output of Variance Inflation Factor

Variable	VIF	1/VIF
Non-performing loan	2.23	0.447896
Size	1.78	0.563168
Capital adequacy ratio	1.84	0.543540
Loan to deposit ratio	3.14	0.367488
Liquidity ratio	2.72	0.367488
GDP Growth	1.07	0.936068
Inflation	2.01	0.498037
Mean VIF 2.11		

Source: Based on results generated by STATA 18.0

5.6 Results of Regression Analysis

To determine the impact of firm specific factors on bank profitability and credit risk, fixed effects panel regression analysis is used. Moreover, the pooled OLS model was also solicited along with the above-mentioned analysis. To identify the relationship between profitability and credit risk as well as other financial indicators which have their influence through using panel data of state-owned banks of banks of Bangladesh over the period of 2015-2024. Return on asset and non-performing loan are the explained variable while explanatory variables are bank size, capital adequacy ratio, loan to deposit ratio, liquidity ratio, GDP growth and inflation. Here the bidirectional relationship is also tried to be explained through the analysis.

In this research study, two econometric model have been applied. Fixed effect model and pooled Ordinary Least Squares (OLS) model have been depicted here. Some diagnostic tests such as multicollinearity, heteroscedasticity, serial correlation, autocorrelation have been performed. Heteroscedasticity and autocorrelation have been found. Robust standard errors and Feasible

Generalized Least Squares have been applied for addressing autocorrelation and heteroskedasticity problem.

The regression analysis demonstrates a significant negative impact of NPL on ROA that shows that the hypothesis 1 is rejected proving that there is significant relationship between return on asset (ROA) and non-performing loan (NPL). Both impacts each other negatively and that is significant. Capital adequacy ratio has positive significant impact on return on asset on both fixed effect model and pooled OLS model. Bank size has positive significant impact on return on asset with coefficient of .5040958. Loan to deposit ratio has negative significant impact on return on asset while it has positive significant impact on NPL on 1% level of significance with coefficient of .55 that rejects the hypothesis proving that loan to deposit ratio has significant relationship with both ROA and NPL in pooled OLS model. Liquidity ratio has positive significant relationship with NPL with coefficient of 4.627 in model II at 1% level of significance. It has also significant relationship with return on asset as well with coefficient of .13194 in model I.

In model I inflation has positive significant relationship with NPL, in model II it has positive significant influence on return on asset (ROA) with 5% level of significance with coefficient of .124, it has positive significant impact on non-performing loan at with 1% level of significance with coefficient of 2.771, indicating that macro factor such as inflation do have significant relationship with ROA and NPL.

Overall, the regression analysis demonstrate that profitability of state-owned banks is significantly affected by non-performing loan, in essence, both have significant negative influence on each other. Bank size, capital adequacy, loan to deposit ratio and liquidity ratio have their significant impact at different level of significance, while macro factor, inflation has its significant impact on both return on asset (ROA) and non-performing loan (NPL). But GDP growth is not found to have that significance on any of these explained variable.

Table 5.6.1: Output of P-values models (Pooled ordinary least square [OLS] and Fixed effect

Variables	Model I Fixed effect model		Model II Pooled OLS model	
	ROA (T-stat)	NPL (T-stat)	ROA (T-stat)	NPL (T-stat)
Return on asset		0.76 (2.309462)	-	-2.88*** (-7.665)
Non-performing loan	0.76 (.0051908)		-2.88*** (-.018)	-
Size	1.76* (.5040958)	0.45 (2.777682)	1.18 (.054)	-0.90 (-.851)
Capital adequacy ratio	2.48** (.0485687)	1.44 (-.6176951)	6.77*** (0.072)	1.56 (.457)
Loan to deposit ratio	-0.99 (-.0088587)	0.17 (.0328247)	-1.82* (-.013)	4.07*** (.55)
Liquidity ratio	2.01* (.13194)	1.03 (1.473546)	.32 (.026)	2.91*** (4.627)
GDP growth	0.83 (.0363382)	1.46 (1.322581)	0.87 (.049)	1.34 (1.55)
Inflation	1.60 (.071634)	1.87* (1.750485)	2.49** (.124)	2.73*** (2.771)
Constant	-2.17** (-7.583286)	-0.35 (1.750485)	-0.98 (-1.275)	-2.26** (-58.838)
F stat	0.1005 (1.85)	0.0000*** (8.43)	0.0000*** (20.46)	0.000*** (11.809)
Adj. R^2/ R^2	0.2157	0.2571	0.6978	0.5619
No. Of observation	60	60	60	60

Statistically Significant *p<0.10, **p<0.05, *** p<0.01; t statistics are enclosed in parentheses.

Notes: The table shows the results of regression analysis of 6 state-owned banks in Bangladesh using data from 2015 to 2024. Model-I shows the results of Fixed effects model and Model- II shows the results from the Pooled OLS model. Additionally, the 'robust standard error' method is applied to both tests.

5.6.2 Summary of Hypothesis testing

The below table describes the summary of null hypothesis of the study:

Table 5.6.2 Hypothesis Summary

Hypothesis	Decision	Remarks
Ho_1	rejected	Significant relationship
Ho_2	rejected	Significant relationship
Ho_3	rejected	Significant relationship
Ho_4	rejected	Significant relationship
Ho_5	rejected	Significant relationship
Ho_6	Failed to reject	No Significant relationship
Ho_7	rejected	Significant relationship
Ho_8	rejected	Significant relationship
Ho_9	Failed to reject	No Significant relationship
Ho_{10}	rejected	Significant relationship

Source: Author's calculation by Stata 18.00

5.7 Findings

The Findings from analyzing the research study using the data of 6 state-owned banks of Bangladesh are given below:

1. Non-performing loan has significant negative impact on return on asset (ROA) with 1% level of significance. This asserts that when the non-performing loan (NPL) increases, the profitability or return on asset (ROA) decreases.
2. Bank size has positive significant impact on return on asset (ROA) it implies that with the increase of bank size or total asset, the profitability also accelerates.
3. Capital adequacy ratio (CAR) has positive significant impact on return on asset (ROA). That indicates that with the enhancement of Capital adequacy ratio (CAR), the return on asset (ROA) also enhances.
4. Loan to deposit ratio (LDR) has negative significant impact on return on asset (ROA) while it has positive significant impact on NPL on 1% level of significance.
5. Liquidity ratio (LQR) has positive significant relationship with NPL at 1% level of significance. It has significant relationship with return on asset (ROA) as well.
6. Firm specific factors do have their significant impact on credit risk or non-performing loan (NPL).
7. inflation has positive significant relationship with NPL at with 1% level of significance. it has positive significant influence on return on asset (ROA) with 5% level of significance.

CHAPTER 6

Recommendations, Conclusion and Limitation

6.1 Recommendations

On the basis of the analysis through using the data of 6 state-owned banks the following recommendation is suggested below:

1. The state-owned banks of Bangladesh should pay more attention in managing the credit risk through enhancing the efficiency of credit control techniques.
2. The regulatory practice of these state-owned banks should be increased more efficiently.
3. Loan should be monitored effectively in order to sustain the drastic challenge of minimizing bad loan.
4. Internal factors should be taken into consideration to balance financial performance or profitability of state-owned banks.
5. Macro factors should be analyzed more often to keep pace with the trends and maintain profitability.
6. Competent authority should come forward to take appropriate measure to address the problem of classified loan.
7. Some incentives such as interest exemption, lowering the interest rates and expansion of duration of loan repayment could help to minimize this problem.

This problem of classified loan should be addressed in order to sustain in the long run. For a developing country like Bangladesh, government should pay more attention in this subject and employ competent authority to solve this or minimize this problem. The above recommendation can be taken into consideration while preventing this problem.

6.2 Conclusion

Credit risk cannot be eliminated completely but this trouble can be minimized or prevented, the banks must take corrective steps to measures to address this problem of non-performing loan. Some incentives can be offered which will motivate the payers to pay the loan and not make it bad loan. Some incentives such as interest exemption, lowering the interest rates and expansion of duration of loan repayment could help to minimize this his problem. The empirical analysis of these research study has asserted that non-performing loan drastically hampers the pace of financial performance or profitability which enables the researcher to suggest that appropriate measures should be taken into consideration. Fixed effect model and pooled OLS model is depicted in this study.

From the analysis it is found that for sustaining in the long run, these factors influencing the explained variables, should be the in the focus of the competent authority so that the financial performance or profitability is maintained appropriately. For a developing economy of Bangladesh these troublesome activities should be addressed. Previous researchers have generated several findings and concluded with the suggestion that non-performing loan should be handled appropriately with a view that it would balance the financial performance of the state-owned banks.

The study's results have pointed out a number of important interactions for the regulatory and management spheres of the banking sector in Bangladesh. It is also possible that the banks following the Basel III capital and liquidity buffer standards will realize the shocking bad debts less, thereby gradually gaining the confidence of the entire financial system. The results also indicate that, particularly for the large banks, improvements in cost efficiency through technology, digital, and governance changes are going to be the way out. To be on the safe side during interest rate fluctuations, it might be a good idea to have an income mix that includes not only interest but also fintech ventures among others. Finally, the highlighted factor is that the effective credit risk management can help balancing sustainable development and financial indicators such as both the bank specific and macro factors influence the profitability and credit risk of the state-owned banks of banks of Bangladesh.

6.3 Limitations of the Study

It is quite normal for every study to have some limitations. Thus, this study has some as well. The limitations are given below:

- Some sophisticated econometric techniques for analyzing such as dynamic panel models, Generalized Method of Moments (GMM), or Vector Autoregression (VAR) could be used which will assert better understanding of the analysis to both researcher and reader as well.
- A cross-country comparative study which includes not only the other South Asian economies but also the whole region may give a wider regional outlook on the profitability and credit risk.
- Other comparison among various foreign and private commercial banks across the world could be done.
- Not only these factors of these models but also some other factors such as management efficiency, corporate governance, and regulatory policies could be incorporated in the model.
- The study uses only data of a decade but could have included more data of extended periods.

6.4 Future Research Directions

The research study provides considerable insights regarding the financial indicator influencing the profitability and credit risk. In future, Generalized Method of Moments (GMM), or Vector Autoregression (VAR) can be explored to provide a better understanding of the analysis. Extended periods can be taken for the analysis and more variables can be considered. Various foreign banks across the world and domestic commercial banks can be used.

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Serial no.	Names of the websites	Links
1	Google Scholar	https://scholar.google.com/
2	ResearchGate	https://www.researchgate.net/
3	Sonali Bank PLC	https://www.sonalibank.com.bd/
4	Janata Bank PLC	https://www.jb.com.bd/
5	Agrani Bank PLC	https://www.agranibank.org/
6	Rupali Bank PLC	https://rupalibank.com.bd/
7	BASIC Bank PLC	https://basicbankplc.com/
8	BDBL (Bangladesh Development Bank PLC)	https://bdbl.com.bd/

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Appendix

1. List of sample banks

Serial no.	Banks
1	Sonali Bank PLC
2	Janata Bank PLC
3	Agrani Bank PLC
4	Rupali Bank PLC
5	BASIC Bank PLC
6	BDBL (Bangladesh Development Bank PLC)

2. Results of Hausman test

Model 1:

Hausman test for fixed and random effect model	
Chi2	25.74
Prob > chi2	0.0001

Model 2:

Hausman test for fixed and random effect model	
Chi2	24.59
Prob > chi2	0.0002