

Internship Report
On
**“The Effects of Credit Management on the Financial Performance: An
Empirical Study of Agrani Bank PLC”**



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Letter of Transmittal

20 April 2026

To

Manjurul Alam Mazumder

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Subject: Submission of Internship Report on “The Effects of Credit Management on the Financial Performance of Agrani Bank PLC”

Honourable Sir,

With due respect, I would like to state that I am submitting my internship report titled “**The Effects of Credit Management on the Financial Performance of Agrani Bank PLC**” as a partial requirement for the completion of my Bachelor of Business Administration (BBA) program. The main objective of this report is to analyse how Credit Management (NPL) influences the financial performance of Agrani Bank PLC, particularly focusing on Return on Assets (ROA). This report is based on secondary data collected from annual reports and relevant financial sources, and analysed using statistical tools.

I have tried my best to prepare this report in a comprehensive and informative manner by including all relevant information and analysis. This internship has been a valuable learning experience for me, allowing me to gain practical knowledge and insights into the banking sector.

I would be highly grateful if you kindly accept my report. I will be glad to provide any further clarification if required.

Sincerely yours,

Abdulla Al Mohammad Momin

ID No: 12117059

Session: 2020-2021

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Acknowledgement

First of all, I would like to express my sincere gratitude to Almighty Allah for giving me the strength and ability to complete this internship report successfully. I would like to convey my heartfelt thanks to my respected supervisor, Manjurul Alam Mazumder, Associate Professor, Department of Finance and Banking, Comilla University, for his valuable guidance, continuous support, and constructive suggestions throughout the preparation of this report. I am also grateful to the branch manager and officials of Agrani Bank PLC, Tomsombridge Branch, Cumilla for their kind cooperation and assistance during my internship period.

Student Declaration

I solemnly declare that the work presented in this Internship Report on “**The Effects of Credit Management on the Financial Performance of Agrani Bank PLC**” is an original work done by me under the supervision of my honourable teacher, Manjurul Alam Mazumder, Associate Professor, Department of Finance and Banking, Comilla University. No part of this report has been previously submitted to any other university or institution for any degree or diploma. I also declare that this report does not contain any material previously published or written by others, except where due reference has been made in the text.

I further declare that I shall be responsible for any loss or damage arising from any breach of the above statement.

Abdulla Al Mohammad Momin

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Session: 2020-2021

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Supervisor Declaration

This is to certify that the internship report titled “**The Effects of Credit Management on the Financial Performance of Agrani Bank PLC**” has been prepared by Abdulla Al Mohammad Momin, ID No:12117059, Session: 2020-2021, Department of Finance and Banking, Comilla University, as a partial fulfilment of the requirements for the degree of Bachelor of Business Administration (BBA).

The report has been completed under my supervision and guidance. To the best of my knowledge, this report is an authentic work carried out by the student.

Manjurul Alam Mazumder

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Abstract

This study investigates the effects of credit management on the financial performance of Agrani Bank PLC, a leading state-owned commercial bank in Bangladesh. Given the rising concerns over asset quality in the national banking sector, the research focuses on how credit risk indicators influence profitability, measured by Return on Assets (ROA). The study utilizes secondary financial data spanning a ten-year period from 2015 to 2024. To ensure the reliability of the statistical findings and mitigate the impact of extreme values, the data was Winsorized at the 10% level.

The methodology employs a panel data approach, where a Random Effects Model (REM) was selected as the most appropriate estimator based on the Hausman test. The empirical results reveal that Non-Performing Loans (NPL) have a statistically significant negative impact on ROA ($p = 0.009$), confirming that poor credit quality is the primary driver of declining profitability. Other control variables, including Capital Adequacy Ratio (CAR), Cost to Income Ratio (CIR), Loan to Deposit Ratio (LDR), and Net Interest Margin (NIM), showed statistically insignificant relationships with performance during the observed period. The findings suggest that simply maintaining high capital levels is insufficient to guarantee financial stability if credit risk remains unmanaged. The study recommends that Agrani Bank PLC should implement more stringent credit appraisal processes, enhance its loan recovery mechanisms, and prioritize the reduction of classified loans to ensure long-term sustainable growth and improved financial performance.

Keywords: Credit Management, Non-Performing Loans (NPL), Financial Performance, Return on Assets (ROA), Agrani Bank PLC, Random Effects Model.

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Chapter – One

Introduction

1.1 Introduction

The banking industry is regarded as the backbone of a nation's financial system, as it plays a crucial role in mobilizing savings, facilitating investment, and supporting economic growth. One of the most important functions of banks is credit creation, which involves lending funds to individuals and businesses. Therefore, effective credit management is essential to ensure the quality of loans, minimize default risk, and maintain financial stability. Credit management refers to the process by which banks assess borrowers, monitor loan performance and ensure timely recovery of loans. Poor credit management often leads to an increase in Non-Performing Loans (NPL), which significantly reduces profitability and weakens the financial position of banks. On the other hand, efficient credit management enhances asset quality and improves overall financial performance. In modern banking, profitability and risk management are closely interrelated. While lending activities generate income, they also expose banks to credit risk. Therefore, maintaining a balance between risk and return is essential for sustainable banking operations. In this context, internal factors such as Non-Performing Loans (NPL), Cost-Income Ratio (CIR), Loan-to-Deposit Ratio (LDR), and Net Interest Margin (NIM) play a significant role in determining bank performance. This study aims to examine the effects of credit management on the financial performance of Agrani Bank PLC, using Return on Assets (ROA) as a measure of financial performance over the period from 2015 to 2024.

1.2 Background of the Study

Following the global financial crises, international regulatory bodies such as the Basel Committee on Banking Supervision introduced various frameworks (Basel I, II, and III) to strengthen the stability of the banking sector. These frameworks emphasize risk management, capital adequacy and effective credit control to ensure the soundness of financial institutions. In Bangladesh, the central bank has implemented Basel III guidelines to enhance financial discipline and risk management practices in the banking industry. Despite these regulatory improvements, state-owned commercial banks continue to face significant challenges, particularly in managing credit risk. Agrani Bank PLC, as one of the leading state-owned banks has experienced issues such as high levels of Non-Performing Loans (NPL), weak loan recovery mechanisms, and operational inefficiencies. These challenges directly affect the bank's profitability and overall financial performance. In this context effective credit management has become a critical concern for ensuring financial stability and improving bank

performance. Poor credit management leads to an increase in default loans, which reduces income and requires higher provisioning, ultimately lowering profitability. On the other hand, efficient credit risk assessment, monitoring and recovery practices can enhance asset quality and improve financial outcomes. This study focuses on examining the effects of credit management on financial performance, while considering key internal financial variables such as Non-Performing Loans (NPL), Cost to Income Ratio (CIR), Loan to Deposit Ratio (LDR), and Net Interest Margin (NIM) to provide a comprehensive understanding of the determinants of financial performance.

1.3 Objectives of the Study

1.3.1 Main Objectives

The main objective of this study is to examine the impact of Credit Management on Financial Performance of Agrani Bank PLC, measured by Return on Assets (ROA), during the period 2015–2024.

1.3.2 Specific Objectives

The specific objectives study are as follows:

1. To analyse how Non-Performing Loans (NPL) affect the profitability of the bank.
2. To investigate the trend and fluctuations of the Capital Adequacy Ratio of Agrani Bank PLC throughout the study period.
3. To assess the correlation between CAR and Return on Assets (ROA).
4. To analyse how Non-Performing Loans (NPL) affect the profitability of the bank.
5. To evaluate the influence of the Cost to Income Ratio (CIR) on operational efficiency and overall performance.
6. To explore the effect of the Loan to Deposit Ratio (LDR) on the earning potential of the bank.
7. To identify the significance of the Net Interest Margin (NIM) in clarifying the overall performance of the bank.

1.4 Significance of the Study

This study possesses both academic and practical significance. From an academic perspective, it contributes to the existing body of knowledge by providing empirical evidence on the relationship between credit management and bank performance, particularly in the context of a state-owned commercial bank in Bangladesh. It also enhances understanding of how credit risk indicators, especially Non-Performing Loans (NPL), influence profitability.

From a practical standpoint, the findings of this study may assist various stakeholders including:

1. Bank management, in improving credit risk assessment, loan monitoring, and recovery strategies to enhance financial performance.
2. Regulatory authorities, such as Bangladesh Bank, in evaluating the effectiveness of credit risk management policies and strengthening supervision over loan classification and provisioning.
3. Investors and stakeholders, in gaining better insights into the credit risk exposure and financial stability of Agrani Bank PLC.
4. Moreover, since state-owned banks play a vital role in financing government projects and supporting rural and agricultural development, assessing their credit management practices is essential for ensuring the stability and sustainability of the overall banking sector.

1.5 Scope of the Study

The scope of this study is focused on the credit management efficiency and its impact on the financial performance of Agrani Bank PLC. The study covers a ten-year period from 2015 to 2024, using secondary financial data collected from the annual reports of Agrani Bank PLC and publications of Bangladesh Bank. The analysis focuses on one dependent variable Return on Assets (ROA), and five independent variables: Non-Performing Loans (NPL) as the primary indicator of credit management, along with CAR, CIR, LDR, and NIM as supporting factors. Statistical analysis, including descriptive statistics, correlation, and multiple regression (Random Effects Model), is conducted using Stata software to examine how loan quality and credit risk influence the bank's profitability.

1.6 Limitations of the Study

Notwithstanding the valuable insights offered by this study, it is important to acknowledge several limitations:

1. The research is entirely dependent on secondary data. Which may be prone to reporting errors or inconsistencies in the bank's annual reports.
2. The focus on a single bank Agrani Bank PLC constrains the ability to generalize the findings to the broader banking sector of Bangladesh.
3. While the study captures the dynamics of credit management over a ten-year timeframe, it may not fully reflect long-term structural changes or policy shifts in the national banking industry.
4. Macroeconomic variables such as inflation, GDP growth, and interest rates, which can influence credit recovery and asset quality, have been excluded due to constraints related to data availability and time.
5. Lastly the study employs solely quantitative analysis and does not integrate qualitative perspectives such as the internal credit appraisal processes or expert opinions from bank officials.

Chapter – Two

Organisational Profile of Agrani Bank PLC

2.1 Vision

The vision of Agrani Bank PLC is to establish itself as a leading and trusted state-owned commercial bank in Bangladesh by delivering innovative, customer-focused, and technology-driven financial services. The bank aims to contribute significantly to the country's economic development by maintaining financial stability, ensuring customer satisfaction, and adopting modern banking practices.

2.2 Mission

The mission of Agrani Bank PLC is to provide high-quality banking services through efficient utilization of resources, sound risk management, and strong corporate governance. The bank is committed to achieving sustainable growth, enhancing shareholder value, and supporting the economic progress of Bangladesh by financing key sectors such as agriculture, industry, and trade.

2.3 Core Values

Agrani Bank PLC operates based on several core values that guide its business operations and decision-making process. These include:

Integrity: Maintaining honesty and transparency in all banking activities.

Customer Focus: Ensuring maximum satisfaction for clients through quality services.

Accountability: Taking responsibility for actions and decisions.

Professionalism: Upholding high standards of service and behaviour.

Innovation: Adopting modern technologies and improving service delivery.

Teamwork: Promoting collaboration among employees.

These values help the bank build trust among customers and stakeholders.

2.4 Strategic Objectives

The strategic objectives of Agrani Bank PLC focus on strengthening its financial position and improving operational performance. These include:

1. Enhancing capital adequacy and maintaining regulatory compliance.
2. Reducing Non-Performing Loans (NPL) to improve asset quality.
3. Increasing profitability through efficient cost management.
4. Expanding digital banking and online services.
5. Improving customer service quality and satisfaction.

6. Strengthening internal control and risk management systems.

2.5 Corporate Profile

Agrani Bank PLC is one of the largest state-owned commercial banks in Bangladesh. It was established in 1972 after the independence of Bangladesh through the nationalization of two banks. Over the years, the bank has developed a strong presence across the country with a large number of branches and a wide customer base. The bank plays a crucial role in financing major economic sectors including agriculture, industry, export-import trade, and small and medium enterprises (SMEs). It also contributes significantly to foreign remittance inflows and government financial operations.

2.6 Business Areas

Agrani Bank PLC operates in multiple business segments to serve different types of customers:

1. **Retail Banking:** Savings, current accounts, and personal banking services.
2. **Corporate Banking:** Large-scale financing for industries and corporations.
3. **SME Financing:** Loans for small and medium enterprises.
4. **Agricultural Finance:** Support for farmers and rural development.
5. **International Banking:** Foreign trade financing and remittance services.

2.7 Ethical Principles

The bank follows strict ethical principles to maintain transparency and accountability:

1. Compliance with Bangladesh Bank rules and regulations.
2. Ensuring fairness and honesty in all transactions.
3. Preventing fraud, corruption, and money laundering.
4. Protecting customer privacy and confidentiality.

2.8 Key Milestones

1. 1972: Establishment of Agrani Bank after independence.
2. Expansion of branch network nationwide.
3. Introduction of modern banking technologies.
4. Launch of online and digital banking services.
5. Conversion into Public Limited Company (PLC).

2.9 Products Offered by Agrani Bank PLC

Agrani Bank PLC offers a wide range of deposit products:

1. Savings Account.
2. Current Account.
3. Fixed Deposit Receipt (FDR).
4. Deposit Pension Scheme (DPS).
5. Special savings schemes.

These products help customers manage their savings and investments effectively.

2.10 Services Offered by Agrani Bank PLC

The bank provides various services to ensure convenience for customers:

1. ATM and debit card services.
2. Internet and mobile banking.
3. Foreign remittance services.
4. Trade finance and LC services.
5. Online fund transfer.

2.11 Types of Loan

Agrani Bank PLC provides different types of loans to meet customer needs:

1. Personal Loan.
2. SME Loan.
3. Agricultural Loan.
4. Industrial Loan.
5. House Building Loan.
6. Consumer Credit.

2.12 Loan Classification Table

Classification	Time period	Status
Unclassified	Regular	Standards
Substandard	3-6 months overdue	Risky
Doubtful	6-9 months Overdue	High Risk
Bad/Loss	More than 9 months	Default

2.13 Loan Provisioning

Loan provisioning is a mandatory requirement where banks set aside funds against potential loan losses. As per Bangladesh Bank guidelines, higher classified loans require higher provisioning. This reduces the bank's net profit but ensures financial stability.

2.14 Loan Classification and Impact on NPL

Loan classification directly affects the NPL ratio. When loans become overdue and are classified, the NPL ratio increases. A higher NPL negatively impacts profitability, reduces investor confidence, and weakens the financial health of the bank.

2.15 Loan Recovery Method

Agrani Bank PLC adopts several methods for loan recovery:

1. Continuous monitoring and follow-up.
2. Legal action against defaulters.
3. Loan rescheduling and restructuring.
4. Negotiation and set Section.

2.16 Limitations in Loan Advancement Section

Despite its strengths, the bank faces several challenges:

1. Lengthy and bureaucratic loan approval process.
2. Political influence in loan disbursement.
3. Weak monitoring and supervision.
4. High default rate.

2.17 Credit Rating

Agrani Bank PLC is evaluated by credit rating agencies based on its financial performance and risk exposure. The rating indicates moderate financial strength but highlights areas for improvement, particularly in asset quality and profitability.

2.18 Corporate Social Responsibility (CSR)

The bank actively participates in CSR activities, including:

1. Educational scholarships.
2. Healthcare support.
3. Disaster relief programs.
4. Environmental protection initiatives.
5. These activities enhance the bank's social image and responsibility.

4.19 SWOT Analysis

Strengths:

1. Strong government support.
2. Large branch network.
3. Wide customer base.

Weaknesses:

1. High NPL ratio.
2. Operational inefficiency.
3. Slow decision-making.

Opportunities:

1. Growth of digital banking.
2. Expansion in SME sector.
3. Increasing remittance inflow.

Threats:

1. Strong competition from private banks.
2. Economic uncertainty.
3. Regulatory pressure.

Chapter – Three

Literature Review and Research Gap

3.1 Literature Review

The relationship between credit management and financial performance has been widely examined in banking literature across both developed and developing economies. Credit management refers to the process by which banks manage their loan portfolio, assess credit risk, and ensure timely recovery of loans. Effective credit management plays a crucial role in maintaining asset quality and enhancing profitability. Return on Assets (ROA) is commonly used as a measure of financial performance, reflecting how efficiently a bank utilizes its assets to generate earnings. One of the most important indicators of credit management is Non-Performing Loans (NPL), which represents loans that are not generating income. A higher NPL ratio indicates poor credit management and increased credit risk, which negatively affects bank profitability.

Berger (1995) found that poor asset quality reduces bank earnings and increases financial vulnerability. Similarly, Athanasoglou, Brissimis, and Delis (2008) reported that credit risk, measured by NPL, has a significant negative impact on bank profitability.

Goddard, Molyneux, and Wilson (2004) analysed European banks and concluded that higher levels of problem loans reduce profitability, while efficient cost management enhances performance. Supporting this view, Dietrich and Wanzenried (2011) found that asset quality and credit risk management are key determinants of bank profitability, especially during periods of financial instability.

Flamini, McDonald, and Schumacher (2009) examined banks in Sub-Saharan Africa and reported that credit risk significantly influences profitability, where higher NPL ratios lead to lower returns. Similarly, Petria, Capraru, and Ihnatov (2015) confirmed that asset quality and credit risk are critical factors affecting bank performance in European Union countries.

In emerging economies, several studies emphasize the importance of effective credit management. Dauda (2018) found that proper credit risk management significantly improves bank performance in Nigeria. Ani et al. (2012) also reported that NPL has a strong negative relationship with profitability, while other factors such as capital adequacy show weaker effects.

Singh and Sharma (2019), using panel data analysis for Indian banks, found that credit risk, particularly NPL, significantly reduces profitability, while efficient loan utilization improves financial performance.

Ongore and Kusa (2013) similarly found that credit risk negatively affects bank performance in Kenya, highlighting the importance of maintaining asset quality. Operational efficiency also plays an important role in credit management.

Oliveira and Costa (2020) found that higher Cost-Income Ratio (CIR) reduces profitability, indicating inefficiency in bank operations. Sufian and Habibullah (2009) also confirmed that cost efficiency is a significant determinant of bank profitability in developing economies.

In addition, liquidity management is closely related to credit management. The Loan-to-Deposit Ratio (LDR) reflects how effectively banks utilize deposits for lending purposes. Bawumia et al. (2019) found that LDR has a mixed effect on profitability, as efficient loan utilization increases income, but excessive lending increases liquidity risk.

Net Interest Margin (NIM) is another important factor influencing bank performance. Alam, Rifat, and Hosen (2020) found that NIM positively affects profitability, as higher interest income improves bank earnings. Similarly, Islam and Nishiyama (2016) reported that internal bank-specific factors, including interest margin and credit risk, significantly influence profitability in developing countries.

In the context of Bangladesh, several studies highlight the importance of credit management in determining bank performance. Rahman and Akhter (2015) found that asset quality and credit risk significantly influence profitability in commercial banks. Hossain (2018) reported that NPL has a strong negative impact on ROA, indicating poor credit management practices. These findings are particularly relevant for state-owned banks, which often face higher default rates and operational inefficiencies compared to private banks.

Miller Stephen M. and Noulas Athanasios G. (1997) examined U.S. banks and found that poor loan quality significantly reduces profitability, highlighting the importance of effective credit management.

Keeton William R. (1999) analysed loan losses in U.S. banks and reported that rapid loan growth often leads to higher default rates, indicating weak credit risk assessment.

Salas Vicente and Saurina Jesús (2002) studied Spanish banks and found that credit risk, particularly NPL, has a strong negative effect on profitability. Louzis Dimitrios P., Vouldis Angelos T., and Metaxas Vasilios L. (2012) analysed Greek banks and found that macroeconomic conditions and poor credit management significantly increase NPL levels. Klein Nir (2013) examined Central and Eastern European banks and reported that weak credit management practices lead to higher NPL and lower profitability.

Abreu Margarida and Mendes Victor (2002) found that operational inefficiency and poor credit allocation negatively affect bank performance. Bikker Jacob A. and Hu Haizhou (2002) emphasized that cost efficiency and risk management are key determinants of profitability in commercial banks. Rajan Raghuram G. (1994) argued that weak credit policies and poor borrower screening increase default risk, which ultimately reduces bank profitability.

Foos Daniel, Norden Lars, and Weber Martin (2010) found that excessive loan growth increases credit risk and negatively affects bank stability and performance. Curak Marijana, Pepur Sanda, and Poposki Klime (2012) found that credit risk and operational inefficiency significantly reduce bank profitability in South-eastern Europe.

Alper Deger and Anbar Adem (2011) analysed Turkish banks and found that asset quality and cost efficiency are major determinants of bank performance. Saeed Muhammad Shahid (2014) examined Pakistani banks and reported that credit risk negatively affects profitability, while efficient loan management improves performance.

Overall, empirical evidence suggests that Credit Management generally exerts a positive influence on Return on Assets (ROA), although the strength and statistical significance vary across countries and economic conditions. Non-Performing Loans (NPL) consistently show a negative relationship with profitability due to increased credit risk and provisioning costs. Net Interest Margin (NIM) positively contributes to profitability by enhancing interest income, while Cost-Income Ratio (CIR) negatively affects ROA due to operational inefficiencies. The effect of Loan-to-Deposit Ratio (LDR) remains mixed, depending on liquidity management

efficiency and risk exposure. In Bangladesh, most studies focus on the overall banking sector rather than a specific bank. However, state-owned banks play an important role in the financial system and often face different operational challenges compared to private commercial banks. Therefore, examining the effect of capital adequacy on the performance of Agrani Bank PLC over the period 2015–2024 will provide more specific and updated insights.

3.2 Research Gap

Although a substantial number of empirical studies have examined the relationship between credit management and financial performance, several research gaps still exist. Most prior studies have primarily focused on the overall banking sector across different countries, without giving sufficient attention to individual banks. In particular, limited research has been conducted on state-owned commercial banks, which operate under different structural, operational, and regulatory conditions compared to private banks.

Furthermore, existing studies in the context of Bangladesh have largely analysed the impact of broad financial indicators such as capital adequacy, liquidity, and profitability at an aggregate level. However, few studies have specifically emphasized credit management practices, especially in terms of loan quality, recovery mechanisms, and their direct effect on financial performance within a single bank.

In addition, many previous studies rely on cross-sectional or short-term panel data, which may not adequately capture the long-term dynamics of credit management and its impact on bank performance. There is a lack of recent time-series-based analysis that reflects the current financial condition and evolving credit risk environment of banks in Bangladesh.

Moreover, while Non-Performing Loans (NPL) are widely recognized as a key indicator of credit risk, limited studies have integrated multiple internal factors such as Cost-Income Ratio (CIR), Loan-to-Deposit Ratio (LDR), and Net Interest Margin (NIM) simultaneously to provide a comprehensive understanding of financial performance.

Therefore, this study attempts to fill these gaps by focusing on a single state-owned commercial bank, Agrani Bank PLC, and examining the effects of credit management on financial performance using recent time-series data from 2015 to 2024. By incorporating multiple bank-specific variables and applying econometric analysis, this study provides updated and bank-specific insights that contribute to the existing literature.

Chapter- Four

Research Methodology

4.1 Research Design

This research employs a quantitative and explanatory methodology to investigate how credit management practices influence the financial performance of Agrani Bank PLC. Time series data spanning a decade (2015–2024) has been gathered from the bank’s annual reports to ensure the reliability of the study. In this research design, the Return on Assets (ROA) is chosen as the dependent variable to represent financial performance. The Non-Performing Loan (NPL) ratio serves as the primary independent variable representing the effectiveness of credit management, while other factors such as Capital Adequacy Ratio (CAR), Cost-to-Income Ratio (CIR), Loan-to-Deposit Ratio (LDR), and Net Interest Margin (NIM) are included as control variables. An econometric approach is utilized, specifically employing Panel Data Regression analysis (Random Effects Model) in Stata to explore the statistical relationships among these variables. This design facilitates the examination of historical trends and enables a robust assessment of how credit risk and management quality affect the bank's overall profitability.

4.2 Population and Sample

“Population is all commercial banks in Bangladesh, but my sample is Agrani Bank PLC with 10-year time-series data.”

4.3 Sampling Design

The research utilizes purposive sampling, concentrating on Agrani Bank PLC, a single state-owned commercial bank, because of its important position in Bangladesh’s banking industry and the accessibility of reliable financial data. The sample includes 10 annual observations spanning from 2015 to 2024. This study employs year-wise financial data gathered from verified annual reports.

4.4 Sample and Sample Size

The sample of this study consists of Agrani Bank PLC, selected purposively. The sample size includes 10 annual observations covering the period from 2015 to 2024, where each observation represents one financial year.

4.5 Data Source and Collection

All of the secondary data used in this study came from reputable, publicly accessible sources. The annual reports of Agrani Bank PLC for the years 2015 to 2024 provided financial information on variables like Return on Assets (ROA), Non-Performing Loan Ratio (NPL), Cost to Income Ratio (CIR), Capital Adequacy Ratio (CAR), Loan to Deposit Ratio (LDR), and Net Interest Margin (NIM). When needed, World Development Indicators (WDI), Bangladesh Bank, and the Bangladesh Bureau of Statistics (BBS) publications have provided additional statistics and supporting material. Before being imported into Stata software for additional statistical analysis, the gathered data was initially arranged and processed using Microsoft Excel.

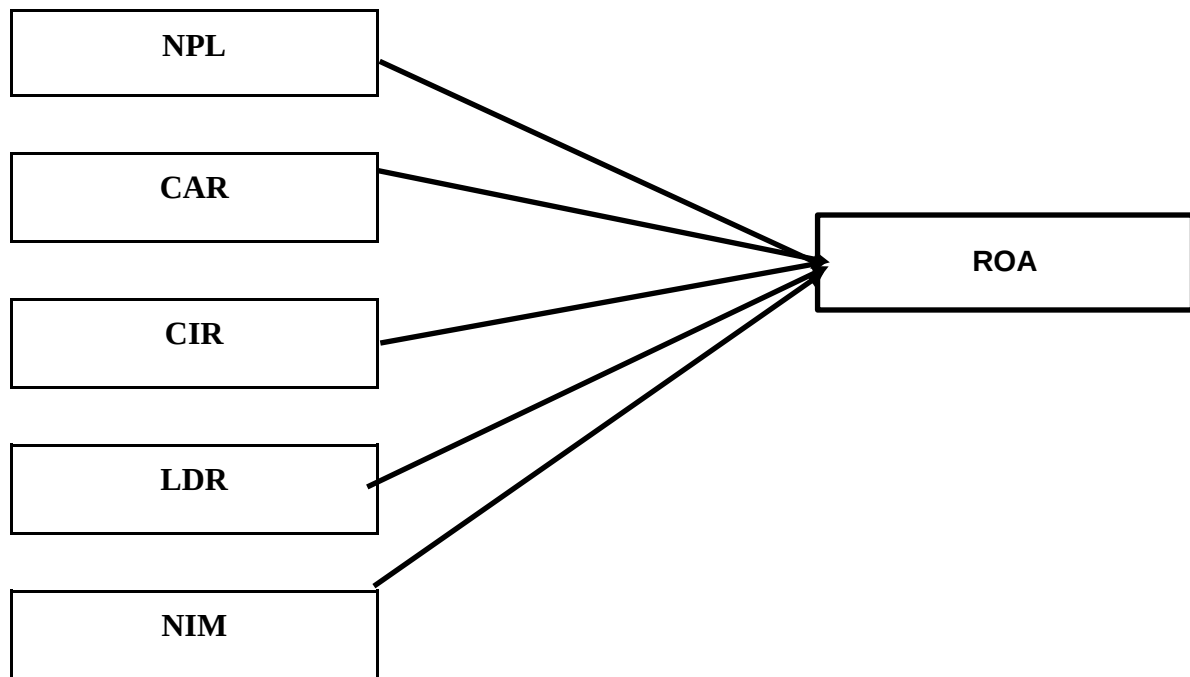
4.6 Methods of Data Analysis and Tools

The study uses a number of statistical methods to examine the connection between credit management sufficiency and financial performance:

1. Using descriptive statistics to comprehend the distribution and trend of variables.
2. Using correlation analysis to assess the direction and strength of links.
3. Using multiple linear regression analysis to assess how independent variables affect ROA.

Stata software, which is frequently used for econometric and financial research, has been used for all statistical analysis.

4.7 Conceptual Framework



The conceptual framework of this study demonstrates the relationship between credit management practices and the financial performance of Agrani Bank PLC. The primary independent variable used to assess the effectiveness of credit management is the Non-Performing Loan (NPL) ratio, while the dependent variable is Return on Assets (ROA), representing profitability. To capture a comprehensive view of the bank's performance, additional financial indicators such as Capital Adequacy Ratio (CAR), Cost to Income Ratio (CIR), Loan to Deposit Ratio (LDR), and Net Interest Margin (NIM) are included as control variables. This framework illustrates how credit quality and risk mitigation directly influence the overall financial stability and earnings of the bank.

Where:

Return on Assets (RoA) = Dependent variable

Non-performing Loan (NPL) = Main Independent variable

Capital Adequacy Ratio (CAR), Cost to Income Ratio (CIR), Loan to Deposit Ratio (LDR),

Net Interest Margin (NIM) = Control Variable

Return on Assets (ROA) – Dependent Variable

Return on Assets (ROA) is used as the dependent variable to measure the financial performance of the bank. It indicates how efficiently a bank utilizes its total assets to generate profit. A higher ROA reflects better profitability and efficient management of assets.

Non-Performing Loan (NPL) – Independent Variable

Non-Performing Loan (NPL) represents the proportion of loans that are not generating income. A higher NPL ratio indicates poor credit management and increased default risk. Therefore, NPL is expected to have a negative impact on bank performance (ROA).

Capital Adequacy Ratio (CAR) – Independent Variable

Capital Adequacy Ratio (CAR) measures the bank's capital strength and its ability to absorb financial losses. A higher CAR indicates a more stable and secure bank, which is expected to positively influence profitability. However, excessive capital may also reduce returns if not utilized efficiently.

Cost to Income Ratio (CIR) – Independent Variable

Cost to Income Ratio (CIR) measures the operational efficiency of a bank. A higher CIR indicates higher operating costs relative to income, which reduces profitability. Hence, CIR is expected to have a negative relationship with ROA.

Loan to Deposit Ratio (LDR) – Independent Variable

Loan to Deposit Ratio (LDR) indicates how effectively a bank uses its deposits to generate loans. A moderate LDR is considered beneficial for profitability, as it reflects efficient lending. However, an excessively high LDR may increase liquidity risk. Generally, LDR is expected to have a positive impact on ROA.

Net Interest Margin (NIM) – Independent Variable

Net Interest Margin (NIM) measures the difference between interest income and interest expenses relative to earning assets. A higher NIM indicates better income generation from lending activities, which positively contributes to bank profitability. Therefore, NIM is expected to have a positive effect on ROA.

4.8 Model Specification

To examine the impact of credit management on financial performance, the following multiple regression model has been used:

$$ROA_t = \beta_0 + \beta_1 NPL_t + \beta_2 CAR_t + \beta_3 CIR_t + \beta_4 LDR_t + \beta_5 NIM_t + \varepsilon_t$$

Where:

ROA = Return on Assets (dependent variable)

NPL = Non-Performing Loan Ratio (main independent variable)

CAR = Capital Adequacy Ratio

CIR = Cost to Income Ratio

LDR = Loan to Deposit Ratio

NIM = Net Interest Margin

β_0 = Intercept

β_1 – β_5 = Coefficients of independent variables

ε = Error term

t = Time(year)

This model helps determine how changes in capital adequacy and other internal factors affect the profitability of Agrani Bank PLC.

4.9 Hypothesis Development

Based on financial theory and previous empirical studies regarding credit management and financial performance, the following hypotheses have been developed for this study:

Main Hypothesis

H₀: Credit management (measured by NPL) has no significant impact on the Return on Assets (ROA) of Agrani Bank PLC.

H₁: Credit management (measured by NPL) has a significant impact on the Return on Assets (ROA) of Agrani Bank PLC.

Specific Hypotheses

- ✓ **H1:** Non-Performing Loans (NPL) have a negative relationship with ROA. (Primary Focus)
- ✓ **H2:** Capital Adequacy Ratio (CAR) has a positive relationship with ROA.
- ✓ **H3:** Cost-to-Income Ratio (CIR) has a negative relationship with ROA.
- ✓ **H4:** Loan-to-Deposit Ratio (LDR) has a positive relationship with ROA.
- ✓ **H5:** Net Interest Margin (NIM) has a positive relationship with ROA.

4.10 Variables Identified

All of the dependent and independent variables used in the analysis are listed below. Furthermore, economic theory has been used to establish predicted relationships.

Variables	Notation	Calculation Procedure	Expected Impact	Data Source
Return on Assets	ROA	Net Income / Total Assets	-	Annual Report
Capital Adequacy Ratio	CAR	Regulatory Capital / Risk Weighted Assets	Positive/ Negative	Annual Report
Non-performing Ratio	NPL	Non-performing Loans / Total Loan	Negative	Annual Report
Cost to Income Ratio	CIR	Operating Cost / Operating Income	Negative	Annual Report
Loan to Deposit Ratio	LDR	Total Loan / Total Deposit	Positive	Annual Report
Net Interest Margin	NIM	Net Interest Income / Earning Assets	Positive	Annual Report

Chapter – Five

Data Analysis

5.1 Descriptive Statistics Analysis

This table shows the central tendency and dispersion of the data.

Statistics	ROA	CIR	NPL	LDR	NIM	CAR
Mean	-0.02	83.439	21.306	65.078	2.776	7.992
Maximum	1.00	90.27	40.49	79.65	4.04	10.24
Minimum	-1.12	78.55	12.46	53.81	1.50	1.86
Obs	10	10	10	10	10	10
Range	2.12	11.72	28.03	25.84	2.54	8.38
skewness	-0.401	0.531	1.280	0.453	-0.019	-1.103
Kurtosis	3.427	2.185	3.855	1.628	1.7667	2.893
Median(p50)	0.11	82.705	18.315	61.90	2.82	9.64

The descriptive statistics provide an essential summary of the data used in this study, reflecting the credit management efficiency and financial performance of Agrani Bank PLC from 2015 to 2024.

Credit Quality (NPL): As the primary indicator of credit management, the Non-Performing Loan (NPL) ratio shows a remarkably high mean of 21.31%, with a maximum reaching 40.49% in recent years. This indicates that a significant portion of the bank's loan portfolio is classified, suggesting challenges in credit recovery and borrower selection. Such a high NPL ratio is a critical concern for the bank's asset quality and overall financial stability.

Profitability (ROA): The Return on Assets (ROA) shows a mean value of -0.02, which signifies that, on average, the bank faced net losses during the period under study. The wide range between the minimum value of -1.12 and the maximum of 1.00 indicates high volatility in earnings, largely driven by the fluctuations in credit losses and provision requirements.

Operational Efficiency (CIR): The mean Cost to Income Ratio (CIR) is 83.44%. This suggests that for every 100 BDT earned, the bank spends over 83 BDT on operating expenses. In the context of credit management, this high ratio reflects the high costs associated with managing a large portfolio of non-performing assets and operational inefficiencies.

5.2 Correlation Matrix

The correlations between the variables and their significance (P-value) are given below.

Variables	ROA	CIR	NPL	LDR	NIM	CAR
ROA	1.000					
CIR	-0.2576	1.000				
NPL	-0.6585	-0.3205	1.000			
LDR	-0.1016	-0.4237	0.5474	1.000		
NIM	0.1442	-0.4179	-0.2476	-0.3397	1.000	
CAR	0.2360	0.2510	-0.7158	-0.8262	0.6709	1.000

The correlation matrix examines the linear relationship between the dependent variable (ROA) and the independent variables representing credit management and financial health.

Dominance of Credit Risk (NPL): There is a strong and statistically significant negative correlation (-0.6585) between Non-Performing Loans (NPL) and ROA. This confirms that credit risk is the most influential factor; as the volume of default loans increases due to weak credit management, the profitability of Agrani Bank significantly declines.

Capital Adequacy (CAR): CAR shows a positive correlation (0.2360) with ROA. This implies that while a stronger capital base generally supports financial stability, its relationship with profitability is much weaker compared to the dominant impact of NPL.

Credit Exposure and Liquidity (LDR): The Loan-to-Deposit Ratio (LDR) shows a negative but weak correlation with ROA. This suggests that aggressive credit exposure (lending) without maintaining asset quality does not translate into higher profits, further emphasizing the need for efficient credit management.

5.3 Linear Regression (Pooled OLS)

Variable	Coefficient	St. Error	P-Value
CIR	-0.0725	0.0463	0.192
NPL	-0.0732	0.0279	0.058*
LDR	-0.0070	0.0196	0.738
NIM	-0.0992	0.369	0.801
CAR	-0.0645	0.169	0.722
Constant	8.7250	3.951	0.092*
R-squared	0.8030		

The Pooled OLS (Ordinary Least Squares) regression was conducted to examine the linear relationship between the independent variables (NPL, CIR, LDR, NIM, and CAR) and the dependent variable, Return on Assets (ROA), for Agrani Bank PLC.

Model Fitness (R-squared): The R-squared value of the model is 0.8030, which indicates that approximately 80.30% of the variation in Return on Assets (ROA) is explained by the independent variables included in the model. This suggests that the model has strong explanatory power in analysing the financial performance of Agrani Bank PLC.

Statistical Significance of the Model: Although the model shows a high R-squared value, the overall statistical significance should be interpreted cautiously based on individual variable significance levels. Among all explanatory variables, only NPL demonstrates marginal statistical significance, while the rest of the variables are statistically insignificant. This implies that not all variables jointly contribute significantly to explaining profitability.

Analysis of Individual Variables:

Non-Performing Loans (NPL): NPL has a negative coefficient (-0.0732) and is statistically significant at the 10% level ($p = 0.058$). This indicates that an increase in non-performing loans leads to a decline in profitability. Specifically, a 1% increase in NPL results in a 0.0732% decrease in ROA, holding other factors constant. This finding highlights that poor credit management negatively affects bank performance.

Capital Adequacy Ratio (CAR): CAR shows a negative coefficient (-0.0645) with a p-value of 0.722, indicating that it is not statistically significant. This suggests that capital adequacy does not have a meaningful impact on profitability during the study period.

Cost to Income Ratio (CIR): CIR has a negative coefficient (-0.0725) and is statistically insignificant ($p = 0.192$). This implies that operational inefficiency, as measured by CIR, does not significantly affect the bank's profitability in this model.

Net Interest Margin (NIM): NIM exhibits a negative coefficient (-0.0992) with a high p-value (0.801), indicating that it is not statistically significant. Therefore, interest income does not play a significant role in determining profitability in this analysis.

Loan to Deposit Ratio (LDR): LDR shows a negative coefficient (-0.0070) and is statistically insignificant ($p = 0.738$). This suggests that liquidity management does not significantly influence the profitability of the bank.

Conclusion of OLS Results: The Pooled OLS results confirm that NPL (Non-Performing Loans) is the primary driver of financial performance for Agrani Bank PLC. The significant negative impact of NPL underscores the urgent need for better credit management to ensure sustainable profitability.

5.4 Multicollinearity Test (VIF Analysis)

Variance Inflation Factor (VIF) is used to detect the presence of multicollinearity among the independent variables. A VIF value greater than 10 generally indicates a serious multicollinearity problem, while values below 5 suggest that multicollinearity is not a concern.

Variables	VIF	1/VIF
CIR	2.27	0.4403
LDR	2.19	0.4557
NIM	2.09	0.4784
NPL	1.51	0.6609

Mean VIF = 2.02

To ensure the reliability of the regression estimates, a Multicollinearity test was conducted using the Variance Inflation Factor (VIF).

VIF Values: The results show that all individual VIF values (ranging from 1.51 to 2.27) and the Mean VIF of 2.02 are well below the commonly accepted threshold of 10.

Conclusion: This indicates that there is no multicollinearity among the independent variables. Therefore, each variable provides unique and independent information to the model, ensuring that the standard errors of the coefficients are not inflated. Initially, multicollinearity was observed due to a high correlation between CAR and LDR. After excluding CAR from the model, the VIF values dropped significantly confirming the absence of multicollinearity.

5.5 Diagnostic Tests (Heteroskedasticity & Hausman)

The tests to verify the reliability of the model are given below:

Test Name	Method	Statistic	Prob>chi2	Result
heteroskedasticity	Breusch-pagan	1.35	0.2456	No heteroskedasticity
Model selection	Hausman test	2.11	0.1459	Random effect is appropriate

Heteroskedasticity (Breusch-Pagan Test): The test yielded a p-value of 0.2456. Since this is greater than the 0.05 significance level, we fail to reject the null hypothesis of constant variance. This confirms that the model is free from heteroskedasticity issues, and the results are stable across the data.

Hausman Test for Model Selection: The Hausman test was performed to decide between Fixed Effects and Random Effects models. The p-value of 0.1459 is greater than 0.05, meaning the null hypothesis (Random Effects is appropriate) is accepted. Thus, the Random Effects Model (REM) is chosen for the final analysis as it provides more efficient estimates for this specific dataset.

5.6 Regression Result of Random Effects Model (REM)

Variables	Coefficients	Std.Error	Z-Value	P-Value
CIR	-0.0725	0.046	-1.57	0.117
NPL	-0.0732	0.027	-2.63	0.009***
LDR	-0.0070	0.196	-0.36	0.720
NIM	-0.0992	0.368	-0.27	0.787
CAR	-0.0645	0.169	-0.38	0.702
Constant	8.7250	3.951	2.21	0.027**

Note: * $p < 0.01$, ** $p < 0.05$, * $p < 0.1$; Standard errors are reported in parentheses. These asterisks indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

The regression analysis was conducted to evaluate the impact of credit management and financial indicators on the Return on Assets (ROA) of Agrani Bank PLC. Based on the Hausman test results, the Random Effects Model (REM) was selected as the most efficient and appropriate model for this study. The variable-wise interpretation is provided below:

Non-Performing Loans (NPL): The coefficient for NPL is -0.0732 with a p-value of 0.009. This indicates that NPL is statistically significant at the 1% level. The negative coefficient implies a strong inverse relationship, meaning that for every 1% increase in non-performing loans, the bank's ROA decreases by 0.0732%. This confirms that poor credit management and deteriorating asset quality are the primary drivers of declining profitability in Agrani Bank.

Capital Adequacy Ratio (CAR): CAR yielded a coefficient of -0.0645 with a p-value of 0.702, making it statistically insignificant. This suggests that during the study period, maintaining the regulatory capital ratio did not have a measurable impact on the bank's profitability, as its influence was the effect of CAR appears weak and statistically insignificant possibly due to the dominant influence of credit risk (NPL) during the study period.

Cost to Income Ratio (CIR): The CIR has a coefficient of -0.0725 and a p-value of 0.117. While negative, the result is statistically insignificant, implying that operational efficiency though important was not the dominant factor affecting ROA compared to the severe impact of credit defaults (NPL). Although CIR shows a negative relationship with ROA, it is not statistically significant, indicating that operational efficiency did not have a strong measurable effect.

Net Interest Margin (NIM) & Loan-to-Deposit Ratio (LDR): Both NIM ($p=0.787$) and LDR ($p=0.720$) were found to be statistically insignificant. This indicates that interest spreads and lending volume relative to deposits did not significantly alter the ROA during the observed years, this suggests that variations in interest margin and lending activity did not significantly influence ROA during the study period.

Why is Credit Management (NPL) More Significant than CAR?

In the case of Agrani Bank PLC, the insignificance of CAR compared to the high significance of NPL can be justified by the following logical reasons:

Overwhelming Impact of NPL (Asset Quality Dominance): The most critical reason is the high volume of NPLs, which averaged 21.31%. The negative impact of these default loans is so massive that it completely overshadows any potential contribution from the capital base. This proves that Credit Management is the ultimate predictor of performance for this bank.

Regulatory Compliance vs. Profitability: As a state-owned bank, Agrani Bank maintains CAR primarily to meet central bank mandates (Basel III) through government recapitalization. Since it is a compliance-driven measure rather than a profit-generating tool, it shows no direct link to ROA.

Inefficient Capital Utilization: A large portion of the bank's capital is held as a buffer or provision against bad loans rather than being utilized in high-yield assets, neutralizing its impact on profitability.

Summary: While CAR remains vital for solvency, the financial performance of Agrani Bank PLC is currently dictated more by its Credit Management quality (NPL) than its capital structure.

Model Reliability: The overall R-squared value of 0.8030 indicates that approximately 80.30% of the fluctuations in ROA are explained by the variables in this model. The model's overall significance (Prob > Chi2 = 0.0060) proves that the chosen indicators collectively have a strong and reliable impact on the bank's performance.

Chapter- Six

Findings, Recommendations and Conclusion

Findings

The following sections provide a detailed analysis of the impact of each independent variable on the performance (ROA) of Agrani Bank PLC, based on the Random Effects Model:

Non-Performing Loan (NPL)

Finding: The study finds that Non-Performing Loans (NPL) as a core indicator of credit management quality have a significant negative impact on the Return on Assets (ROA) of Agrani Bank PLC.

Statistical Evidence: The coefficient for NPL is -0.0732 with a p-value of 0.009, which is statistically significant at the 1% level.

Interpretation: This indicates that for every 1% increase in NPL, the bank's profitability (ROA) decreases by 0.0732%. This confirms that credit risk manifested through a high volume of default loans is the most critical factor hindering the bank's financial performance.

Capital Adequacy Ratio (CAR)

Finding: Capital Adequacy Ratio (CAR) has a negative but statistically insignificant relationship with the bank's performance.

Statistical Evidence: The regression analysis shows a coefficient of -0.0645 for CAR, with a high p-value of 0.702.

Interpretation: The lack of statistical significance implies that during the study period, mere changes in the capital base did not decisively influence profitability. This suggests that without improving credit management (reducing NPLs), simply maintaining a higher capital ratio does not ensure better financial performance for Agrani Bank PLC.

Cost to Income Ratio (CIR)

Finding: The Cost to Income Ratio (CIR) shows a negative impact on ROA, though it is not statistically significant.

Statistical Evidence: The coefficient for CIR is -0.0725 with a p-value of 0.117.

Interpretation: This negative relationship suggests that higher operational costs often exacerbated by the expenses of managing a large portfolio of classified loans tend to reduce profitability. However, for this specific bank, it is not as dominant a driver as credit risk.

Net Interest Margin (NIM)

Finding: The Net Interest Margin (NIM) shows a negative and insignificant relationship with ROA in this model.

Statistical Evidence: The coefficient for NIM is -0.0992 with a p-value of 0.787.

Interpretation: This indicates that the margin between interest income and expense was not a significant predictor of ROA. In the context of credit management, this implies that any gains from interest margins were likely nullified by high loan loss provisions and the non-recovery of interest from NPLs.

Loan-to-Deposit Ratio (LDR)

Finding: The Loan-to-Deposit Ratio (LDR) has a minimal and statistically insignificant negative effect on the bank's performance.

Statistical Evidence: The coefficient for LDR is -0.0070 with a p-value of 0.720.

Interpretation: This suggests that the bank's lending volume relative to its deposits (credit exposure) did not significantly influence its profitability compared to the quality of the loans being managed.

Recommendations

Based on the empirical findings of this study, the following recommendations are provided to enhance the credit management efficiency and financial performance (ROA) of Agrani Bank PLC:

Strengthening Credit Management and Recovery (NPL)

Since Non-Performing Loans (NPL) is the only statistically significant factor negatively affecting ROA ($p=0.009$), it requires the highest strategic priority.

Rigorous Credit Scrutiny: The bank must implement a more stringent credit risk assessment process and independent credit appraisal systems to ensure that loans are granted based on commercial merit and borrower creditworthiness.

Specialized Recovery Units: Strengthening the legal and recovery departments is essential. The bank should establish dedicated "Recovery Cells" to fast-track the settlement of long-pending defaulted loans and reduce provision costs.

Early Warning Systems (EWS): A robust monitoring system should be established for large loan portfolios to identify early warning signals of potential defaults, allowing for proactive intervention before a loan becomes classified.

Strategic Optimization of Capital Adequacy (CAR)

Although CAR was found to be statistically insignificant, it remains a vital buffer for credit risk management.

Capital Efficiency: The bank should focus on "Capital Optimization." Instead of merely maintaining capital for regulatory compliance, it should be utilized in high-yield, low-risk sectors to improve its impact on profitability.

Risk-Weighted Asset Management: Agrani Bank should optimize its risk-weighted assets to ensure that the capital base effectively supports quality lending rather than just covering up for high NPL.

Improving Operational Efficiency (CIR)

The negative relationship of the Cost to Income Ratio (CIR) with ROA suggests a need for better management of the costs associated with credit operations.

Digital Transformation: Investing in automation and digital banking services can significantly reduce the long-term operational costs involved in manual loan processing and monitoring.

Cost Control in Recovery: The management should streamline the administrative expenses related to loan recovery and legal disputes to improve overall efficiency.

Enhancing Income through Diversification (NIM & LDR)

To mitigate the risks of credit-driven losses, the bank must optimize its lending and deposit strategies.

Optimizing Deposit Mix: The bank should focus on attracting low-cost deposits (CASA) to improve the Net Interest Margin (NIM), ensuring that interest gains are not swallowed by the cost of funds and loan defaults.

Balanced Lending (LDR): While maintaining liquidity is crucial, the bank should avoid aggressive lending. A balanced Loan-to-Deposit Ratio (LDR) should be maintained, focusing on quality over quantity to ensure sustainable profit.

Conclusion

This study aimed to examine the effects of credit management on the financial performance of Agrani Bank PLC, using Return on Assets (ROA) as a measure of profitability over the period 2015–2024. The analysis was conducted using time-series data and various econometric techniques, including descriptive statistics, correlation analysis, and regression models. The findings of the study reveal that the overall financial performance of Agrani Bank PLC has been relatively weak and volatile during the study period. The average ROA is slightly negative, indicating that the bank faced consistent profitability challenges over the decade.

The core finding of this research is that credit management quality, specifically the level of Non-Performing Loans (NPL), is the primary driver of the bank's financial health. The regression analysis, particularly the Random Effects Model, confirms that NPL is the only statistically significant variable influencing ROA, with a strong negative effect. This implies that the accumulation of default loans directly erodes the bank's earning capacity and is the most significant hurdle to its profitability.

On the other hand, variables such as the Capital Adequacy Ratio (CAR), Cost to Income Ratio (CIR), Loan to Deposit Ratio (LDR), and Net Interest Margin (NIM) exhibit statistically insignificant relationships with profitability. This suggests that for a state-owned bank like Agrani Bank, merely maintaining regulatory capital levels or adjusting interest margins is insufficient to guarantee improved performance as long as the burden of non-performing assets remains high. The diagnostic tests, including the Hausman test and multicollinearity checks, confirm the reliability and robustness of these findings, with the model explaining approximately 80.30% of the variation in ROA.

In conclusion, the study highlights that efficient credit management is the most critical factor affecting bank profitability. While capital adequacy is essential for solvency, it cannot substitute for asset quality. Therefore, to ensure sustainable profitability and financial stability, Agrani Bank PLC must prioritize strengthening its loan management practices, implementing rigorous credit appraisals, and focusing on the aggressive recovery of classified loans.

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Websites:

Serial Number	Name of the Website	Links
1	Google Scholar	https://scholar.google.com/
2	Research Gate	https://www.researchgate.net/
3	Agrani Bank PLC	https://www.agranibank.org/
4	Bangladesh Bank	https://www.bb.org.bd/en/index.php

Appendix:

A. Data Set of Variables Used in the Study Agrani Bank PLC (2015 to 2024).

Bank Name	Year	ROA	CIR	NPL	LDR	NIM	CAR
Agrani Bank PLC	2024	-0.73	82.68	40.49	79.65	2	1.86
Agrani Bank PLC	2023	0.06	78.55	28.37	76.53	2.3	4.57
Agrani Bank PLC	2022	0.1	82.15	21.11	78.36	2.4	6.28
Agrani Bank PLC	2021	0.12	90.27	16.7	59.28	1.5	7.55
Agrani Bank PLC	2020	-0.01	88.09	12.46	56.42	1.96	9.74
Agrani Bank PLC	2019	0.13	83.29	14.26	67.29	4.04	10.02
Agrani Bank PLC	2018	0.13	82.73	17.67	63.63	3.25	10.09
Agrani Bank PLC	2017	1	80.51	17.45	60.17	3.59	10.24
Agrani Bank PLC	2016	-1.12	86.6	25.59	53.81	3.24	10.03
Agrani Bank PLC	2015	0.12	79.52	18.96	55.64	3.34	9.54

B. Stata Output for Descriptive Statistics.

obs:	ROA	CIR	NPL	LDR	NIM	CAR
9.	-1.12	86.6	25.59	53.81	3.24	10.03
1.	-.73	82.68	40.49	79.65	2.14	1.86
5.	-.01	88.09	12.46	56.42	1.96	9.74
2.	.06	78.55	28.37	76.53	2.3	4.57
3.	.1	82.15	21.11	78.36	2.4	6.28

4.	.12	90.27	16.7	59.28	1.5	7.55
10.	.12	79.52	18.96	55.64	3.34	9.54
6.	.13	83.29	14.26	67.29	4.04	10.02
7.	.13	82.73	17.67	63.63	3.25	10.09
8.	1	80.51	17.45	60.17	3.59	10.24

```
. tabstat ROA CIR NPL LDR NIM CAR, statistics (mean max min n range kurtosis skewness median)
```

Stats	ROA	CIR	NPL	LDR	NIM	CAR
Mean	-.02	83.439	21.306	65.078	2.776	7.992
Max	1	90.27	40.49	79.65	4.04	10.24
Min	-1.12	78.55	12.46	53.81	1.5	1.86
N	10	10	10	10	10	10
Range	2.12	11.72	28.03	25.84	2.54	8.38
Kurtosis	3.427383	2.184719	3.855381	1.628107	1.760674	2.892729
Skewness	-.4010155	.5312681	1.279839	.4532394	-.019913	-1.102863
p50	.11	82.705	18.315	61.9	2.82	9.64

C. Stata Output for Corelation Matrix

```
. pwcorr wROA wCIR wNPL wLDR wNIM wCAR, sig
```

	wROA	wCIR	wNPL	wLDR	wNIM	wCAR
wROA	1.0000					
wCIR	-0.2576 0.4724	1.0000				
wNPL	-0.6585 0.0384	-0.3205 0.3666	1.0000			
wLDR	-0.1016 0.7800	-0.4237 0.2224	0.5474 0.1015	1.0000		
wNIM	0.1442 0.6911	-0.4179 0.2295	-0.2476 0.4903	-0.3397 0.3370	1.0000	
wCAR	0.2360 0.5115	0.2510 0.4842	-0.7158 0.0199	-0.8262 0.0032	0.6709 0.0337	1.0000

D. Linear Regression (Pool OLS)

```
. reg wROA wCIR wNPL wLDR wNIM wCAR
```

Source	SS	df	MS	Number of obs	=	10
Model	.893528315	5	.178705663	F(5, 4)	=	3.26
Residual	.219231685	4	.054807921	Prob > F	=	0.1376
				R-squared	=	0.8030
Total	1.11276	9	.12364	Adj R-squared	=	0.5567
				Root MSE	=	.23411

wROA	Coefficient	Std. err.	t	P> t	[95% conf. interval]	
wCIR	-.0725388	.046259	-1.57	0.192	-.2009744	.0558967
wNPL	-.0732181	.0278894	-2.63	0.058	-.1506515	.0042153
wLDR	-.0070158	.0195957	-0.36	0.738	-.0614222	.0473907
wNIM	-.0992535	.3680926	-0.27	0.801	-1.121242	.9227355
wCAR	-.0645272	.1688922	-0.38	0.722	-.5334471	.4043927
_cons	8.725012	3.950856	2.21	0.092	-2.244322	19.69435

E. Multicollinearity Test (VIF)

```
. estat vif
```

Variable	VIF	1/VIF
wCIR	2.27	0.440326
wLDR	2.19	0.455693
wNIM	2.09	0.478357
wNPL	1.51	0.660864
Mean VIF	2.02	

F. Fixed Effects Model (Robust)

. xtreg wROA wCIR wNPL wLDR wNIM wCAR, fe vce (robust)					
Fixed-effects (within) regression			Number of obs	=	10
Group variable: banksname_id			Number of groups	=	2
R-squared:			Obs per group:		
Within = 0.9056			min	=	1
Between = 1.0000			avg	=	5.0
Overall = 0.7372			max	=	9
corr(u_i, Xb) = -0.3078			F(1, 1)	=	.
			Prob > F	=	.
(Std. err. adjusted for 2 clusters in banksname_id)					
wROA	Coefficient	Robust std. err.	t	P> t	[95% conf. interval]
wCIR	-.0484506	4.29e-07	-1.1e+05	0.000	-.048456 -.0484451
wNPL	-.0808128	6.92e-09	-1.2e+07	0.000	-.0808129 -.0808128
wLDR	-.0040198	6.59e-08	-6.1e+04	0.000	-.0040206 -.004019
wNIM	-.0196474	1.77e-06	-1.1e+04	0.000	-.0196699 -.0196248
wCAR	-.0546754	1.72e-07	-3.2e+05	0.000	-.0546776 -.0546732
_cons	6.374546	.0000434	1.5e+05	0.000	6.373995 6.375098
sigma_u	.34066471				
sigma_e	.18559396				
rho	.77112508	(fraction of variance due to u_i)			

G. Fixed Effects Regression Results

```
. xtreg wROA wCIR wNPL wLDR wNIM wCAR, fe
```

Fixed-effects (within) regression Number of obs = 10
Group variable: banksname_id Number of groups = 2

R-squared: Obs per group:
 Within = 0.9056 min = 1
 Between = 1.0000 avg = 5.0
 Overall = 0.7372 max = 9

corr(u_i, Xb) = -0.3078 F(5, 3) = 5.76
 Prob > F = 0.0903

	wROA	Coefficient	Std. err.	t	P> t	[95% conf. interval]
wCIR		-.0484506	.0389527	-1.24	0.302	-.1724154 .0755142
wNPL		-.0808128	.022494	-3.59	0.037	-.1523987 -.009227
wLDR		-.0040198	.0156203	-0.26	0.814	-.0537307 .0456911
wNIM		-.0196474	.2950189	-0.07	0.951	-.9585293 .9192345
wCAR		-.0546754	.1339988	-0.41	0.711	-.4811194 .3717686
_cons		6.374546	3.384068	1.88	0.156	-4.395069 17.14416
sigma_u		.34066471				
sigma_e		.18559396				
rho		.77112508	(fraction of variance due to u_i)			

F test that all u_i=0: F(1, 3) = 3.36 Prob > F = 0.1640

Note: the rank of the differenced variance matrix (1) does not equal the number of coefficients being tested (5); be sure this is what you expect, or there may be problems computing the test. Examine the output of your estimators for anything unexpected and possibly consider scaling your variables so that the coefficients are on a similar scale.

	Coefficients		(b-B)	sqrt(diag(V_b-V_B))
	(b)	(B)	Difference	Std. err.
	b1	B1		
wCIR	-.0484506	-.0725388	.0240882	.016565
wNPL	-.0808128	-.0732181	-.0075947	.0052228
wLDR	-.0040198	-.0070158	.002996	.0020603
wNIM	-.0196474	-.0992535	.0796061	.0547436
wCAR	-.0546754	-.0645272	.0098518	.0067749

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

```
chi2(1) = (b-B)'[(V_b-V_B)^(-1)](b-B)
          = 2.11
Prob > chi2 = 0.1459
(V_b-V_B is not positive definite)
```


H. Heteroskedasticity Test and Random Effects Model

```
. estat htest
```

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

H0: Constant variance

```
chi2(1) = 1.35
Prob > chi2 = 0.2456
```

```
. xtreg wROA wCIR wNPL wLDR wNIM wCAR, re
```

Random-effects GLS regression
Group variable: banksname_id

```
Number of obs      =      10
Number of groups   =       2
```

R-squared:

Within = 0.8594
Between = 1.0000
Overall = 0.8030

Obs per group:

```
min = 1
avg = 5.0
max = 9
```

$$\text{corr}(u_i, X) = 0 \text{ (assumed)}$$

```
Wald chi2(5)      =      16.30
Prob > chi2       =      0.0060
```

wROA	Coefficient	Std. err.	z	P> z	[95% conf. interval]	
wCIR	-.0725388	.046259	-1.57	0.117	-.1632048	.0181271
wNPL	-.0732181	.0278894	-2.63	0.009	-.1278803	-.0185559
wLDR	-.0070158	.0195957	-0.36	0.720	-.0454227	.0313911
wNIM	-.0992535	.3680926	-0.27	0.787	-.8207018	.6221948
wCAR	-.0645272	.1688922	-0.38	0.702	-.3955498	.2664955
_cons	8.725012	3.950856	2.21	0.027	.9814768	16.46855
sigma_u	0					
sigma_e	.18559396					
rho	0	(fraction of variance due to u_i)				

I. Housman Test

Note: the rank of the differenced variance matrix (1) does not equal the number of coefficients being tested (5); be sure this is what you expect, or there may be problems computing the test. Examine the output of your estimators for anything unexpected and possibly consider scaling your variables so that the coefficients are on a similar scale.

	Coefficients		(b-B) Difference	sqrt(diag(V_b-V_B)) Std. err.
	(b) f1	(B) r1		
wCIR	-.0484506	-.0725388	.0240882	.016565
wNPL	-.0000128	-.0732181	-.0075947	.0052228
wLDR	-.0040198	-.0070158	.002996	.0020603
wNIM	-.0196474	-.0992535	.0796061	.0547436
wCAR	-.0546754	-.0645272	.0098518	.0067749

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

$\chi^2(1) = (b-B)'[(V_b-V_B)^{-1}](b-B)$
= 2.11

Prob > χ^2 = 0.1459

(V_b-V_B is not positive definite)