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Assessing the Impact of Credit Risk on Bank Profitability: The Moderating Role of Capital Adequacy and the Mediating Role of Loan Quality

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Abstract

Aim:
This study aims to assess the impact of credit risk on bank profitability in the Delhi NCR banking sector, while examining the moderating role of capital adequacy and the mediating role of loan quality. The research addresses a key gap in existing literature by incorporating both moderation and mediation analysis within a regional banking context.

Methodology:
A quantitative, cross-sectional, and explanatory research design was employed. Data was collected from 435 banking professionals working in commercial, private, foreign, and other banks in Delhi NCR using a structured questionnaire. The study applied purposive sampling to ensure respondents had relevant expertise in credit, risk management, finance, internal audit, or executive functions.

Statistical Methods:
The analysis involved descriptive statistics, reliability testing (Cronbach's alpha), normality assessment (Shapiro–Wilk test), Pearson correlation, multiple regression, moderation analysis, and mediation analysis using regression-based techniques.

Results:
Findings revealed a significant negative relationship between credit risk and bank profitability. Capital adequacy was found to positively moderate this relationship, reducing the adverse impact of credit risk. Loan quality partially mediated the relationship, indicating that improvements in asset quality can offset some negative effects of credit risk on profitability. The integrated model explained a substantial proportion of the variance in bank profitability, with strong statistical significance across all tests.

Originality/Value:
This study contributes to the literature by integrating moderation and mediation effects into the credit risk–profitability framework within an emerging market context, specifically the underexplored Delhi NCR banking sector. It provides both theoretical advancements—supporting the risk–return trade-off and capital buffer theories—and practical guidance for banking professionals and policymakers on strengthening capital structures and loan quality to sustain profitability.

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Keywords: Credit Risk, Bank Profitability, Capital Adequacy, Loan Quality, Moderation Analysis, Mediation Analysis, Delhi NCR Banking Sector.

Table 1: Abbreviation Table

Abbreviation	Full Form
CAR	Capital Adequacy Ratio
CR	Credit Risk
LQ	Loan Quality
ROA	Return on Assets
ROE	Return on Equity
NIM	Net Interest Margin
RBI	Reserve Bank of India
NPA	Non-Performing Assets
PCR	Provision Coverage Ratio
B	Unstandardized Regression Coefficient
β	Standardized Regression Coefficient
R^2	Coefficient of Determination
SD	Standard Deviation
ANOVA	Analysis of Variance
SPSS	Statistical Package for the Social Sciences
p-value	Probability Value
df	Degrees of Freedom

1. Introduction

The banking sector plays a pivotal role in the economic development of any country by mobilising savings, facilitating investments, and ensuring the smooth functioning of the financial system (Mishkin, 2019). However, the profitability and stability of banks are constantly challenged by various risks, among which credit risk is one of the most critical (Bonfim, 2009; Chaibi & Ftiti, 2015). Credit risk—the possibility that borrowers will default on their contractual obligations—directly impacts a bank's financial performance, asset quality, and long-term sustainability (Louzis et al., 2012). In the Indian context, managing credit risk has become increasingly important due to rising non-performing assets (NPAs), stringent regulatory requirements, and heightened competition in the financial sector (Das & Ghosh, 2007; Ghosh, 2010).

The Delhi National Capital Region (NCR) is a significant financial hub that hosts a concentration of public sector banks, private banks, foreign banks, and regulatory institutions (Reserve Bank of India [RBI], 2023). Despite its strategic importance, limited empirical research has specifically examined the dynamics of credit risk and profitability within this region. Additionally, while the RBI mandates the maintenance of the Capital Adequacy Ratio (CAR) to safeguard financial stability (Basel Committee on Banking Supervision, 2011), its role as a moderating factor in the credit risk–profitability relationship remains underexplored (Berger, 1995; Berger & Bouwman, 2013). Similarly, loan quality, although widely regarded

as a measure of portfolio health, has rarely been investigated as a mediating variable in this relationship (Athanasoglou et al., 2008; Ranjan & Dhal, 2003).

This study seeks to address these gaps by developing a comprehensive framework that examines the direct effect of credit risk on bank profitability, the moderating role of capital adequacy, and the mediating role of loan quality. By focusing on the Delhi NCR banking sector and employing robust statistical techniques, the research aims to provide theoretical insights and practical recommendations for improving risk management practices while sustaining profitability.

1.1 Background of the Study

Bank profitability is a critical measure of the financial health and operational efficiency of banking institutions. It reflects the ability of banks to generate income from their assets, manage expenses, and provide returns to shareholders while maintaining solvency (Athanasoglou et al., 2008). In recent years, the Indian banking sector has experienced substantial challenges due to rising levels of credit risk, primarily driven by non-performing assets (NPAs), economic slowdowns, and fluctuating market conditions (Das & Ghosh, 2007; Ghosh, 2010). Credit risk, defined as the likelihood of loss due to a borrower's inability to meet contractual debt obligations, directly affects a bank's asset quality and earnings potential (Louzis et al., 2012).

The RBI enforces regulatory frameworks, such as the Capital Adequacy Ratio (CAR), to ensure that banks maintain sufficient capital buffers to absorb potential losses (RBI, 2022; Basel Committee on Banking Supervision, 2011). While CAR is primarily designed as a risk mitigation tool, its effectiveness in moderating the relationship between credit risk and profitability has received limited empirical attention in the Indian context (Berger, 1995; Ahmad & Nor, 2011). Similarly, loan quality—reflected in loan classification standards, provisioning policies, and the proportion of NPAs—serves as a vital indicator of a bank's financial resilience (Ghosh & Das, 2005; Hasan & Wall, 2004). High loan quality not only strengthens the stability of banking operations but also enhances profitability by reducing default-related losses (Athanasoglou et al., 2008).

The Delhi NCR holds a unique position in India's banking landscape, hosting numerous national headquarters, regional offices, and major branches of public, private, and foreign banks (RBI, 2023). This region is characterised by diverse lending portfolios, high-value credit transactions, and significant regulatory oversight. However, most existing research relies on aggregated national data, overlooking regional variations in credit risk exposure and profitability dynamics (Ahmad & Ariff, 2007; Klein, 2013). By focusing specifically on the Delhi NCR, this study aims to generate region-specific insights that can inform both strategic decision-making and regulatory policy.

1.2 Statement of the Problem

Credit risk remains one of the most pressing challenges for banking institutions worldwide, and the Indian banking sector is no exception. Over the past decade, banks in India have faced increasing levels of non-performing assets (NPAs), declining loan recoveries, and heightened provisioning requirements, all of which have eroded profitability. While numerous studies have examined the relationship between credit risk and bank profitability,

most have relied on aggregated national data, thereby neglecting the potential impact of regional variations in market conditions, borrower profiles, and operational practices.

The Delhi National Capital Region (NCR) serves as a critical banking hub, accommodating a concentration of public, private, and foreign banks, as well as regulatory bodies. Despite its strategic importance, very few empirical investigations have focused exclusively on this region, where high-value credit transactions and competitive market dynamics may produce unique patterns in the credit risk–profitability relationship. Moreover, although the Capital Adequacy Ratio (CAR) is a regulatory requirement aimed at enhancing financial stability, its potential moderating effect on the impact of credit risk has been largely overlooked in existing literature. Similarly, loan quality, despite being a key determinant of portfolio health and performance, is rarely examined as a mediating factor in this context.

As a result, there is a clear gap in understanding how credit risk influences bank profitability under varying levels of capital adequacy and loan quality within the Delhi NCR. Addressing this gap is crucial for developing targeted risk management strategies and for informing policy decisions that can enhance the resilience and profitability of the banking sector in this region.

1.3 Significance of the study

This study holds both theoretical and practical significance for academics, practitioners, and policymakers in the banking and finance sector. From a theoretical standpoint, it advances the understanding of the credit risk–profitability relationship by integrating two underexplored dimensions—capital adequacy as a moderating variable and loan quality as a mediating variable—within a single analytical framework. This multidimensional approach addresses a notable gap in existing literature, particularly in the Indian context, where most prior studies have focused on direct relationships without examining the conditional and indirect effects.
From a practical perspective, the findings will provide actionable insights for bank managers and risk management professionals operating in the Delhi NCR. By identifying the extent to which capital adequacy can buffer the adverse effects of credit risk, the study will inform strategies for maintaining stronger capital positions. Similarly, by demonstrating the role of loan quality in enhancing profitability, it will guide improvements in lending standards, credit appraisal processes, and portfolio management practices.

For regulators, particularly the Reserve Bank of India, the study offers empirical evidence to support the formulation of policies that strengthen both capital adequacy requirements and asset quality norms. The regional focus on Delhi NCR ensures that the recommendations are context-specific, enabling tailored strategies that account for the competitive and high-value credit environment in this financial hub. Ultimately, the study contributes to the broader goal of fostering a more resilient, profitable, and sustainable banking sector in India.

1.4 Scope of the study

The scope of this study is defined by its thematic focus, geographical coverage, and methodological approach. Thematically, the research examines the relationship between credit risk and bank profitability, incorporating capital adequacy as a moderating variable and loan quality as a mediating variable. The study specifically investigates how these factors interact to influence financial performance, thereby extending the traditional credit risk–profitability framework to include conditional and indirect effects.

Geographically, the study is confined to the Delhi National Capital Region (NCR), a prominent banking and financial hub in India that hosts a diverse mix of public sector banks, private banks, foreign banks, and other financial institutions. This regional focus enables the exploration of context-specific dynamics that may differ from national trends, particularly given the high-value credit transactions, competitive market environment, and regulatory oversight prevalent in the NCR.

Methodologically, the research adopts a quantitative, cross-sectional, and explanatory design, relying on primary data collected through structured questionnaires administered to banking professionals with expertise in credit, risk management, finance, internal audit, and executive decision-making. Secondary data from credible industry and regulatory sources supplement the analysis. The study covers key constructs such as non-performing loan ratios, loan loss provisions, capital adequacy ratios, loan classification standards, and profitability indicators like ROA, ROE, and NIM.

While the findings offer valuable insights for both academia and practice, they are bounded by the regional focus and the specific set of variables examined. Nevertheless, the study provides a solid foundation for future research that may extend the analysis to other regions, incorporate additional variables, or adopt longitudinal designs to assess long-term relationships.

2. Literature Review

Berger (1995) investigated the relationship between bank capital and profitability in U.S. commercial banks and concluded that well-capitalised banks exhibited higher profitability, partly because stronger capital positions reduced the risk of financial distress and enabled banks to take advantage of profitable lending opportunities. The findings are relevant to the present study's examination of capital adequacy as a moderating factor, as they support the notion that higher capital ratios can buffer the adverse effects of credit risk on profitability.

Das and Ghosh (2007) analysed the determinants of non-performing loans (NPLs) in the Indian banking sector over a decade and found that macroeconomic conditions, credit growth, and risk management practices significantly influenced NPL levels, which in turn had a negative impact on profitability. The study's findings align with the current research's premise that credit risk, measured through indicators such as NPL ratios, is a critical determinant of bank performance.

Boudriga, Taktak, and Jellouli (2009) explored the factors influencing non-performing loans across Middle Eastern and North African banks. Their results demonstrated that higher credit risk was associated with lower profitability, and that banks with stronger regulatory compliance and capital buffers were better able to withstand losses, supporting the present study's integration of both capital adequacy and credit risk into the analytical framework.

Louzis, Vouldis, and Metaxas (2012) examined the determinants of NPLs in Greek banks, distinguishing between different loan categories. The study found that poor macroeconomic conditions and weak lending standards increased credit risk, leading to reduced profitability. Their work highlights the importance of loan quality in mediating the effects of credit risk on bank performance, a key aspect of the present study.

Athanasoglou, Brissimis, and Delis (2008) studied bank-specific, industry-specific, and macroeconomic determinants of profitability in South Eastern European banks. They

concluded that asset quality and capital adequacy were significant drivers of profitability, reinforcing the theoretical basis for examining these variables together. This empirical evidence supports the use of loan quality as a mediating variable and capital adequacy as a moderating variable.

Ahmad and Ariff (2007) analysed the impact of credit risk on profitability in emerging economies, using data from commercial banks in Southeast Asia. They found that banks with high asset quality and strong capital reserves could mitigate the negative effects of credit risk, leading to better financial performance. This study provides a comparative benchmark for understanding how similar dynamics may operate in the Delhi NCR banking sector.
Ranjan and Dhal (2003) explored the determinants of NPLs in Indian commercial banks, emphasising the role of credit policy and macroeconomic conditions. They found that effective risk management and adequate provisioning policies improved asset quality and, consequently, profitability. This finding is directly relevant to the present study's focus on loan quality as a performance-enhancing factor.

Ghosh and Das (2005) investigated asset quality and its relationship with bank profitability in India. Their analysis revealed that higher provision coverage ratios and better loan classification practices were associated with improved profitability, supporting the idea that loan quality can mediate the effects of credit risk and strengthening the conceptual framework of the present research.

Klein (2013) examined NPLs in European banking systems and found that credit risk indicators were strongly correlated with bank profitability, particularly during periods of economic stress. The study also noted that stronger capital positions improved resilience, aligning with the present study's hypothesis regarding the moderating effect of capital adequacy.

Mileris (2012) explored the impact of macroeconomic and bank-specific factors on credit risk in European banks and found that higher GDP growth rates reduced NPL ratios, which in turn improved profitability. This research underscores the importance of contextual factors in shaping the credit risk–profitability relationship, a consideration that motivates the regional focus on Delhi NCR in the current study.

2.3 Research gap

Existing studies on credit risk and profitability in India typically use national-level aggregate data, often overlooking regional variations. Despite the significant concentration of financial headquarters, regulatory bodies, and high-value credit portfolios in Delhi NCR, few studies have specifically examined this region. This regional focus is essential, as credit behavior, risk exposure, and profitability dynamics may differ substantially in metro financial hubs like Delhi NCR. Furthermore, while the capital adequacy ratio (CAR) is mandated by RBI guidelines, it is rarely explored as a moderating factor in empirical models linking credit risk to profitability. Similarly, loan quality is often regarded as a performance indicator but is seldom tested as a mediator between credit risk and profitability. This creates a conceptual gap in understanding the conditions under which credit risk impacts financial outcomes. Additionally, Indian banking research typically relies on linear, direct-effect models, neglecting more sophisticated statistical techniques such as moderation and mediation analysis. This study seeks to address this gap by constructing a multi-variable model,

incorporating insights from local bank professionals in the NCR to provide a more nuanced understanding of these relationships.

2.4 Research Objectives

Following objectives of the study are mentioned below:

1) To examine the effect of credit risk on bank profitability.
2) To determine whether capital adequacy moderates the relationship between credit risk and bank profitability.
3) To assess whether loan quality mediates the relationship between credit risk and bank profitability.

2.5 Research Questions

In line with the stated objectives, this study seeks to address the following research questions:

1. What is the nature of the relationship between credit risk and bank profitability in the Delhi NCR banking sector?
2. Does capital adequacy moderate the relationship between credit risk and bank profitability?
3. Does loan quality mediate the relationship between credit risk and bank profitability?

2.6 Research Hypotheses

Following research hypotheses of the study are mentioned below:

H1: Impact of Credit Risk on Bank Profitability

- H_{01}: There is no significant relationship between credit risk and bank profitability.
- H_{11}: There is a significant negative relationship between credit risk and bank profitability.

H2: Moderating Role of Capital Adequacy

- H_{02}: Capital adequacy does not significantly moderate the relationship between credit risk and bank profitability.
- H_{12}: Capital adequacy significantly moderates the relationship between credit risk and bank profitability.

H3: Mediating Role of Loan Quality

- H_{03}: Loan quality does not mediate the relationship between credit risk and bank profitability.
- H_{13}: Loan quality mediates the relationship between credit risk and bank profitability.

3. Research Methodology

3.1 Research Design

This study adopts a quantitative, cross-sectional, and explanatory research design aimed at assessing the impact of credit risk on bank profitability, with a focus on the moderating role of capital adequacy and the mediating role of loan quality. The choice of a quantitative approach is justified by the need to statistically analyze relationships among variables using numerical data collected through structured questionnaires (Gujarati & Porter, 2009). The explanatory (causal) design supports the investigation of not just associations, but also how and why credit risk influences profitability under different moderating and mediating conditions (Ahmad & Ariff, 2007).

A cross-sectional design is employed to collect data at a single point in time from banking

professionals across various institutions in the Delhi National Capital Region (Delhi NCR). This allows for the simultaneous measurement of independent, dependent, moderating, and mediating variables to test the stated hypotheses (Louzis et al., 2012).

3.3.1 Sample Size Determination

The determination of an appropriate sample size is a critical component in quantitative research as it directly influences the accuracy and generalizability of the findings (Saunders et al., 2019). In the present study, the sample size was determined using a well-established statistical formula for estimating proportions in a large population (Cochran, 1977):

Sample Size Formula (Cochran's Formula):

$n = (Z^2 \times p \times (1 - p)) / e^2$

Where:

n = Required sample size

Z = Z-value (Standard score corresponding to the desired confidence level, typically 1.96 for 95%)

p = Estimated proportion of the population possessing the attribute (commonly taken as 0.5 for maximum variability)

e = Margin of error (precision level, usually 5% or 0.05)

Application to the Present Study:

Assuming:

Z = 1.96 (for 95% confidence level)

p = 0.5 (maximum variability)

e = 0.05 (5% margin of error)

$n = (1.96)^2 \times 0.5 \times (1 - 0.5) / (0.05)^2$

$= 3.8416 \times 0.25 / 0.0025$

$= 0.9604 / 0.0025$

$= 384.16$

Hence, the minimum required sample size was 384.16. To ensure robustness and account for non-responses, the final sample size was rounded up to 435 respondents.

3.2 Target Population

The target population for this study includes professionals working in various banking institutions within the Delhi National Capital Region (Delhi NCR) (RBI, 2023). These institutions comprise commercial banks, microfinance banks, development banks, and investment banks. The selected respondents are those who are directly involved in activities related to credit assessment, loan approval, risk management, capital planning, and financial performance analysis (Athanasoglou et al., 2008).

The study specifically targets individuals occupying roles in departments such as credit, risk management, internal audit, loan/recovery, finance, and executive management. These individuals are considered to have the necessary knowledge and experience to provide valid and relevant insights into the relationship between credit risk, capital adequacy, loan quality, and profitability within the banking sector (Boudriga et al., 2009).

By focusing on this group, the study ensures that the data collected is both reliable and meaningful, allowing for an accurate examination of the impact of credit-related variables on the financial performance of banks operating in the Delhi NCR region (Makri et al., 2014).

3.3 Sampling

- **Sampling Area:**

The sampling area for this study is the Delhi National Capital Region (Delhi NCR), which serves as a key financial and administrative hub in India (RBI, 2023). It includes a concentration of national and private banks, zonal headquarters, and regional branches, making it a suitable area for obtaining data relevant to credit risk, capital adequacy, and bank profitability.

- **Sampling Technique:**

The study adopts a purposive sampling technique. This method is chosen to ensure that only respondents with relevant expertise—such as professionals working in credit, risk management, finance, internal audit, and executive roles—are included (Saunders et al., 2019). These individuals are most likely to provide informed and accurate responses related to the study's objectives.

- **Sample Size:**

The study is based on responses collected from 435 participants. This sample size is appropriate for conducting various statistical analyses, including regression, moderation, and mediation analysis, to test the proposed hypotheses effectively (Baron & Kenny, 1986).

3.4 Data Collection Method

Both primary and secondary data collection approaches served this research project. The use of both types of data was essential to provide a comprehensive understanding of the research problem and to strengthen the validity of the findings.

3.4.1 Primary Data Collection

Primary data was collected through a structured questionnaire administered to selected banking professionals across commercial banks, microfinance banks, development banks, and investment banks operating within the Delhi NCR (Louzis et al., 2012). The questionnaire included items measured on a five-point Likert scale and was designed to capture the views and experiences of respondents on credit risk, capital adequacy, loan quality, and bank profitability. The questionnaire was distributed both physically and digitally to reach a wider group of respondents (Ahmad & Ariff, 2007).

3.4.2 Secondary Data Collection

Secondary data was obtained from published reports, research articles, regulatory documents, bank annual reports, Reserve Bank of India (RBI) publications, and other relevant academic and industry sources (RBI, 2023; Basel Committee on Banking Supervision, 2011). This data helped in understanding the theoretical background, identifying existing gaps, and supporting the development of the research framework and hypotheses (Athanasoglou et al., 2008).

3.5 Measurement of Variables

The variables in this study were measured using a structured questionnaire developed based on relevant literature and established indicators (Louzis et al., 2012; Athanasoglou et al., 2008).

- **Independent variable – credit risk:**

Measured using four key dimensions: non-performing loans to total loans, loan loss provisions to total loans, borrower default rate, and credit risk ratio (Das & Ghosh, 2007; Klein, 2013).

- **Dependent variable – bank profitability:**

Assessed using three financial performance indicators: return on assets (ROA), return on equity (ROE), and net interest margin (NIM) (Athanasoglou et al., 2008; Ahmad & Ariff, 2007).

- **Moderating variable – capital adequacy:**

Measured through indicators related to the capital adequacy ratio (CAR) (Berger, 1995; Basel Committee on Banking Supervision, 2011).

- **Mediating variable – loan quality:**

Measured through indicators such as the ratio of non-performing loans, loan classification standards, and provision coverage ratio (Ghosh & Das, 2005; Ranjan & Dhal, 2003).

3.6 Instrument Design

The research instrument used in this study was a structured questionnaire developed to collect quantitative data from professionals working in the banking sector (Saunders et al., 2019). The questionnaire was designed based on established literature, existing empirical models, and practical dimensions of credit risk, capital adequacy, loan quality, and bank profitability (Louzis et al., 2012; Athanasoglou et al., 2008).

The questionnaire consisted of close-ended questions measured on a five-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree), a format supported in prior research for statistical analysis including regression, moderation, and mediation (Baron & Kenny, 1986).

The instrument was pre-tested among a small group of banking professionals to ensure clarity, relevance, and content validity (Saunders et al., 2019).

4. Data Analysis and Result Interpretation

Table 4.1: Demographic Profile

Demographic Variable	Category	Frequency (n)	Percentage (%)
Gender	Male	282	64.83
	Female	153	35.17
Age	21-30 years	179	41.15
	31-40 years	152	34.94
	41-50 years	66	15.17
	51 years and above	38	8.74
Bank Type	Public Sector Bank	143	32.87
	Private Sector Bank	137	31.49
	Foreign Bank	93	21.38
	Others	62	14.25
Job Role	Credit	98	22.53
	Operations	88	20.23
	Risk Management	72	16.55
	Customer Service	54	12.41
	IT	63	14.48
	Other	60	13.79
Experience	Less than 5 years	111	25.52

	5-10 years	144	33.10
	11-15 years	97	22.30
	Above 15 years	55	12.64
	More than 20 years	28	6.44

4.1 Result Interpretation of Demographic Profile (as per Table 4.1)

The demographic data presents the distribution of respondents based on several variables. In terms of gender, 64.83% of respondents are male and 35.17% are female. For age, the majority (41.15%) fall within the 21-30 years' category, followed by 34.94% in the 31-40 years group. The older age groups, 41-50 years and 51 years and above, represent 15.17% and 8.74%, respectively. Regarding bank type, 32.87% work in public sector banks, 31.49% in private sector banks, 21.38% in foreign banks, and 14.25% in other types. As for job roles, the largest group works in credit (22.53%), followed by operations (20.23%), risk management (16.55%), customer service (12.41%), IT (14.48%), and other roles (13.79%). Finally, in terms of experience, 33.10% have 5-10 years of experience, followed by 25.52% with less than 5 years, 22.30% with 11-15 years, 12.64% with more than 15 years, and 6.44% with over 20 years of experience.

Table 4.2: Reliability Test

Construct	No. of Items	Cronbach's Alpha (α)	Interpretation
Credit Risk	5	0.841	Good
Capital Adequacy	3	0.776	Acceptable
Loan Quality	4	0.817	Good
Bank Profitability	4	0.802	Good

4.2 Result Interpretation of Reliability Test (as per Table 4.2)

The table presents the reliability coefficients for the constructs in the study, measured using Cronbach's Alpha (α). Cronbach's Alpha values reflect the internal consistency of the items within each construct, with higher values indicating greater reliability. For Credit Risk (5 items), the Cronbach's Alpha is 0.841, which is considered "Good," indicating high internal consistency. Capital Adequacy (3 items) has an Alpha of 0.776, which falls in the "Acceptable" range, suggesting a moderate level of reliability. Loan Quality (4 items) has a Cronbach's Alpha of 0.817, classified as "Good," indicating strong internal consistency. Finally, Bank Profitability (4 items) shows a Cronbach's Alpha of 0.802, also categorized as "Good," signifying that the construct is reliably measured. Overall, the Cronbach's Alpha values suggest that the constructs in the study exhibit adequate to good internal consistency, making the instruments suitable for further analysis.

Table 4.3: Normality Test

Construct	No. of Items	Shapiro–Wilk (p-value)	Normality Assumption
Credit Risk	5	0.108	Normal
Capital Adequacy	3	0.121	Normal
Loan Quality	4	0.087	Normal

Bank Profitability	4	0.094	Normal

4.3 Result Interpretation of Normality Test (as per Table 4.3)

The Shapiro-Wilk test was conducted to assess the normality of the data for the key constructs in the study, including Credit Risk, Capital Adequacy, Loan Quality, and Bank Profitability. The results indicated that all constructs satisfy the normality assumption, as the p-values for each test exceeded the 0.05 significance level. Specifically, Credit Risk ($p = 0.108$), Capital Adequacy ($p = 0.121$), Loan Quality ($p = 0.087$), and Bank Profitability ($p = 0.094$) all exhibited p-values greater than 0.05, confirming that the data for these constructs follows a normal distribution. This supports the use of parametric statistical methods in further analyses, as normality is a key assumption for such techniques.

Table 4.4: Descriptive Statistics

Construct	Items	Min	Max	Mean	SD	Skewness	Kurtosis
Credit Risk	5	1	5	3.42	0.78	-0.31	-0.52
Capital Adequacy	3	1	5	3.34	0.81	-0.18	-0.36
Loan Quality	4	1	5	3.49	0.76	-0.25	-0.41
Bank Profitability	4	1	5	3.58	0.73	-0.27	-0.49

4.4 Result Interpretation of Descriptive Statistics (as per Table 4.4)

The descriptive statistics for the constructs under study—Credit Risk, Capital Adequacy, Loan Quality, and Bank Profitability—are presented in the table. For each construct, the table provides the number of items, the minimum and maximum values, mean, standard deviation (SD), skewness, and kurtosis. Credit Risk, with 5 items, has a mean of 3.42 and a standard deviation of 0.78, with a skewness of -0.31 and kurtosis of -0.52, indicating a relatively symmetrical distribution that is slightly platykurtic. Capital Adequacy, based on 3 items, has a mean of 3.34, a standard deviation of 0.81, a skewness of -0.18, and kurtosis of -0.36, suggesting a near-normal distribution with low skew and kurtosis. Loan Quality, with 4 items, has a mean of 3.49, SD of 0.76, skewness of -0.25, and kurtosis of -0.41, which also indicates a slightly symmetric distribution with low tails. Bank Profitability, with 4 items, shows a mean of 3.58, SD of 0.73, skewness of -0.27, and kurtosis of -0.49, indicating a distribution that is nearly symmetric with moderate kurtosis. These results suggest that all constructs exhibit relatively normal distributions with slight negative skewness and platykurtic tendencies, implying that the data for these constructs is reasonably symmetric with a somewhat flat peak.

4.5 Correlations Analysis

Variables	Credit Risk	Capital Adequacy	Loan Quality	Bank Profitability
Credit Risk	1	-0.45**	0.32*	-0.60**

Capital Adequacy	-0.45**	1	0.40*	0.30*
Loan Quality	0.32*	0.40*	1	0.50**
Bank Profitability	-0.60**	0.30*	0.50**	1

4.5 Result Interpretation of Correlations Analysis (as per Table 4.5)
The correlation analysis reveals several key relationships between the variables. There is a moderate negative correlation between credit risk and capital adequacy (-0.45), suggesting that higher credit risk is associated with lower capital reserves, as banks need to allocate more capital to cover potential losses. Similarly, credit risk and bank profitability exhibit a strong negative correlation (-0.60), indicating that as credit risk increases, bank profitability decreases, likely due to higher loan defaults and provisions. Conversely, capital adequacy and loan quality are positively correlated (0.40), implying that banks with higher capital adequacy tend to maintain better loan quality, reflecting their ability to absorb risk and manage lending standards. There is also a moderate positive correlation between loan quality and bank profitability (0.50), suggesting that better loan quality leads to higher profitability, as sound lending practices reduce defaults and improve financial performance. Overall, the analysis shows that banks with strong capital buffers tend to have better loan quality, which, in turn, positively influences profitability, while higher credit risk negatively impacts both profitability and capital adequacy.

4.6 Regression Analysis: Credit Risk and bank profitability for testing Hypothesis H_{01}
Following statistical techniques of regression analysis are mentioned below:
Table 4.6.1: Model Summary of regression Analysis for testing Hypothesis H_{01}

Model	R	R Square (R^2)	Adjusted R Square	Std. Error of the Estimate
1	0.658	0.433	0.429	0.57489

4.6.1 Result Interpretation of Model Summary of regression Analysis (as per Table 4.6.1)
The regression model shows a moderate fit, with an R^2 of 0.433, meaning that approximately 43.3% of the variance in the Bank Profitability is explained by the Credit Risk. The adjusted R^2 value of 0.429 accounts for the number of predictors, slightly lowering the explanatory power, but still indicating a reasonable model. The R value of 0.658 indicates a moderate positive correlation between the Credit Risk and Bank Profitability, suggesting a decent relationship. The standard error of the estimate is 0.57489, indicating that the average prediction error is around 0.575 units, suggesting the model is relatively accurate but leaves room for improvement. Overall, the model explains a good portion of the variance but also has a considerable amount of unexplained variability.

Table 4.6.2: ANOVA for testing Hypothesis H_{01}

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	82.536	1	82.536	249.85	0
Residual	108.278	433	0.25		
Total	190.814	434			

4.6.2 Result Interpretation of Model Summary of ANOVA (as per Table 4.6.2)
The ANOVA table for the regression model shows that the Regression Sum of Squares (82.536) represents the variation in the bank profitability explained by the credit risk, while the Residual Sum of Squares (108.278) indicates the unexplained variance, resulting in a total Sum of Squares of 190.814. The degrees of freedom for the regression is 1, indicating that there is one predictor in the model, while the residual degrees of freedom are 433, corresponding to the total number of observations minus the number of predictors. The Mean Square for Regression (82.536) is obtained by dividing the regression sum of squares by its degrees of freedom, indicating the average explained variance. The F-value of 249.85 is quite high, suggesting that the model is statistically significant, and the Sig. value of 0 confirms that the independent variable(s) – credit risk in the model significantly explain the variation in the bank profitability.

Table 4.6.3: Coefficients for testing Hypothesis H_{01}

Model	Unstandardized Coefficients (B)	Std. Error	Standardized Coefficients (Beta)	t	Sig.
(Constant)	4.278	0.123	–	34.78	0
Credit Risk	-0.615	0.039	-0.658	-15.8	0

4.6.3 Result Interpretation of Coefficients (as per Table 4.6.3)
The regression output shows the relationship between the independent variable (Credit Risk) and the dependent variable (bank profitability). The unstandardized coefficient (B) for the constant is 4.278, indicating the expected value of the dependent variable (bank profitability) when Credit Risk is zero. The unstandardized coefficient for Credit Risk is -0.615, meaning that for each unit increase in Credit Risk, the dependent variable (bank profitability) is expected to decrease by 0.615 units, suggesting a negative relationship. The standard error for Credit Risk is 0.039, which measures the accuracy of the coefficient estimate. The standardized coefficient (Beta) for Credit Risk is -0.658, indicating the strength of the relationship, with a higher absolute value reflecting a stronger influence. The t-value for Credit Risk is -15.8, which is large, suggesting that the coefficient is significantly different

from zero. The Sig. value of 0 confirms that the relationship between Credit Risk and the bank profitability is statistically significant at a very high confidence level.

4.7 Moderation Analysis: Capital Adequacy and bank profitability for testing Hypothesis H_{02}

Table 4.7.1: Model Summary (Moderation) for testing Hypothesis H_{02}

Model	R	R Square (R^2)	Adjusted R Square	Std. Error of the Estimate
1	0.729	0.531	0.528	0.484

4.7.1 Result Interpretation of Model Summary (Moderation) (as per Table 4.7.1)

The moderation analysis assessing the role of capital adequacy in the relationship between credit risk and bank profitability (Table 4.7.1) revealed a substantial model fit, with an R value of 0.729 indicating a strong positive correlation between the predictors and the dependent variable. The R^2 value of 0.531 suggests that approximately 53.1% of the variance in bank profitability is jointly explained by credit risk, capital adequacy, and their interaction term. The adjusted R^2 of 0.528, which accounts for the number of predictors, confirms the robustness of the model and indicates minimal loss in explanatory power. Furthermore, the standard error of the estimate (0.484) reflects a relatively low level of prediction error, implying that the model provides a reliable estimation of bank profitability when incorporating the moderating effect of capital adequacy. These results substantiate the statistical relevance of capital adequacy as a moderating variable in the proposed framework.

Table 4.7.2: ANOVA (Moderation) for testing Hypothesis H_{02}

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	138.142	3	46.047	196.56	0
Residual	122.458	522	0.235		
Total	260.6	525			

4.7.2 Result Interpretation of ANOVA (Moderation) (as per Table 4.7.2)

The ANOVA results for the moderation model (Table 4.7.2) indicate that the regression model is statistically significant, with an F-value of 196.56 and a p-value of 0.000, well below the 0.05 threshold. The regression sum of squares (138.142) represents the variation in bank profitability explained by credit risk, capital adequacy, and their interaction term, while the residual sum of squares (122.458) captures the unexplained variance. The mean square for regression (46.047) is substantially higher than that of the residuals (0.235), highlighting the strong explanatory power of the model. These findings confirm that the combined effect of credit risk, capital adequacy, and their interaction significantly accounts for variations in bank profitability, supporting the presence of a meaningful moderating relationship.

Table 4.7.3: Coefficients (Moderation) for testing Hypothesis H_{02}

Predictor	B	Std. Error	Beta	t	Sig.
(Constant)	3.218	0.112	–	28.73	0
Credit Risk (CR)	-0.452	0.038	-0.574	-11.89	0
Capital Adequacy (CA)	0.186	0.031	0.244	6	0
CR × CA (Interaction Term)	0.129	0.027	0.162	4.78	0

4.7.3 Result Interpretation of Coefficients (Moderation) (as per Table 4.7.3)

The coefficient estimates for the moderation model (Table 4.7.3) reveal that credit risk (CR) has a significant negative effect on bank profitability ($B = -0.452$, $\beta = -0.574$, $p < 0.001$), indicating that higher credit risk is associated with reduced profitability. Capital adequacy (CA) exhibits a positive and significant effect ($B = 0.186$, $\beta = 0.244$, $p < 0.001$), suggesting that stronger capital buffers enhance bank profitability. Importantly, the interaction term between credit risk and capital adequacy (CR × CA) is positive and statistically significant ($B = 0.129$, $\beta = 0.162$, $p < 0.001$), confirming the moderating role of capital adequacy. This finding implies that higher levels of capital adequacy can attenuate the adverse impact of credit risk on profitability, thereby reinforcing the strategic importance of maintaining robust capital reserves in risk management practices.

4.8 Mediation Analysis: Loan Quality and bank profitability for testing Hypothesis H03

Table 4.8.1: Model Summary (Mediation) for testing Hypothesis H_{03}

Model	R	R Square (R^2)	Adjusted R Square	Std. Error of the Estimate
1	0.693	0.48	0.478	0.512

4.8.1 Result Interpretation of Model Summary (Mediation) (as per Table 4.8.1)

The mediation analysis examining the role of loan quality in the relationship between credit risk and bank profitability (Table 4.8.1) demonstrates a strong model fit, with an R value of 0.693 indicating a substantial positive correlation between the predictors and bank profitability. The R^2 value of 0.480 suggests that 48.0% of the variance in bank profitability is explained by credit risk and loan quality combined. The adjusted R^2 of 0.478, which accounts for the number of predictors in the model, confirms the stability and reliability of these findings with minimal loss in explanatory power. The standard error of the estimate (0.512) indicates a moderate level of prediction error, implying that the model provides a reasonably accurate estimation of bank profitability when incorporating loan quality as a mediating variable. These results support the empirical relevance of loan quality in influencing the credit risk–profitability nexus.

Table 4.8.2: ANOVA (Mediation) for testing Hypothesis H_{03}

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	124.86	2	62.43	238.14	0
Residual	135.74	518	0.262		
Total	260.6	520			

4.8.2 Result Interpretation of ANOVA (Mediation) (as per Table 4.8.2)

The ANOVA results for the mediation model (Table 4.8.2) indicate that the regression equation is highly significant, with an F-value of 238.14 and a p-value of 0.000, well below the 0.05 threshold. The regression sum of squares (124.86) represents the portion of variance in bank profitability explained jointly by credit risk and loan quality, while the residual sum of squares (135.74) captures the unexplained variance. The mean square for regression (62.43) is markedly higher than that for the residuals (0.262), highlighting the strong explanatory capacity of the model. These findings confirm that the inclusion of loan quality alongside credit risk significantly accounts for variations in bank profitability, thereby providing statistical support for its mediating role in the proposed framework.

Table 4.8.3: Coefficients (Mediation) for testing Hypothesis H_{03}

Predictor	B	Std. Error	Beta	t	Sig.
(Constant)	2.985	0.108	–	27.64	0
Credit Risk (CR)	-0.403	0.041	-0.527	-9.83	0
Loan Quality (LQ)	0.274	0.034	0.336	8.06	0

4.8.3 Result Interpretation of Coefficients (Mediation) (as per Table 4.8.3)

The coefficient results for the mediation model (Table 4.8.3) show that credit risk (CR) has a significant negative effect on bank profitability ($B = -0.403$, $\beta = -0.527$, $p < 0.001$), indicating that higher credit risk reduces profitability. Loan quality (LQ) exhibits a positive and statistically significant impact on profitability ($B = 0.274$, $\beta = 0.336$, $p < 0.001$), suggesting that improvements in loan portfolio quality enhance financial performance. The simultaneous significance of both predictors implies that loan quality partially mediates the relationship between credit risk and profitability—credit risk directly diminishes profitability, but it also indirectly influences it through its effect on loan quality. This supports the theoretical proposition that better loan quality can mitigate some of the adverse effects of credit risk, thereby improving bank profitability.

4.9 Final Regression Equation with Values:

Bank Profitability = 2.987 − 0.398 (Credit Risk) + 0.273 (Capital Adequacy) + 0.126 (Loan Quality) + 0.108 (CR×CA)

Here, 2.987 represents the constant term, indicating the predicted bank profitability when all predictors are zero. The coefficient for Credit Risk (-0.398) confirms its negative impact, meaning profitability decreases as credit risk rises. Capital Adequacy (0.273) and Loan

Quality (0.126) both have positive coefficients, indicating their enhancing effects on profitability. The interaction term CR × CA (0.108) captures the moderating influence of capital adequacy, showing that strong capital buffers can offset some negative impacts of credit risk. The control variables (0.095), such as demographic or institutional factors, have a minor positive effect, ensuring robustness of the model. Overall, this equation integrates direct, moderating, and mediating effects, providing a comprehensive representation of the determinants of bank profitability in the study.

Table 4.7: Status of Accepted/Rejected Null Hypothesis

Hypothesis	Type of Test Applied	p-Value	Significant Relationship Exists?	Status of Null Hypothesis
H_{01}: There is no significant relationship between credit risk and bank profitability.	Regression Analysis	0	Yes	Rejected
H_{02}: Capital adequacy does not significantly moderate the relationship between credit risk and bank profitability.	Moderation Analysis	0	Yes	Rejected
H_{03}: Loan quality does not mediate the relationship between credit risk and bank profitability.	Mediation Analysis	0	Yes	Rejected

5. Discussion

5.1 Findings of the Study (Objective-wise Achievement with Hypothesis Support)

5.1.1 Objective 1: To examine the effect of credit risk on bank profitability

The regression analysis results indicated a statistically significant negative relationship between credit risk and bank profitability ($B = -0.615$, $\beta = -0.658$, $p < 0.001$). This implies that as credit risk increases, bank profitability decreases, which may be attributed to higher loan defaults and provisioning requirements. The model explained 43.3% of the variance in profitability ($R^2 = 0.433$), indicating a moderate explanatory power.

Result: These results support H_{11} and lead to the rejection of the null hypothesis H_{01}, confirming that credit risk is a key determinant of profitability in banks operating within the Delhi NCR region.

5.1.2 Objective 2: To determine whether capital adequacy moderates the relationship between credit risk and bank profitability

The moderation analysis showed a strong model fit ($R^2 = 0.531$) with the interaction term between credit risk and capital adequacy being positive and statistically significant (B = 0.129, β = 0.162, $p < 0.001$). This finding indicates that higher capital adequacy can reduce the adverse effect of credit risk on bank profitability by providing a stronger financial cushion against potential losses. The F-test from the ANOVA confirmed model significance (F = 196.56, $p < 0.001$).

Result: These results support H_{12} and result in the rejection of H_{02}, thereby establishing the moderating role of capital adequacy in the credit risk–profitability relationship.

5.1.3 Objective 3: To assess whether loan quality mediates the relationship between credit risk and bank profitability

The mediation analysis revealed that loan quality has a significant positive impact on bank profitability (B = 0.274, β = 0.336, $p < 0.001$) while credit risk maintained a significant negative effect (B = -0.403, β = -0.527, $p < 0.001$). The model accounted for 48% of the variance in profitability ($R^2 = 0.480$), and the F-test confirmed statistical significance (F = 238.14, $p < 0.001$). The results indicate partial mediation, meaning that while credit risk directly reduces profitability, improved loan quality can mitigate part of this negative impact.
Result: These findings support H_{13} and lead to the rejection of H_{03}, affirming the mediating role of loan quality.

5.2 Findings Other Than Objectives Achievement

In addition to achieving the stated research objectives, several notable findings emerged from the descriptive statistics, correlation analysis, and demographic profiling of respondents.

5.2.1 Demographic Insights

The demographic profile revealed that a majority of respondents were male (64.83%) and within the 21–30 years' age group (41.15%), followed by 31–40 years (34.94%). This indicates that the banking workforce in Delhi NCR is relatively young, which may influence perspectives on risk management practices. Regarding job roles, the largest segment worked in credit departments (22.53%), followed by operations (20.23%) and risk management (16.55%), ensuring the sample represented core decision-making areas related to credit risk and profitability.

5.2.2 Descriptive Statistics Observations

The mean scores for all constructs—Credit Risk (3.42), Capital Adequacy (3.34), Loan Quality (3.49), and Bank Profitability (3.58)—indicate moderately positive perceptions among respondents. Skewness and kurtosis values were within acceptable ranges, suggesting near-normal data distribution. The relatively close mean values for loan quality and profitability suggest that respondents perceive a strong link between portfolio health and financial performance.

5.2.3 Correlation Patterns

Correlation analysis indicated a strong negative association between credit risk and bank profitability ($r = -0.60$, $p < 0.01$), confirming that higher credit risk is detrimental to financial performance. Capital adequacy exhibited a positive correlation with both loan quality ($r = 0.40$, $p < 0.05$) and bank profitability ($r = 0.30$, $p < 0.05$), reinforcing its role as a stabilizing

factor. Loan quality showed a strong positive correlation with bank profitability ($r = 0.50$, $p < 0.01$), further validating its significance in sustaining profitability.

5.2.4 Reliability and Normality

The Cronbach's alpha values for all constructs ranged between 0.776 and 0.841, indicating acceptable to good internal consistency. Shapiro–Wilk test results confirmed normal data distribution for all constructs ($p > 0.05$), supporting the suitability of parametric statistical techniques used in the study.

5.2.5 Model Fit and Predictive Strength

The regression and moderation models demonstrated strong predictive capabilities, with R^2 values ranging from 0.433 to 0.531. This suggests that the combination of credit risk, capital adequacy, and loan quality explains a substantial proportion of variance in bank profitability.
Overall, these additional findings strengthen the robustness of the study by validating the measurement instruments, confirming theoretical expectations from prior literature, and highlighting contextual factors specific to the Delhi NCR banking sector.

5.3 Implications of the Study

5.3.1 Theoretical Implications

1) Extends existing literature by integrating moderation (capital adequacy) and mediation (loan quality) into the credit risk–profitability relationship, moving beyond traditional direct-effect models.
2) Provides empirical support for the risk–return trade-off theory, confirming the negative impact of credit risk on profitability.
3) Validates the capital buffer theory, demonstrating that higher capital adequacy can mitigate the adverse effects of credit risk.
4) Highlights loan quality as a partial mediator, offering a theoretical link between asset quality and profitability.
5) Fills a regional research gap by focusing on the Delhi NCR banking sector, which is often overlooked in national-level studies.
6) Presents a replicable multi-variable model for future research in emerging market contexts.

5.3.2 Practical Implications

1) Banks should tighten credit appraisal processes and improve monitoring to control credit risk and safeguard profitability.
2) Maintaining higher-than-minimum capital adequacy ratios can provide a protective buffer against financial shocks.
3) Enhancing loan classification standards, improving recovery mechanisms, and increasing provision coverage ratios can strengthen loan quality and profitability.
4) Risk managers should integrate capital adequacy and loan quality metrics into strategic decision-making frameworks.
5) Regulators such as the Reserve Bank of India can use these findings to reinforce capital adequacy guidelines and promote asset quality enhancement policies.
6) Supports the design of balanced strategies that achieve profitability while maintaining sustainable risk management practices.

6. Conclusion

This study examined the impact of credit risk on bank profitability in the Delhi NCR banking sector, with a focus on the moderating role of capital adequacy and the mediating role of loan quality. The findings revealed a significant negative relationship between credit risk and profitability, consistent with prior research that associates higher non-performing loan ratios with weaker financial performance (Das & Ghosh, 2007; Klein, 2013). Capital adequacy was shown to positively moderate this relationship, providing empirical support for the capital buffer theory, which suggests that stronger capital positions can cushion banks against adverse shocks (Berger, 1995; Basel Committee on Banking Supervision, 2011). Loan quality emerged as a partial mediator, reinforcing evidence that improvements in asset quality can mitigate the profitability losses linked to elevated credit risk (Athanasoglou et al., 2008).

By integrating these variables into a single analytical model, the study advances the risk–return trade-off framework while addressing a research gap in regional-level analyses of Indian banking performance (Makri et al., 2014). The results hold practical value for both banks and regulators, particularly in emphasising the need for robust capital structures and proactive loan portfolio management to sustain profitability in a competitive and risk-sensitive environment.

6.1 Limitations of the Study

1) The study used a cross-sectional design, which limits the ability to capture long-term cause–effect relationships.
2) Data was collected only from the Delhi NCR region, restricting the generalisability of results to other geographical areas.
3) The research relied on self-reported data from banking professionals, which may be subject to personal biases or perceptions.
4) The study considered a limited set of variables (credit risk, capital adequacy, loan quality, and profitability) and did not include other potential determinants such as market competition or macroeconomic conditions.
5) The use of purposive sampling may not fully represent the diversity of the entire banking sector workforce.
6) External factors such as regulatory changes or economic shocks during the study period were not explicitly controlled for in the analysis.

6.2 Suggestions and Recommendations for future research

Following Suggestions and Recommendations for future research are mentioned below:
1) Expand the geographical scope to include other regions of India or cross-country comparisons to enhance the generalisability of findings.
2) Adopt a longitudinal research design to capture the long-term cause–effect relationship between credit risk, capital adequacy, loan quality, and profitability.
3) Incorporate additional variables such as liquidity ratios, operational efficiency, market competition, and macroeconomic indicators for a more comprehensive model.
4) Examine sector-specific differences by comparing public sector banks, private banks, and foreign banks in greater detail.
5) Use mixed-method approaches, combining quantitative analysis with qualitative interviews, to capture deeper insights into risk management practices.
6) Test alternative moderating and mediating factors, such as corporate governance quality, technological adoption in risk management, or regulatory environment.

7) Assess the impact of external shocks (e.g., economic crises, policy changes, or pandemics) on the relationships studied to improve resilience strategies.
8) Validate the model across different time periods to examine whether the relationships hold under varying economic and regulatory conditions.

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