

**An Internship Report on
An Empirical Analysis of the Effects of Bank Size, Profitability, and Risk Factors on
Capital Adequacy Ratio: Evidence from Agrani Bank PLC**



*(This report is submitted for the partial fulfilment of the program of Bachelor of Business
Administration (BBA) with Major in Finance and Banking)*

SUBMITTED TO

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DATE OF SUBMISSION

20 April 2026



**Department of Finance & Banking
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Letter of Transmittal

20 April, 2026

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Assistant Professor

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Subject: Submission of internship report on **An Empirical Analysis of the Effects of Bank Size, Profitability, and Risk Factors on Capital Adequacy Ratio: Evidence from Agrani Bank PLC**

Honorable Sir,

With due respect and great pleasure, I am Abu Hanif Mohammad Noman, a student of BBA program, submitting the internship report on the titled An Empirical Analysis of the Effects of Bank Size, Profitability, and Risk Factors on Capital Adequacy Ratio: Evidence from Agrani Bank PLC. The report is a prerequisite for completing Bachelor's of Business Administration at Comilla University. I convey my deepest appreciations to honorable sir for his continuous guidance and whole-hearted supervision and supports in preparing this. I express my sincerest gratitude for having been given opportunity to prepare this and like to share that I enjoyed doing so.

I, therefore, would be grateful if you can enlighten me with your perspective on the assignment and assess the assignment keeping the limitations in mind.

Your Sincerely,

Abu Hanif Mohammad Noman

ID: 12117056

Session: 2020-21

Department of Finance and Banking

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Student Declaration

Myself, **Abu Hanif Mohammad Noman**, student of Bachelor's of Business Administration, Department of Finance and Banking, Comilla University, do hereby declare that the Internship Report on **An Empirical Analysis of the Effects of Bank Size, Profitability, and Risk Factors on Capital Adequacy Ratio: Evidence from Agrani Bank PLC** uniquely prepared by me after the completion of three months working at Agrani Bank PLC.

No part of this report has been previously submitted to any other University / College / Institution / Organization for any academic certificate / degree / diploma.

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

Signature:

.....

Abu Hanif Mohammad Noman

ID: 12117056

Session: 2020-21

Bachelor's of Business Administration

Department of Finance and Banking

Comilla University, Cumilla

Supervisor's Declaration

This is to certify that **Abu Hanif Mohammad Noman, ID:12117056**, a student of the Bachelor's of Business Administration (BBA) Program at Comilla University, has completed the internship report under my supervision. He has worked at Agrani Bank PLC as an intern and **An Empirical Analysis of the Effects of Bank Size, Profitability, and Risk Factors on Capital Adequacy Ratio: Evidence from Agrani Bank PLC** completed the report entitled as a partial requirement for obtaining a Bachelor's of Business Administration (BBA) Degree. He has completed the report by himself. He has been permitted to submit the report.

I wish him Success.

Signature:

.....

DR. Md. Monzur Hossain

Assistant Professor

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Acknowledgement

Firstly, I would like to express my deep gratitude to Almighty for giving me the strength and the composure to finish the task.

I would like to express my sincere gratitude & appreciation to my supervisor **DR. Md. Monzur Hossain**, Assistant Professor, Department of Finance & Banking, Comilla University, who has been glad to give me right approach, guidance and support which helped me a lot in writing this report. I am grateful to him for his constant help and supervision, proposals. Without his help and guideline, it is difficult for me to complete the report.

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It was not the easiest task to complete the report on **An Empirical Analysis of the Effects of Bank Size, Profitability, and Risk Factors on Capital Adequacy Ratio: Evidence from Agrani Bank PLC**, where all the information needs to be gathered properly, analyzed and represent in a descriptive manner. There are so many individuals who had helped, encouraged to complete the report successfully.

Finally, I pay my obligation to those faculty members and teachers of Finance and Banking Department who helped me by providing lot of information and guidelines. Without their help it would not be possible for me to complete the project report as well as my BBA program also.

Internship Certificate

Certificate of Anti-Plagiarism

It is certified that the Internship Report titled An Empirical Analysis of the Effects of Bank Size, Profitability, and Risk Factors on Capital Adequacy Ratio: Evidence from Agrani Bank PLC submitted by Abu Hanif Mohammad Noman (ID No. 12117056) of the Department of Finance and Banking, Comilla University has been examined with the anti-plagiarism tool.

I undertake that:

- I. The report has significant new work/knowledge as compared already published or are under consideration to be published elsewhere. No sentence, equation, diagram, table, paragraph or section has been copied verbatim from previous work unless it is placed under quotation mark and duly referenced.
- II. The work presented is original and own work of the author i.e. there is no plagiarism. No ideas, processes, results or words of others have been presented as the author's own work.
- III. There is no fabrication of data or results which have been compiled and analyzed.
- IV. There is no falsification by manipulating research materials, equipment or processes, or changing or omitting data or results such that the research is not accurately represented in the research record.

N.B. Plagiarism Checker Report received from the Department of Finance and Banking, Comilla University is also enclosed along with this Summary of Results.

Date: 20.04.2026

Place: Cumilla

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Abu Hanif Mohammad Noman

(Student)

Executive Summary

This study examines the capital adequacy of Agrani Bank PLC from 2015 to 2024, focusing on how Non-Performing Loan Ratio (NPL), Loan-to-Deposit Ratio (LDR), Return on Assets (ROA), and bank size affect the Capital Adequacy Ratio (CAR). Using secondary data from annual reports, the study applied descriptive statistics, trend and correlation analysis, and multiple regression.

Findings show that CAR declined over the period, with rising NPL and LDR indicating increasing credit risk and lending pressure. ROA was volatile, while bank size remained mostly stable. Regression results highlight LDR as the most influential factor on CAR, with other variables showing weaker effects.

The study recommends that Agrani Bank focus on prudent credit expansion, improved loan monitoring, and profitability stabilization. Regulatory oversight should emphasize capital strength and lending behavior to ensure financial resilience. This institution-specific analysis provides insights for both management and policymakers to strengthen capital adequacy in state-owned banks.

Acronyms

Abbreviation	Amplification
CAR	Capital Adequacy Ratio
NPL	Non-Performing Loan
LDR	Loan-to-Deposit Ratio
ROA	Return on Assets
BB	Bangladesh Bank
PLC	Public Limited Company
NII	Non-Interest Income
FX	Foreign Exchange
Ex.	Exchange
ELG	Export-Led Growth
IRS	Interest Rate Spread
CIR	Cost-to-Income Ratio
REM	Remittance
OLS	Ordinary Least Squares

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Chapter 1: Introduction

1.0 Introduction

The stability of the banking sector is a critical determinant of a nation's economic health. The Capital Adequacy Ratio (CAR) measures a bank's capital relative to its risk-weighted assets, serving as a primary buffer against unexpected losses. Following the 2008 global financial crisis, regulators worldwide, including the Bangladesh Bank, have strengthened capital requirements to ensure that banks can absorb financial shocks and protect depositors (Chowdhury, 2021).

In Bangladesh, the banking sector faces persistent challenges, including high levels of non-performing loans (NPLs), fluctuating profitability, and liquidity pressures (Ahmed, 2018). State-owned commercial banks, such as Agrani Bank PLC, are particularly vulnerable due to governance issues and legacy asset quality problems. Over the period 2015–2024, Agrani Bank PLC has experienced a notable decline in its CAR, falling from 10.24% in 2017 to 4.56% in 2023, with a slight recovery to 5.85% in 2024. Simultaneously, the bank's NPL ratio increased sharply from 17.45% in 2017 to 40.49% in 2024, while its Return on Assets (ROA) turned negative in several years.

Existing empirical literature has identified bank size, profitability (ROA), asset quality (NPL), and liquidity (Loan to Deposit Ratio, LDR) as potential determinants of CAR (Athanasoglou et al., 2006; Shrieves & Dahl, 1992). However, most studies employ cross-country or large panel datasets, often overlooking firm-specific, time-series dynamics within a single institution, especially in developing economies. This gap is significant because bank-specific factors can vary considerably across institutions, and findings from aggregate studies may not apply to individual banks like Agrani Bank PLC (Hasan & Siddiqui, 2020). Therefore, this study provides an empirical analysis of how NPL, LDR, ROA, and bank size influence the CAR of Agrani Bank PLC, using raw data from its annual reports and econometric techniques including correlation, regression, and diagnostic testing for heteroskedasticity and autocorrelation. The findings aim to support evidence-based risk management and regulatory oversight for a major state-owned bank in Bangladesh.

1.1 Background of the Study

Capital adequacy is a core indicator of banking stability because it shows whether a bank has enough capital to absorb losses arising from credit, market, and operational risks. At the international level, the Basel III framework was introduced to strengthen bank regulation, supervision, and risk management after the global financial crisis, while the capital conservation framework was designed to ensure that banks maintain an additional layer of usable capital above minimum requirements. In Bangladesh, this issue has direct regulatory relevance because Bangladesh Bank issued revised Guidelines on Risk Based Capital Adequacy in line with Basel III, making capital strength a central prudential concern for the banking industry.

The academic literature shows that capital adequacy does not change randomly; it is shaped by bank-specific financial conditions such as profitability, risk exposure, liquidity structure, and institutional size. Gropp and Heider (2010) argue that bank capital structure is influenced by economic and balance-sheet factors rather than regulation alone, while Berger and Bouwman (2013) show that stronger capital can improve bank resilience and performance, particularly during stress periods. More recent work on Bangladesh also suggests that bank-level variables remain important in explaining capital and performance outcomes. Naoaj (2023) examined the determinants of capital adequacy in Bangladesh's banking sector, while Islam and Rana (2017), Rahman et al. (2017), and Uddin (2022) showed that profitability, non-performing loans, and related financial indicators remain central in Bangladeshi banking research.

Agrani Bank PLC provides commercial banking services across Bangladesh and remains an institutionally important government-linked bank within the country's banking system. Because of its scale, ownership structure, and public role, its capital position is important not only for the bank itself but also for wider confidence in the banking sector. Official Agrani Bank disclosures show that annual reports for 2015–2024 are publicly available, making the bank suitable for a time-series analysis of capital adequacy and its determinants.

Although prior studies identify profitability, risk, liquidity, and size as important determinants of bank capital, two gaps remain. First, much of the existing evidence for Bangladesh is based on panel data across multiple banks rather than a focused

institution-level analysis. Second, a large part of the local literature studies profitability or non-performing loans as dependent variables, while fewer studies place Capital Adequacy Ratio (CAR) at the center of the analysis, especially for a state-owned commercial bank. These gaps justify a bank-specific study of Agrani Bank PLC using CAR as the dependent variable and Non-Performing Loan Ratio (NPL), Loan-to-Deposit Ratio (LDR), Return on Assets (ROA), and Bank Size as explanatory variables (Naoaj, 2023; Uddin, 2022).

1.2 Statement of the Problem

Maintaining an adequate capital base is one of the most important challenges in modern banking because insufficient capital weakens a bank's ability to absorb losses, meet regulatory requirements, and sustain public confidence. This concern becomes more serious when weak profitability, rising non-performing loans, or aggressive lending behavior place pressure on capital. Earlier studies have shown that credit risk, liquidity-related decisions, and profitability can materially affect bank soundness, but the direction and magnitude of these effects vary across banking systems and institutions (Berger & Bouwman, 2013; Gropp & Heider, 2010; Naoaj, 2023).

In Bangladesh, the problem is particularly relevant because the banking sector operates under a Basel-aligned capital framework, yet many studies still focus more on profitability or general financial performance than on the direct determinants of CAR. Existing Bangladesh-based studies have examined profitability in private commercial banks, the drivers of non-performing loans, and the broader determinants of bank capital using panel methods, but these studies provide limited institution-specific evidence for a major state-owned commercial bank such as Agrani Bank PLC (Islam & Rana, 2017; Rahman et al., 2017; Uddin, 2022; Naoaj, 2023). As a result, there remains a clear empirical gap regarding how bank size, profitability, and risk-related variables affect the capital adequacy of Agrani Bank PLC over time.

The problem is further supported by the study data itself. Over the period covered in this research, Agrani Bank PLC's CAR declined from 9.54 in 2015 to 5.85 in 2024, while NPL increased from 18.95 to 40.49, and LDR rose from 55.64 to 79.65. These movements suggest growing pressure on the bank's capital strength and justify a focused empirical investigation into the determinants of CAR. If these relationships are not properly understood, bank management and policymakers may be less able to

identify the main drivers of capital deterioration and design timely corrective measures.

1.3 Research Objectives

Based on the identified problem, this study pursues both a main objective and several general objectives.

Main Objective

To investigate how selected financial and risk-related factors (NPL, LDR, ROA, and bank size) influence the Capital Adequacy Ratio (CAR) of Agrani Bank PLC.

General Objectives

1. To explore the individual impact of Non-Performing Loan Ratio (NPL), Loan to Deposit Ratio (LDR), Return on Assets (ROA), and bank size on CAR.
2. To assess the financial strength of Agrani Bank PLC using these key indicators over the period 2015–2024.

These objectives are consistent with the broader empirical literature that models capital adequacy using bank-specific financial characteristics such as profitability, credit risk, liquidity, and size (Gropp & Heider, 2010; Naoaj, 2023; Thoa et al., 2020).

1.4 Research Questions

In line with the above objectives, the study seeks to answer the following research questions:

1. How do Non-Performing Loan Ratio (NPL), Loan-to-Deposit Ratio (LDR), and Return on Assets (ROA) influence the Capital Adequacy Ratio (CAR) of Agrani Bank PLC?
2. What is the effect of Bank Size on the Capital Adequacy Ratio (CAR) of Agrani Bank PLC?
3. Which among NPL, LDR, ROA, and Bank Size has the most significant impact on CAR?

These questions are derived from the study's objective structure and are also aligned with prior empirical work on capital adequacy determinants in Bangladesh and other banking systems (Naoaj, 2023; Gropp & Heider, 2010).

1.5 Significance of the Study

This study has academic significance because it extends the literature on capital adequacy by providing institution-specific evidence from a major Bangladeshi state-owned commercial bank. Much of the previous evidence for Bangladesh has either concentrated on profitability and non-performing loans or used pooled panel data across multiple banks. By focusing specifically on Agrani Bank PLC and placing CAR at the center of the analysis, this study adds a more focused case-based perspective to the literature on bank capital adequacy in Bangladesh (Islam and Rana, 2017; Rahman et al., 2017; Naoaj, 2023; Uddin, 2022).

The study also has practical significance for bank management. Its findings can help identify whether deteriorating capital strength is more closely associated with poor asset quality, higher lending pressure, weak profitability, or bank expansion. This can support better internal decision-making in the areas of loan management, deposit planning, risk control, and capital strategy. Since capital adequacy is closely linked to bank resilience, understanding its determinants is important for improving the long-term financial health of Agrani Bank PLC (Berger & Bouwman, 2013).

In addition, the study has policy significance for regulators and financial policymakers. Because Bangladesh Bank's Basel III-aligned capital framework places strong emphasis on risk-sensitive capital management, empirical evidence on the determinants of CAR can help inform supervisory assessment, prudential monitoring, and corrective policy action. The findings may therefore be useful to Bangladesh Bank, bank boards, and public financial authorities seeking to strengthen the stability of the banking sector through better capital management and early identification of risk pressures.

Chapter 2: Literature Review

2.0 Introduction

Capital adequacy is a central indicator of banking soundness because it reflects a bank's ability to absorb unexpected losses and continue operating within regulatory standards. In the empirical literature, the capital adequacy ratio is commonly examined alongside profitability, credit risk, liquidity structure, and bank size because these factors jointly shape the risk-bearing capacity of banks. Prior research also shows that bank capital is not determined only by regulation; it is influenced by portfolio choices, capital-structure behavior, and strategic responses to economic conditions (Berger & Bouwman, 2013; Gropp & Heider, 2010; Hovakimian & Kane, 2000).

2.1 Theoretical and Empirical Background

The broader banking literature suggests that banks actively manage capital buffers rather than treating capital ratios as fixed regulatory outcomes. Gropp and Heider (2010) argued that many determinants of bank capital structure resemble those of non-financial firms. Hovakimian and Kane (2000) showed that capital regulation affects bank behavior, while Lindquist (2004) and Jokipii and Milne (2008) demonstrated that bank capital buffers respond to risk and cyclical conditions. Berger and Bouwman (2013) further found that capital plays an important role in bank performance, especially during crisis periods. Together, these studies establish that capital adequacy is dynamic and shaped by both internal banking decisions and the external environment (Berger & Bouwman, 2013; Gropp & Heider, 2010; Hovakimian & Kane, 2000; Jokipii & Milne, 2008; Lindquist, 2004).

2.2 International Evidence on the Determinants of Capital Adequacy

Empirical evidence from international banking systems consistently identifies profitability, liquidity, size, and credit risk as major determinants of capital adequacy, although the sign and strength of these relationships vary across countries. Ahmad et al. (2008) found that bank capital ratios in a developing economy are shaped by internal financial factors and institutional conditions. Tran et al. (2020) and Hoque and Kashefi-Pour (2018) similarly concluded that both bank-level and country-level factors matter

for bank capital structure. In more focused regional studies, Mili et al. (2017) found that the capital adequacy of foreign bank subsidiaries is influenced by interbank market conditions and regulatory environment, while Thoa et al. (2020) reported that internal bank factors significantly explain CAR in Vietnamese banks. Evidence from Jordan, the Arab region, and Nepal likewise shows that profitability, risk, size, and liquidity remain central explanatory variables, although their effects are not always uniform across settings (Bhattarai, 2020; Gharaibeh, 2023; Obeid, 2023).

2.3 Credit Risk, Profitability, Liquidity, and Size in the Literature

Credit risk has been one of the most frequently used predictors of bank stability and capital strength. Studies on non-performing loans consistently show that worsening loan quality reduces efficiency and profitability and can therefore undermine solvency. Do et al. (2020) found that non-performing loans negatively affect profitability in Vietnamese commercial banks, while Phung et al. (2022) reported that non-performing loans also harm bank efficiency. Oino (2021) linked both credit risk and liquidity risk to bank solvency, reinforcing the view that deteriorating asset quality can weaken a bank's capital position. At the same time, profitability remains an important but mixed determinant. Coccorese and Girardone (2021) found a meaningful relationship between bank capital and profitability in a global sample, while Bitar et al. (2018) and Haris et al. (2020) also confirmed that capitalization matters for efficiency, risk, and profitability, although the effects differ by sample and banking context. These mixed findings suggest that profitability, risk, and liquidity should be examined together rather than in isolation when explaining CAR (Bitar et al., 2018; Coccorese & Girardone, 2021; Do et al., 2020; Haris et al., 2020; Oino, 2021; Phung et al., 2022).

2.4 Evidence from Bangladesh

The Bangladeshi banking literature has expanded over time, but much of it has focused on profitability and non-performing loans rather than CAR as the dependent variable. Samad (2015) and Islam and Rana (2017) showed that internal bank-specific variables are important in explaining profitability in Bangladeshi commercial banks. Rahman et al. (2017) examined non-performing loans and found that financial ratios significantly influence NPL behavior in listed commercial banks. Amin et al. (2021) extended this line of inquiry by showing that both macroeconomic and firm-specific variables affect

non-performing loans in Bangladesh. Uddin (2022) reported that leverage, operating efficiency, non-performing loans, and CAR are relevant to the profitability of Bangladeshi commercial banks. More directly, Naoaj (2023) examined the determinants of capital adequacy in Bangladesh using panel data and found that variables such as leverage, liquidity risk, net profit, inflation, and size help explain CAR. These studies are highly relevant to the present research because they confirm that bank-specific risk and performance indicators are empirically meaningful in the Bangladeshi context, even though many of them do not focus specifically on a single state-owned bank (Amin et al., 2021; Islam & Rana, 2017; Naoaj, 2023; Rahman et al., 2017; Samad, 2015; Uddin, 2022).

2.5 Synthesis of the Literature

The reviewed literature suggests four broad conclusions. First, CAR is generally linked to profitability, credit risk, liquidity, leverage, and size. Second, the direction of these effects is context-dependent rather than universal. Third, international studies often use multi-bank panel data and report mixed results across countries and banking systems. Fourth, in Bangladesh, there is stronger empirical concentration on profitability and NPL studies than on CAR-centered studies. This makes it difficult to directly generalize broad panel findings to a specific institution such as Agrani Bank PLC, especially given the unique operating environment of state-owned commercial banks (Ahmad et al., 2008; Gropp & Heider, 2010; Naoaj, 2023; Tran et al., 2020).

2.6 Literature Gap

Despite the available literature, several important gaps remain. First, only a limited number of Bangladeshi studies directly estimate the determinants of capital adequacy ratio itself. Second, most Bangladesh-based evidence is panel-oriented and covers multiple banks, which is useful for sectoral analysis but less suitable for understanding the capital dynamics of one specific institution. Third, there is limited recent empirical work focused specifically on a state-owned commercial bank using a single-bank time-series approach. Fourth, the combined role of non-performing loans, loan-to-deposit ratio, return on assets, and bank size in explaining CAR has not been sufficiently examined for Agrani Bank PLC over a recent ten-year period. This study addresses that gap by placing CAR at the center of the analysis and by using a focused case-based

design for 2015–2024.

2.7 Hypothesis Development

H1: Non-Performing Loan Ratio (NPL) negatively affects the Capital Adequacy Ratio (CAR) of Agrani Bank PLC.

H2: Loan-to-Deposit Ratio (LDR) negatively affects the Capital Adequacy Ratio (CAR) of Agrani Bank PLC.

H3: Return on Assets (ROA) positively affects the Capital Adequacy Ratio (CAR) of Agrani Bank PLC.

H4: Bank Size affects the Capital Adequacy Ratio (CAR) of Agrani Bank PLC.

Chapter 3: Methodology

3.1 Research Design

This study follows a quantitative explanatory research design. The purpose of the study is to examine the effect of selected bank-specific financial and risk indicators on the Capital Adequacy Ratio (CAR) of Agrani Bank PLC. A quantitative approach is appropriate because the study relies on numerical financial data and uses statistical techniques to identify the direction, strength, and significance of relationships among variables. More specifically, the study adopts a time-series case study design, as it focuses on one commercial bank over multiple years and evaluates how changes in explanatory variables are associated with changes in CAR over time.

The study is explanatory in nature because it attempts to explain variation in the dependent variable, CAR, through a set of independent variables, namely Non-Performing Loan Ratio (NPL), Loan-to-Deposit Ratio (LDR), Return on Assets (ROA), and Bank Size. This design is suitable for testing hypotheses regarding the impact of profitability, credit risk, liquidity behavior, and size on capital adequacy.

3.2 Conceptual Framework

The conceptual framework of this study shows the relationship between the dependent variable, Capital Adequacy Ratio (CAR), and the independent variables, Non-Performing Loan Ratio (NPL), Loan-to-Deposit Ratio (LDR), Return on Assets (ROA), and Bank Size. It assumes that changes in credit risk, lending behavior, profitability, and size influence the capital adequacy position of Agrani Bank PLC. Thus, NPL, LDR, ROA, and Bank Size are considered the main determinants of CAR in this study.

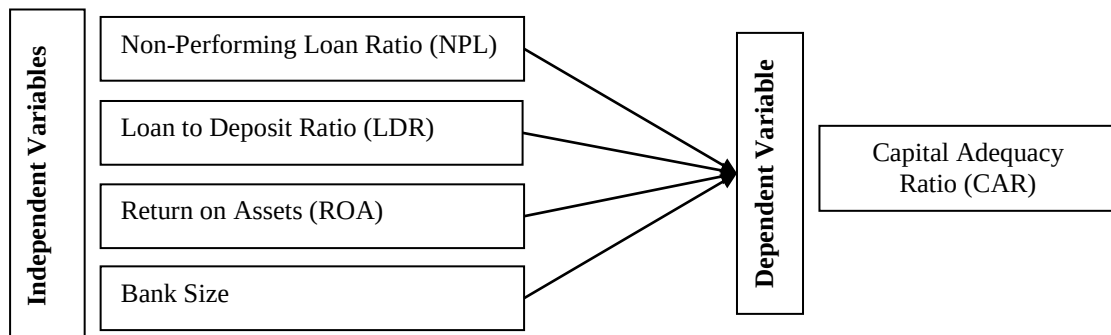


Figure 3.1: Conceptual Framework Showing the Relationship between NPL, LDR, ROA, Bank Size, and CAR

3.3 Data Source and Sample Selection

The study is based entirely on secondary data collected from the published annual reports of Agrani Bank PLC. These reports provide audited financial information and key performance indicators required to calculate or directly extract the study variables. Secondary data were selected because they are reliable, consistent, cost-effective, and appropriate for financial performance analysis.

A purposive sampling method was used to select Agrani Bank PLC as the sample bank. The bank was chosen because it is one of the major state-owned commercial banks in Bangladesh, plays an important role in the country's banking sector, and has publicly available annual reports containing the relevant information needed for empirical analysis. The selection is therefore justified on the basis of relevance, accessibility of data, and the institutional importance of the bank in the national financial system.

Although many banking studies use multiple banks, this research focuses on a single-bank case in order to provide a more detailed and institution-specific analysis of capital adequacy dynamics. Since the study uses one bank observed over several years, the unit of analysis is annual bank-level financial data.

3.4 Time Period of the Study

The study covers the period from 2015 to 2024, producing a total of 10 annual observations. This period was selected because it provides a recent and continuous time horizon for evaluating the movement of capital adequacy and its determinants. The selected period is long enough to capture year-to-year variation in profitability, loan quality, liquidity position, and bank size, while also reflecting the recent financial condition of the bank.

Using this time frame allows the study to observe both relatively stable years and years of financial stress or deterioration. As a result, the period is appropriate for identifying trends and estimating the impact of financial variables on CAR.

3.5 Variables and Measurement

The study uses one dependent variable and four independent variables. The dependent variable is Capital Adequacy Ratio (CAR), while the independent variables are Non-Performing Loan Ratio (NPL), Loan-to-Deposit Ratio (LDR), Return on Assets (ROA), and Bank Size.

Table 1: Variables and Measurement

Variable	Symbol	Type	Measurement	Description
Capital Adequacy Ratio	CAR	Dependent	Total regulatory capital / Risk-weighted assets $\times$ 100	Measures the bank's capital strength and ability to absorb financial risk
Non-Performing Loan Ratio	NPL	Independent	Non-performing loans / Total loans $\times$ 100	Measures credit risk and asset quality deterioration
Loan-to-Deposit Ratio	LDR	Independent	Total loans / Total deposits $\times$ 100	Measures lending intensity relative to deposit mobilization
Return on Assets	ROA	Independent	Net profit after tax / Total assets $\times$ 100	Measures the bank's profitability and efficiency in using assets
Bank Size	SIZE	Independent	Natural logarithm of total assets	Measures the scale of the bank's operations

3.6 Econometric Model

To examine the influence of the selected independent variables on CAR, the study estimates the following multiple linear regression model:

$$CAR_t = \beta_0 + \beta_1 NPL_t + \beta_2 LDR_t + \beta_3 ROA_t + \beta_4 SIZE_t + \varepsilon_t$$

Where:

- CAR_t = Capital Adequacy Ratio in year t
- β_0 = intercept or constant term
- β_1 to β_4 = coefficients of the explanatory variables
- NPL_t = Non-Performing Loan Ratio in year t
- LDR_t = Loan-to-Deposit Ratio in year t
- ROA_t = Return on Assets in year t
- $SIZE_t$ = Bank Size in year t
- ε_t = error term

3.7 Data Analysis Techniques

The collected data were analyzed using Stata 18. Several statistical and econometric techniques were applied in sequence to ensure a clear and systematic analysis.

First, descriptive statistics were used to summarize the basic characteristics of the variables. Measures such as mean, maximum, minimum, standard deviation, range, kurtosis, skewness, and median were used to understand central tendency, dispersion, and distributional shape.

Second, trend analysis was conducted using year-wise tabulation of the variables. This allowed the study to identify whether CAR, NPL, LDR, ROA, and size showed increasing, decreasing, or fluctuating patterns over the study period. Trend analysis is important because it provides a visual and analytical understanding of how the bank's financial condition changed over time.

Third, correlation analysis was performed to examine the pairwise association among the variables. The correlation matrix helps identify whether variables are positively or negatively related and whether those relationships are statistically significant. This step also offers preliminary evidence before regression estimation.

Fourth, a multicollinearity test was conducted using the Variance Inflation Factor (VIF). Multicollinearity occurs when independent variables are highly correlated with one another, which can distort coefficient estimates and reduce the reliability of the regression results. VIF values within acceptable limits indicate that multicollinearity is

not a serious concern.

Fifth, the study employed multiple linear regression analysis to estimate the impact of NPL, LDR, ROA, and bank size on CAR. Regression analysis is the main analytical tool of the study because it enables the researcher to assess the individual effect of each explanatory variable while controlling for the others. The significance of the coefficients was evaluated using t-statistics and p-values, while the overall goodness of fit of the model was assessed through the R-squared, F-statistic, and Prob > F values.

In addition to the regression model, diagnostic tests were performed to validate the assumptions of the OLS model. The Breusch–Pagan/Cook–Weisberg test was used to detect heteroskedasticity, and the Breusch–Godfrey LM test was applied to test for autocorrelation in the residuals. These tests help ensure that the regression estimates are statistically reliable and suitable for interpretation.

Chapter 4: Overview of Agrani Bank Plc



অগ্রণী ব্যাংক প্লিএলসি.

Agrani Bank PLC.

Committed to serve the nation

4.1 Brief Overview of Agrani Bank PLC

Agrani Bank PLC a nationalized commercial bank (NCB) of Bangladesh established on 26 March 1972 under the Bangladesh Banks (Nationalization) Order 1972 by taking over two abandoned Pakistani banks Habib Bank and Commerce Bank. The bank has been converted to a Public Limited Company with 100% ownership of the government and started functioning as Agrani Bank Limited (ABL) from 15 November, 2007 taking over all assets, liabilities and business of Agrani Bank on the basis of Vendors Agreement signed between the Government and the Agrani Bank. After corporatization, the management of the bank has been given autonomy to make the bank competitive and to run its business effectively.

This bank with 935 outlets strategically located in almost all the commercial areas throughout Bangladesh, overseas Exchange Houses and hundreds of overseas Correspondents.

Agrani Bank is governed by a Board of Directors consisting of 12 members headed by a Chairman. The Bank is headed by the Managing Director & Chief Executive Officer; Managing Director is assisted by Deputy Managing Directors and General Managers. The bank has 11 Circle offices, 34 Divisions in head office, 62 zonal offices and 935 branches including 27 corporate and 40 AD (authorized dealer) branches.

4.2 History of Agrani Bank PLC

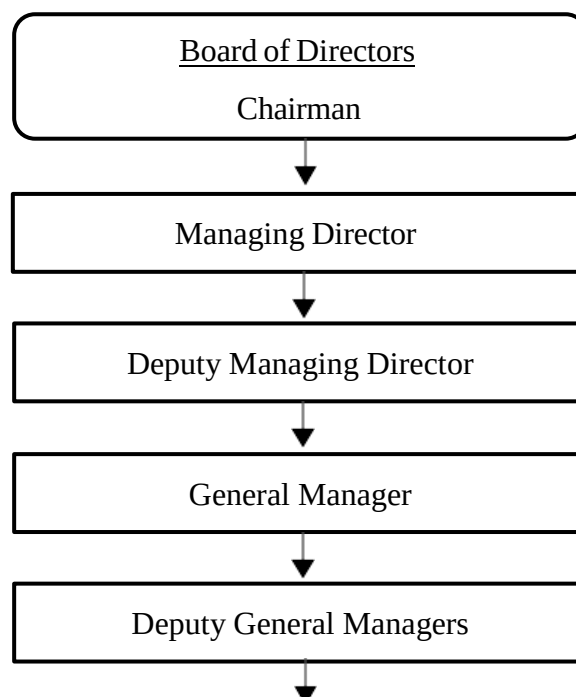
Agrani bank, in pursuance of Bangladesh banks (nationalization) order 1972 (P.O. No-26 of 1972) came into being in 1971 taking over the assets and liabilities of the east while Habib bank ltd. And commerce bank ltd. Functioning in the then East

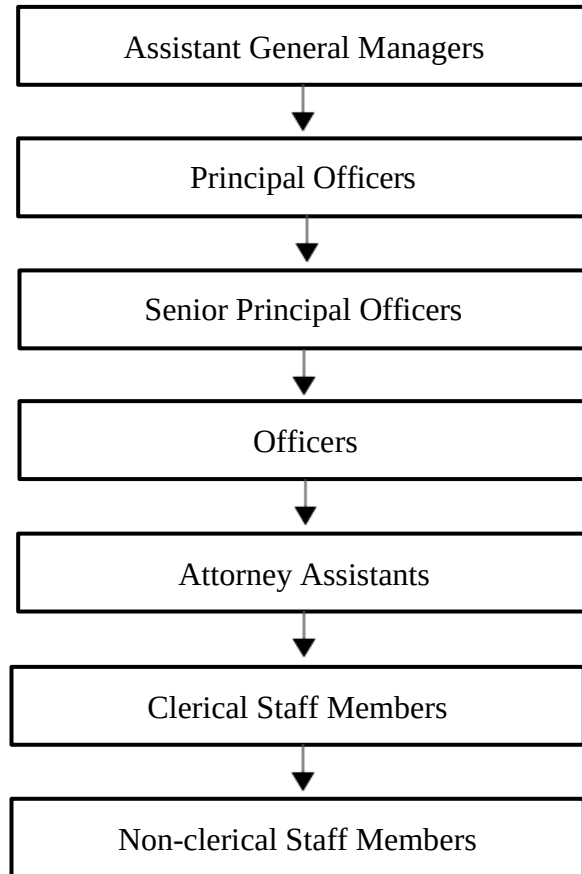
Pakistan. The bank started operation with 249 branches with its head office in Dhaka. In principle, it changed its motto from class banking to mass banking. As there had been poor banking structure and it failed to build sound banking infrastructure by local entrepreneurs before independence and the newly born independent country was down with enormous economic problem, the new govt. Agrani Bank being one of the largest nationalized commercial bank must shoulder the responsibility of expanding its network in rural area. Presently bank has its 561 branches out of total 891 branches located in rural areas implementing as many as 29 programs targeting rural people. During my internship at Agrani Bank PLC, I was placed in the Chattogram Corporate branch. I enjoyed my total working with the young, skilled & professional employees and earn my knowledge of Agrani Bank PLC Bangladesh.

4.3 Hierarchy

Agrani Bank PLC is governed by a Board of Directors consisting of 13(thirteen) members headed by a chairman. The Bank is headed by the Managing Director & Chief Executive Officer; Managing Director is assisted by Deputy Managing Directors and General Managers. The bank has 10 Circle offices, 30 Divisions in head office, 53 zonal and 867 branches including offices 27 corporate and 40 AD(authorized dealer) branches.

Hierarchy of Agrani Bank PLC





4.4 Vision

To become a leading bank of Bangladesh operating at international level of efficiency, quality and customer service.

It signifies to become the best leading state-owned commercial bank of Bangladesh operating at international level of efficiency, quality, sound management, customer service and strong liquidity.

4.5 Mission

Fusing ideas and lessons from best practice to explore new avenues to stay stronger and more efficient and competitive as well as applying information and communication technology for the benefit of customers and employees.

This refers to operate ethically and fairly within the stringent framework set by our regulators and to assimilate ideas and lessons from best practices to improve our business policies and procedures to the benefit of our customers and employees.

4.6 Value

Agrani Bank believes in integrity, transparency and accountability, and also value professionalism that will provide a high standard of service to all customers and stakeholders.

They believe value in integrity, transparency, accountability, dignity, growth and professionalism to provide high level of service to all their customers and stakeholders inside and outside the country.

4.7 Strategic Objectives

Agrani Bank provides commercial banking services to almost every types of people. The range of services provided by the Bank includes- making loans and advances, accepting deposits, discounting bills, directing domestic and international money transfers, carrying out foreign Exchange transactions in addition to international money transfers, and offering other customer services such as safe keeping, collections and issuing guarantees, acceptances and letters of credit. Core business of the Bank includes- deposit mobilization and lending activities including short- term, long- term, import and export financing. Financing activities are extended to different sectors of the economy that could be grouped in to several sectors including Rural & agriculture, Garments & Textiles, Jute, Cement & Bricks, Tannery, Steel & Engineering ,Food & Beverage, Chemical & Pharmaceuticals, Printing & Packing, Glass & Ceramics and miscellaneous. The core and highlighted strategic objectives are:-

- Winning at least 6.50 percent share of deposits and 5.50 percent share of loans and advances of Bangladeshi market.
- Gaining competitive advantages by lowering overall cost compared to that of competitors.
- Overtaking competitors by providing quality customer service.
- Achieving technological leadership among the peer group.
- Strengthening the Bank's brand recognition.

- Contributing towards the economic well-being of the country by focusing particularly on SME and agricultural sectors.
- Strengthening research capability for innovative products and services.
- To facilitate and handle all kinds of commercial banking services to its customer authorized by Bangladesh Bank.
- To handle the export and import trade of Bangladesh.
- To take part in international banking etc.

Chapter 5: Analysis

5.0 Data Analysis

This section presents the empirical analysis of the study in a logical sequence. It begins with descriptive statistics and trend analysis of the study variables, followed by correlation analysis, regression results, and post-estimation diagnostic tests. The purpose is to examine how non-performing loans (NPL), loan-to-deposit ratio (LDR), return on assets (ROA), and bank size influence the capital adequacy ratio (CAR) of Agrani Bank PLC over the study period.

5.1 Descriptive Statistics

Table 2 reports the summary statistics for the dependent variable (Capital Adequacy Ratio, CAR) and the four independent variables: Non-Performing Loan Ratio (NPL), Loan to Deposit Ratio (LDR), Return on Assets (ROA), and bank size (measured by the natural log of total assets).

Table 2: Summary Statistics

Variable	Mean	Max	Min	SD	Range	Kurtosis	Skewness	Median
CAR	8.39	10.24	4.560	2.137	5.68	1.876	-.704	9.64
NPL	21.305	40.49	12.460	8.294	28.03	3.855	1.28	18.31
LDR	65.118	79.65	53.810	9.874	25.84	1.614	.44	61.9
ROA	-.02	1	-1.120	.564	2.12	3.427	-.401	.11
Size	27.764	30.07	27.060	.865	3.01	6.349	2.074	27.595

The descriptive statistics indicate that the average CAR of Agrani Bank PLC over the study period was 8.39, with values ranging from 4.56 to 10.24, suggesting moderate variation in capital adequacy. NPL shows a relatively high mean of 21.305 and substantial dispersion (SD = 8.294), indicating that credit quality varied considerably across years. LDR averaged 65.118, reflecting moderate loan deployment relative to

deposit mobilization, though the wide range suggests shifts in lending aggressiveness over time. ROA recorded a mean of -0.02, implying weak overall profitability during the period, with both positive and negative returns observed. Bank size appears comparatively stable, with a mean of 27.764 and a low standard deviation of 0.865, although the high kurtosis suggests one or more unusually large observations.

5.2 Trend Analysis

Table 3 presents the yearly values of all variables from 2015 to 2024. This allows observation of temporal patterns and anomalies.

Table 3: Yearly Data (2015–2024)

Year	CAR	NPL	LDR	ROA	Size	Total
2015	9.54	18.95	55.64	0.12	27.06	111.31
2016	10.03	25.59	53.81	-1.12	27.15	115.46
2017	10.24	17.45	60.17	1	27.23	116.09
2018	10.09	17.67	63.63	0.13	27.39	118.91
2019	10.02	14.26	67.69	0.13	27.47	119.57
2020	9.74	12.46	56.42	-0.01	27.72	106.33
2021	7.55	16.7	59.28	0.12	30.07	113.72
2022	6.28	21.11	78.36	0.1	27.8	133.65
2023	4.56	28.37	76.53	0.06	27.87	137.39
2024	5.85	40.49	79.65	-0.73	27.883	153.143
Total	83.9	213.05	651.18	-0.2	277.643	1225.573

The trend analysis reveals several important patterns. First, CAR remained relatively stable and high between 2015 and 2019, staying around the 9.5 to 10.2 range. However, from 2020 onward, CAR declined sharply, falling to 4.56 in 2023 before recovering

slightly to 5.85 in 2024. This downward trend suggests a deterioration in the bank's capital strength during the later period.

Second, NPL displayed a worsening long-term pattern, despite some short-run improvement. After declining from 25.59 in 2016 to 12.46 in 2020, it rose steadily afterward and reached 40.49 in 2024, the highest value in the series. This pattern indicates mounting credit risk in recent years.

Third, LDR generally increased over time, especially after 2021. While it fluctuated in earlier years, it rose sharply to 78.36 in 2022, 76.53 in 2023, and 79.65 in 2024. This suggests more aggressive loan expansion relative to deposits in the later period.

Fourth, ROA was volatile throughout the study period, with negative profitability in 2016 (-1.12), 2020 (-0.01), and 2024 (-0.73). Although the bank recorded positive ROA in several years, the instability indicates weak and inconsistent profit performance.

Finally, bank size remained fairly stable, mostly within the 27.06–27.883 range, except for a notable spike to 30.07 in 2021, which may represent an exceptional reporting or asset expansion year. Overall, the trend results suggest that the period was marked by weakening capital adequacy, rising credit risk, and unstable profitability.

5.3 Correlation Analysis

Table 4 presents the pairwise correlation coefficients among all variables, with p-values in parentheses. This helps assess the direction and strength of linear relationships before regression.

Table 4: Pairwise Correlations

Variables	(1)	(2)	(3)	(4)	(5)
(1) CAR	1.000				
(2) NPL	-0.652	1.000			
		(0.041)			
(3) LDR	-0.802	0.598	1.000		

	(0.005)	(0.068)			
(4) ROA	0.174	-0.580	-0.050	1.000	
	(0.631)	(0.079)	(0.891)		
(5) Size	-0.403	-0.042	0.083	0.042	1.000
	(0.248)	(0.909)	(0.819)	(0.909)	

Note: p-values are reported in parentheses.

The correlation results show that CAR is negatively associated with both NPL and LDR, and both relationships are statistically meaningful at conventional levels. The correlation between CAR and NPL is -0.652 ($p = 0.041$), indicating that higher non-performing loans are associated with lower capital adequacy. The relationship between CAR and LDR is even stronger at -0.802 ($p = 0.005$), suggesting that greater loan exposure relative to deposits may substantially weaken the capital base.

By contrast, ROA has a weak positive correlation with CAR (0.174), but the relationship is statistically insignificant ($p = 0.631$), indicating that profitability alone does not show a clear direct association with capital adequacy in this sample. Similarly, bank size is negatively correlated with CAR (-0.403), though this relationship is also not statistically significant ($p = 0.248$).

Among the independent variables, NPL and LDR are positively correlated (0.598), implying that higher lending intensity may coexist with higher loan default pressure. However, the significance level is only marginal ($p = 0.068$). Overall, the correlation analysis provides preliminary evidence that rising loan risk and higher loan deployment may be associated with lower capital adequacy.

5.4 Regression Analysis

A multiple linear regression was estimated with CAR as the dependent variable and NPL, LDR, ROA, and Size as independent variables. Table 5 reports the coefficients, standard errors, t-values, p-values, and 95% confidence intervals.

Table 5: Linear Regression Results

Variable	Coefficient	Std. Err.	t- value	p- value	[95% Conf. Interval]	Sig.
NPL	-0.093	0.084	-1.11	0.317	-0.308	0.122
LDR	-0.121	0.058	-2.10	0.090	-0.269	0.027 *
ROA	-0.182	0.982	-0.19	0.860	-2.707	2.343
Size	-0.913	0.469	-1.95	0.109	-2.119	0.293
Constant	43.58	13.012	3.35	0.020	10.132	77.027 **
Mean dependent var			8.390	SD dependent var		2.137
R-squared			0.824	Number of obs		10
F-test			5.834	Prob > F		0.040
Akaike crit. (AIC)			35.162	Bayesian crit. (BIC)		36.675

*** $p < .01$, ** $p < .05$, * $p < .1$

The regression model explains a substantial proportion of the variation in CAR, with an R-squared of 0.824, meaning that 82.4% of the variation in capital adequacy is jointly explained by NPL, LDR, ROA, and bank size. The overall model is statistically significant (Prob > F = 0.040), indicating that the explanatory variables collectively have meaningful predictive power for CAR.

At the individual level, LDR has a negative and weakly significant effect on CAR ($\beta = -0.121$, $p = 0.09$). This implies that, holding other factors constant, a one-unit increase in LDR is associated with a 0.121 unit decrease in CAR. This result suggests that higher loan deployment relative to deposits may place downward pressure on the bank's capital adequacy.

Although NPL also has a negative coefficient ($\beta = -0.093$), it is statistically insignificant ($p = 0.317$). This indicates that while worsening asset quality appears to reduce CAR, its effect is not strong enough in the multivariate setting to confirm a reliable independent influence.

Similarly, ROA has a negative but highly insignificant coefficient ($\beta = -0.182$, $p = 0.860$). This finding suggests that profitability did not exert a stable or meaningful impact on capital adequacy during the sample period. One possible reason is that profitability was itself volatile and weak across years.

Bank size also shows a negative coefficient ($\beta = -0.913$, $p = 0.109$), suggesting that larger asset size may be associated with lower CAR; however, the effect remains statistically insignificant at the 5% level and only approaches marginal significance. This may reflect that asset expansion without proportional capital strengthening can dilute capital adequacy.

Overall, the regression findings indicate that LDR is the most influential variable in the model, while NPL, ROA, and size do not show statistically significant independent effects after controlling for the other factors.

5.5 Diagnostic Tests

To ensure the reliability of the regression results, several diagnostic tests were conducted: multicollinearity (VIF), heteroskedasticity (Breusch-Pagan/Cook-Weisberg test), and autocorrelation (Breusch-Godfrey LM test).

5.5.1 Multicollinearity Test (VIF)

Table 6 reports the Variance Inflation Factor (VIF) and its reciprocal ($1/VIF$) for each independent variable.

Table 6: Variance Inflation Factor (VIF)

Variable	VIF	1/VIF
NPL	2.990	0.335
ROA	2.000	0.499
LDR	1.900	0.526
Size	1.020	0.978
Mean VIF	1.980	

VIF values range from 1.02 to 2.99, all well below the common threshold of 5 or 10. This indicates that multicollinearity is not a serious concern in this model. The highest VIF is for NPL (2.99), which is acceptable.

5.5.2 Heteroskedasticity Test

The Breusch-Pagan/Cook-Weisberg test was used to check for constant variance of the error terms.

Table 7: Breusch-Pagan/Cook-Weisberg Test for Heteroskedasticity

Test	chi ²	df	Prob > chi ²
Breusch-Pagan	1.07	1	0.3017

Since the p-value (0.3017) is greater than 0.05, the null hypothesis of constant variance cannot be rejected. This means there is no evidence of heteroskedasticity in the model. Accordingly, the regression residuals appear to satisfy the homoskedasticity assumption.

5.5.3 Autocorrelation Test

The Breusch-Godfrey LM test for serial correlation was performed on the residuals.

Table 8: Breusch-Godfrey LM Test for Autocorrelation

chi ²	df	Prob > Chi ²
0.096	1	0.756

The null hypothesis (H_0 : no serial correlation) is not rejected ($\chi^2 = 0.096$, $p = 0.756$). This indicates that the residuals are not serially correlated, which is expected given the relatively small time-series ($n=10$) but still confirms model adequacy.

The descriptive statistics reveal high volatility in NPL and negative mean ROA over the study period. Trend analysis shows a clear decline in CAR alongside rising NPL and LDR. Correlation analysis indicates strong negative relationships between CAR and both NPL and LDR. The regression model is jointly significant ($R^2 = 0.824$, $F = 5.834$, $p = 0.040$), with LDR emerging as the most influential predictor ($p = 0.090$). Diagnostic tests confirm no multicollinearity, heteroskedasticity, or autocorrelation, validating the regression results.

Chapter 6: Findings, Conclusion and Recommendations

6.1 Findings of the Study

The findings of the study indicate that the capital adequacy position of Agrani Bank PLC weakened over the period 2015 to 2024. The descriptive and trend results show that the Capital Adequacy Ratio (CAR) declined noticeably in the later years of the study, while the Non-Performing Loan Ratio (NPL) and Loan-to-Deposit Ratio (LDR) increased. This pattern suggests that the bank experienced growing risk exposure and rising pressure on its capital base over time. Profitability, measured by Return on Assets (ROA), remained unstable across the study period, and bank size showed limited variation except for one unusually high observation. Overall, the trend evidence points to a deterioration in financial strength, particularly in the most recent years covered by the analysis.

The correlation analysis further showed that CAR had a negative relationship with both NPL and LDR, indicating that weaker asset quality and more aggressive lending were associated with lower capital adequacy. The negative association between CAR and LDR was especially strong, while the relationship between CAR and NPL was also statistically meaningful at the bivariate level. By contrast, ROA had only a weak positive relationship with CAR, and bank size showed a moderate negative association, but neither was statistically significant. These findings suggest that risk-related indicators were more closely linked to capital adequacy than profitability or size.

The regression results provide a more refined explanation of these relationships. The model had strong explanatory power, with an R-squared of 0.824, and the overall regression was statistically significant. However, among the independent variables, only LDR showed a marginally significant negative effect on CAR. NPL, ROA, and bank size all had negative coefficients in the regression model, but their effects were not statistically significant at conventional levels. This implies that although several financial factors may influence capital adequacy, the lending-deposit structure of the bank appears to be the most immediate and measurable factor affecting CAR in this study.

The hypothesis testing results are consistent with these findings. The null hypotheses relating to NPL, ROA, and bank size were retained because their individual effects on CAR were not statistically significant. However, the null hypothesis for LDR was rejected at the 10 percent significance level, indicating that LDR had a weak but meaningful negative effect on CAR. Diagnostic tests also confirmed that the model was statistically acceptable, as no serious multicollinearity, heteroskedasticity, or autocorrelation problems were detected. Taken together, the findings show that the weakening capital adequacy of Agrani Bank PLC was accompanied mainly by growing lending pressure, rising credit risk, and unstable profitability.

6.2 Conclusion

This study examined the effect of bank size, profitability, and risk-related factors on the Capital Adequacy Ratio of Agrani Bank PLC using annual data from 2015 to 2024. The analysis was conducted through descriptive statistics, trend analysis, correlation analysis, and multiple regression estimation. The study concludes that capital adequacy at Agrani Bank PLC has weakened over time and that this deterioration occurred in an environment characterized by rising non-performing loans, increasing loan-to-deposit pressure, and unstable profitability.

The empirical evidence suggests that LDR is the most important determinant of CAR among the variables included in the model. Its negative coefficient indicates that as the bank increased lending relative to deposits, its capital adequacy position tended to decline. Although NPL, ROA, and bank size also showed negative relationships with CAR in the regression model, their effects were not statistically significant. This means that these variables may still matter economically, but the study could not establish strong independent effects within the selected sample and model.

In conclusion, the study finds that the capital strength of Agrani Bank PLC is influenced more by balance-sheet pressure linked to lending intensity than by profitability or size alone. The overall message of the study is that sustainable capital adequacy requires not only growth in banking operations but also prudent credit expansion, better asset quality management, and stronger internal financial discipline.

6.3 Policy Recommendations

Based on the findings of the study, Agrani Bank PLC should place greater emphasis on prudent loan growth and deposit-based balance-sheet management. Since LDR emerged as the most influential variable affecting CAR, the bank should avoid excessive loan expansion without corresponding support from deposit mobilization and capital planning. A more balanced approach to credit growth would help reduce pressure on risk-weighted assets and improve capital stability.

The bank should also strengthen its credit risk management framework. Although NPL was not statistically significant in the regression model, its rising trend remains a serious warning sign. Therefore, stronger loan appraisal, early warning systems, closer monitoring of delinquent accounts, and more effective recovery mechanisms are necessary. Reducing the accumulation of bad loans would improve asset quality and indirectly support capital adequacy in the long run.

Profitability should also receive closer strategic attention. The unstable behavior of ROA suggests that the bank needs to improve earnings quality through better asset utilization, cost efficiency, and income diversification. A stronger and more stable profit base would enhance retained earnings and gradually strengthen the bank's capital position.

At the policy level, Bangladesh Bank and other regulatory authorities should continue close supervision of state-owned commercial banks, particularly with regard to capital adequacy, asset quality, and lending behavior. Regulatory monitoring should pay attention not only to whether banks meet minimum capital requirements, but also to the internal financial conditions that may weaken capital over time. Supervisory stress testing, tighter monitoring of LDR and NPL trends, and stronger governance expectations for public sector banks could help improve overall banking sector stability.

Finally, bank management should integrate capital planning with risk management and strategic growth decisions. Capital adequacy should not be treated as a compliance issue only; it should be considered a central component of institutional sustainability, resilience, and stakeholder confidence.

6.4 Contribution of the Study

This study makes an academic contribution by adding institution-specific evidence to the literature on capital adequacy in Bangladesh. Much of the prior literature has focused either on profitability and non-performing loans or on panel analysis across multiple banks. By concentrating specifically on Agrani Bank PLC, this study provides a more focused understanding of how selected internal financial variables influence capital adequacy in a major state-owned commercial bank.

The study also contributes methodologically by applying a time-series case approach using recent annual data. This allows a detailed examination of how CAR changed over time in relation to NPL, LDR, ROA, and bank size. In doing so, the research offers a practical empirical framework that can be adapted for similar bank-level studies in Bangladesh and other developing banking systems.

From a practical perspective, the study contributes to management and policy discussions by identifying LDR as the most influential factor affecting CAR in the model. This provides a clear signal that credit expansion and deposit management deserve close attention when assessing the financial soundness of a bank. The study therefore offers useful insights for bank executives, regulators, and policymakers concerned with capital adequacy and banking stability.

6.5 Limitations of the Study

Like any empirical research, this study has several limitations. First, the study is based on a single bank, Agrani Bank PLC. Although this allows detailed institution-specific analysis, it limits the generalizability of the findings to the wider banking sector of Bangladesh. The results may not fully represent the behavior of private commercial banks, foreign banks, or other state-owned banks.

Second, the sample size is small because the study uses only ten annual observations from 2015 to 2024. A small sample restricts the statistical power of the analysis and may reduce the likelihood of detecting significant relationships for some variables. This may partly explain why several coefficients were not statistically significant even though their signs were economically meaningful.

Third, the study includes only four explanatory variables. While NPL, LDR, ROA, and bank size are important indicators, capital adequacy can also be influenced by other factors such as leverage, cost efficiency, macroeconomic conditions, inflation, GDP growth, interest rate movements, regulatory changes, and governance quality. The omission of these variables means that the model does not capture the full range of influences on CAR.

Fourth, the study relies entirely on secondary data collected from annual reports. Although annual reports are official and reliable documents, they may not provide enough detail to explore deeper operational or managerial factors behind capital adequacy movements. Therefore, the study is limited to the information disclosed in published financial statements.

6.7 Direction of Future Research

Future research can extend this study in several useful ways. First, researchers may conduct comparative studies across multiple commercial banks in Bangladesh, including both state-owned and private banks, to identify whether the determinants of capital adequacy differ across ownership structures and institutional models. Such an approach would improve generalizability and allow stronger sector-wide conclusions.

Second, future studies may expand the sample period or use quarterly data instead of annual data. A larger dataset would improve statistical robustness and provide a more detailed picture of short-term changes in capital adequacy. It may also help reveal effects that are not easily captured in a smaller annual dataset.

Third, additional explanatory variables should be included in future models. Variables such as leverage, cost-to-income ratio, net interest margin, liquidity ratio, GDP growth, inflation, and interest rates may provide a broader and more complete explanation of the determinants of CAR. Including macroeconomic and governance-related variables would also help explain how external and institutional factors interact with bank-specific indicators.

Fourth, future research may apply more advanced econometric techniques, especially when data from multiple banks or longer time periods are available. Panel regression,

dynamic models, or other robust estimation methods could produce more comprehensive findings and allow stronger inference regarding causal relationships.

Finally, qualitative or mixed-method studies may also be valuable. Interviews with bank officials, regulators, or risk managers could help explain why capital adequacy changes over time and how managerial decisions, regulatory responses, or institutional constraints shape the capital position of banks. Such work would complement the quantitative findings and deepen understanding of banking stability in Bangladesh.

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Appendix

Summary statistics

	Mean	Max	Min	SD	Range	Kurtosis	Skewness	Median
CAR	8.39	10.24	4.560	2.137	5.68	1.876	-.704	9.64
NPL	21.305	40.49	12.460	8.294	28.03	3.855	1.28	18.31
LDR	65.118	79.65	53.810	9.874	25.84	1.614	.44	61.9
ROA	-.02	1	-1.120	.564	2.12	3.427	-.401	.11
Size	27.764	30.07	27.060	.865	3.01	6.349	2.074	27.595

Pairwise correlations

Variables	(1)	(2)	(3)	(4)	(5)
(1) CAR	1.000				
(2) NPL	-0.652 (0.041)	1.000			
(3) LDR	-0.802 (0.005)	0.598 (0.068)	1.000		
(4) ROA	0.174 (0.631)	-0.580 (0.079)	-0.050 (0.891)	1.000	
(5) Size	-0.403 (0.248)	-0.042 (0.909)	0.083 (0.819)	0.042 (0.909)	1.000

Linear regression

CAR	Coef.	St.Err.	t-value	p-value	[95% Conf Interval]	Sig
NPL	-.093	.084	-1.11	.317	-.308 .122	
LDR	-.121	.058	-2.10	.09	-.269 .027	*
ROA	-.182	.982	-0.19	.86	-2.707 2.343	
Size	-.913	.469	-1.95	.109	-2.119 .293	
Constant	43.58	13.012	3.35	.02	10.132 77.027	**
Mean dependent var		8.390	SD dependent var		2.137	
R-squared		0.824	Number of obs		10	
F-test		5.834	Prob > F		0.040	
Akaike crit. (AIC)		35.162	Bayesian crit. (BIC)		36.675	

*** $p < .01$, ** $p < .05$, * $p < .1$

VIF

VIF	1/VIF
2.990	0.335
2.000	0.499
1.900	0.526
1.020	0.978
1.980	

estat hottest

Breusch-Pagan/Cook-Weisberg test for heteroskedasticity

Assumption: Normal error terms

Variable: Fitted values of CAR

H0: Constant variance

chi2(1) = 1.07

Prob > chi2 = 0.3017

Autocorrelation test

Breusch-Godfrey LM test for autocorrelation chi2	df	Prob>Chi2
0.096	1	0.756

H0: no serial correlation

