EXAMINING THE IMPACT OF CREDIT RISK, LIQUIDITY RISK, AND OPERATIONAL EFFICIENCY ON BANK PROFITABILITY: THE MODERATING ROLE OF CAPITAL STRUCTURE IN PAKISTAN

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ABSTRACT

This study investigates the determinants of bank profitability in Pakistan, focusing on the direct effects of credit risk (non-performing loans ratio, NPL), liquidity risk (loan-to-deposit ratio, LDR), and operational efficiency (operating expenses to operating income ratio, BOPO), while examining the moderating role of capital structure (debt-to-total assets ratio, DTA). It addresses gaps in the Pakistani banking literature, where evidence on risk-profitability relationships remains mixed and few studies jointly analyze these factors with capital structure moderation. A deductive, quantitative approach was employed, utilizing secondary panel data from 16 commercial banks listed on the Pakistan Stock Exchange over a 15-year period (2010–2024). Data was analyzed using Stata 17. The Hausman specification test was conducted, which supported the use of a random effects panel regression model for estimation. The results reveal significant negative impacts of credit risk, liquidity risk, and operational inefficiency on profitability (ROA). Capital structure significantly moderates these relationships: it amplifies the adverse effect of operational inefficiency but weakens the negative impact of credit risk on profitability. The model is statistically significant ($p < 0.01$) with an overall explanatory power of 62.7% (R-squared = 0.627).

The findings highlight the critical importance of integrated risk management and cost efficiency for sustaining bank profitability in Pakistan. For bank managers, the study underscores that leverage decisions must be carefully balanced with operational controls. For regulators, including the State Bank of Pakistan, the results suggest that supervisory frameworks should consider the conditional role of capital structure, advocating for policies that promote both prudent leverage and enhanced operational efficiency.

Keywords: Return to Asset (ROA), Loan to Deposit (LDR), Operational Efficiency (BOPO), Non-performing Loans (NPL), Capital Structure (DTA), Random Effects Model

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Hira Sabir

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CHAPTER NO 01:
INTRODUCTION

1.1 Background of Study

Bank profitability is a key sign of how well banks are managed and how strong they are in the financial system. Profitable banks can absorb losses, support businesses and households, and help maintain financial stability. In contrast, weak profitability limits a bank's ability to manage risks and can threaten the stability of the entire banking sector (García-Herrero et al., 2009). However, very high profitability is also not always desirable, as it may reflect weak competition or excessive risk-taking rather than true efficiency (Tan, 2014).

In many emerging economies, including Pakistan, banks operate under strict regulatory frameworks set by central banks such as the State Bank of Pakistan (SBP). These regulations include minimum capital requirements, liquidity coverage ratios, and limits on risky lending. While such policies aim to protect depositors and ensure financial stability, they also increase operational costs for banks. For example, SBP's implementation of Basel III capital and liquidity standards has required banks to hold higher capital buffers. Although this strengthens the banking system, it can reduce profitability if banks fail to manage costs efficiently or allocate assets wisely. (State Bank of Pakistan, 2013; Haris et al., 2020).

Banks in Pakistan have also faced several challenges in recent years, including rising non-performing loans (NPLs), tight monetary policy, and economic uncertainty. During periods of high inflation and interest rate hikes, banks experience higher funding costs and increased credit risk, especially when borrowers struggle to repay loans. Some banks have reported lower profits due to higher provisioning expenses and liquidity pressures, highlighting the importance of effective risk management and operational efficiency (Bibi & Mazhar, 2019). These examples show that profitability is not only driven by income generation but also by how well banks control risks and costs.

To measure profitability, previous studies commonly use accounting-based indicators such as return on assets (ROA) and return on equity (ROE) because market-based measures like stock

prices are often unstable or unavailable in developing countries (Bouheni et al., 2014; Naceur & Omran, 2010). Among these measures, ROA is the most widely used in banking research. ROA shows how efficiently a bank uses its total assets to generate profits and is not directly influenced by the bank's capital structure (Saleh & Afifa, 2020).

Several studies rely solely on ROA to evaluate bank profitability because it provides a clear picture of operational performance and asset utilization (Ercegovac et al., 2020; Obamuyi, 2013). Other researchers combine ROA with ROE or net interest margin (NIM) for a broader assessment (Abor, 2005; Mehzabin et al., 2022). However, in emerging markets where banks often operate with high leverage and relatively low equity, ROA is considered the most reliable and consistent measure of profitability (Saona, 2016).

Given these realities, understanding what drives bank profitability has become increasingly important. Factors such as credit risk, liquidity risk, operational efficiency, and capital structure play a crucial role in shaping bank performance. This study focuses on these factors to explain profitability variations in commercial banks, using ROA as the main performance indicator. By doing so, the study provides insights that are useful for bank managers, regulators, and policymakers who aim to strengthen the banking sector while maintaining sustainable profitability.

1.2 Problem Statement and Research Gap

The Pakistani banking sector operates under difficult conditions, including high credit risk, unstable liquidity, rising operational costs, and strict regulatory requirements. These challenges directly affect bank profitability, which is essential for financial stability and economic growth. Since Pakistan relies heavily on banks for financial intermediation, weak bank profitability can reduce credit availability and increase financial risk in the economy. Even though the importance of this issue, existing research provides unclear and mixed evidence on how bank-specific risks affect profitability in Pakistan (Nabi, 2023).

Previous studies report conflicting results regarding the relationship between credit risk and liquidity risk with bank profitability. Research from developed economies and the MENA region generally finds that higher risk reduces profitability. However, some studies from South Asian

countries show that higher risk-taking can increase profits under certain regulatory and market conditions (Saleh & Afifa, 2020). These mixed findings suggest that the impact of bank risks on profitability is highly dependent on country-specific factors such as regulatory enforcement, risk management practices, and loan portfolio quality. Therefore, international findings cannot be directly applied to the Pakistani banking sector.

Operational efficiency is another important factor influencing bank profitability. Inefficient banks face higher costs related to loan monitoring, recovery, and liquidity management, which reduces profits (Damanik, 2025). In Pakistan, banks have experienced rising administrative expenses, digitalization costs, and post-COVID operational restructuring. However, very limited research has examined operational efficiency together with credit risk and liquidity risk within a single empirical framework in Pakistan. This highlights a clear gap in existing literature.

Furthermore, the role of capital structure has not been adequately explored in Pakistani banking studies. Financial theories such as Agency Theory and Trade-Off Theory suggest that capital structure helps banks absorb losses and manage risks without severely affecting profitability (Fersi & Boujelbène, 2023). Although Basel III regulations emphasize capital adequacy and leverage control, most studies in Pakistan treat capital structure only as a direct determinant of profitability. Very few studies have tested whether capital structure changes the strength of the relationship between bank risks and profitability.

This research is significant because it addresses important gaps in the Pakistani banking literature by jointly examining credit risk, liquidity risk, and operational efficiency as key determinants of bank profitability. By including capital structure as a moderating variable, the study provides deeper insights into how banks can better manage risks under different capitalization levels. The findings will be useful for bank managers in improving risk management and cost efficiency strategies. In addition, the study will help policymakers and regulators, including the State Bank of Pakistan, in designing effective capital and risk-related regulations that support both profitability and financial stability.

The main objective of this study is to examine the impact of credit risk (NPL), liquidity risk (LDR), and operational efficiency (BOPO) on bank profitability (ROA) in the Pakistani banking sector. Additionally, the study aims to analyze whether capital structure, measured by the debt-to-asset ratio, moderates the relationship between bank-specific risks and profitability.

To address this problem, the study develops an integrated empirical model using panel data of Pakistani commercial banks. The model examines both the direct effects of credit risk, liquidity risk, operational efficiency on profitability and the moderating role of capital structure. By applying appropriate panel regression techniques, the study provides evidence-based conclusions that can guide banks in optimizing their risk exposure and capital decisions. The results are expected to support better risk management practices, improved operational efficiency, and stronger financial stability in the Pakistani banking system.

1.3 Research Objectives

The objective of this research is to:

1. To analyze the impact of credit risk on profitability of commercial banks in Pakistan.
2. To analyze the impact of liquidity risk on bank profitability in Pakistan.
3. To analyze the impact of operational efficiency on bank profitability in Pakistan.
4. To evaluate whether capital structure strengthens or weakens the relationship between risk factors, operational efficiency and profitability.

1.4 Research Questions

1. How does credit risk affect the profitability of commercial banks in Pakistan?
2. What is the effect of liquidity risk on bank profitability in Pakistan?
3. What is the effect of operational efficiency on bank profitability in Pakistan?
4. Does capital structure moderate the relationship between risks, efficiency and profitability?

1.5 Significance of the Study

The main significance of this study is that it fills important gaps in earlier research on bank profitability in emerging markets, especially Pakistan. Previous studies have mostly examined credit risk, liquidity risk, and operational efficiency separately, but very few studies have analyzed these factors together while also considering the moderating role of capital structure Damanik (2025). Although many researchers have studied the direct impact of bank-specific risks and efficiency on profitability in Pakistan, little attention has been given to how capital structure changes or influences the strength of these relationships. (Haris et al., 2020; Yao et al., 2018).

This study makes an important contribution by introducing capital structure, measured through the debt-to-asset ratio, as a moderating variable in the relationship between bank risks, operational efficiency, and profitability. By doing so, the study extends existing empirical work that largely focuses on direct effects and provides a more integrated understanding of how leverage can strengthen or weaken the impact of credit risk, liquidity risk, and operational efficiency on bank performance. This approach is particularly relevant in the context of Basel III–driven capitalization requirements, which have altered risk management practices in the Pakistani banking sector (Bibi & Mazhar, 2019).

The findings of this study enhance understanding of profitability drivers in emerging economies, where banks face rising non-performing loans, liquidity pressures, and increasing operational costs due to digital transformation and post-COVID adjustments (Shair et al., 2019; Ali & Puah, 2019). By empirically testing these relationships in a single framework, the study provides clearer evidence on how operational efficiency and capital structure jointly shape bank profitability.

From a practical perspective, the study offers useful insights for bank management by highlighting the importance of maintaining an optimal capital structure to manage risks effectively and improve profitability. In addition, the results may assist regulators, including the State Bank of Pakistan, in understanding how capital requirements interact with bank performance, supporting more informed regulatory and supervisory decisions aimed at financial stability (Haris et al., 2020).

This study contributes to the banking literature by providing context-specific evidence from Pakistan and advancing empirical understanding of the moderating role of capital structure in bank profitability analysis within emerging markets.

1.6 Summary of the Chapter

This chapter provides the background of the study by discussing the research topic and key variables, with a specific focus on the banking industry. It highlights the research problem related to the selected variables and explains the need for the current study. This chapter introduces the research topic to the reader by explaining its significance and scope.

CHAP 02:
LITERATURE REVIEW

2.1 Introduction of Chapter

This chapter provides a complete literature review. It starts by explaining the theory and past research behind every variable in the study's framework, showing how other researchers have found them to be connected. The chapter then presents the specific research hypotheses for this study and includes a summary table of the key literature. A major focus is explaining how capital structure acts as a moderating factor, how it influences the main relationships being examined. This chapter also presents the conceptual framework that ties all these elements together. In short, this section thoroughly covers all the existing knowledge that forms the foundation for the current research.

2.2 Theoretical Review

2.2.1 Underpinning Theories

This section will explain the main theories that support the connections between liquidity risk, operational efficiency, capital structure, and bank profitability. These theories help us understand why these variables matter and how they influence each other inside a bank's daily operations. As banks work by collecting deposits, giving loans, managing costs, and controlling risk, these theories guide the logic behind the relationships used in this study.

2.2.2 Financial Intermediation Theory

Financial intermediation theory explains the fundamental role of commercial banks in channeling funds within the economy. Banks collect funds from surplus units such as depositors and convert these into loans for deficit units (such as businesses and individuals who need financing). In this process, banks issue indirect debt like deposits to gather funds and then invest these resources into earning assets. (Goddard & Wilson, 2016)

Commercial banks have been the most important financial intermediaries, helping economies move beyond simple self-financing and direct borrowing. By managing deposits, loans, liquidity,

and risks, banks not only support economic activity but also generate profit from the spread between their funding costs and lending returns. (Bodie & Robert, 1998).

Gurley & Shaw (1955) were among the first to show how banks help economies shift from self-finance to more advanced financial systems. They explained the difference between direct finance, where lenders and borrowers interact without any middle party, and indirect finance, where banks stand in the middle and manage the flow of funds. Their work showed that banks are important not only because they transfer money from savers to borrowers but also because they reduce risks, provide financial stability, and make transactions faster and more reliable.

Later researchers expanded this idea. Allen & Santomero (1998) argued that the role of banks has grown even more with the development of financial markets and technology. They pointed out that banks now do much more than simple lending and borrowing. Modern banks help customers manage different types of financial risks, reduce the cost of participating in financial markets, and make these markets easier for ordinary people to access. They also use advanced tools like derivatives and securitization to manage risks more effectively.

Scholtens et al. (2003) argue that the traditional theory of financial intermediation does not fully explain the real role of modern banks. Although the traditional view offers useful insights, it predicts that intermediaries should become less important as information improves and transaction costs fall. The opposite happened. Banks and other financial institutions have become even more important, and their activities have expanded. This shows that traditional theory does not match real-world developments. The revised theory places risk management at the center of banking. It argues that the main value banks create is through transforming and absorbing risk. Banks take savings from people who prefer safety and liquidity and convert these funds into investments that match the risk profile of borrowers. This process, called qualitative asset transformation, is creative and essential. It allows banks to generate profit while supporting economic activity.

Bank profitability depends on how effectively banks transform savings into investments while managing risks. Financial intermediation theory not only provides the conceptual foundation but also directly generates all five hypotheses of my study. The theory emphasizes that banks earn profit by absorbing credit and liquidity risk and by managing operating costs efficiently. Also, because banks with lower capital ratios engage in more intensive intermediation, the negative effects of credit and liquidity risk on profitability should be stronger for highly leveraged banks.

The significant moderating role of capital structure therefore offers direct empirical validation of the risk-absorption and transformation view of modern financial intermediation theory in the Pakistani banking context.

2.2.3 Efficiency Structure Theory

Efficiency Structure Theory explains that banks become more profitable mainly because they are more efficient, not because they use market power or collusion (Demsetz, 1973; Peltzman, 1977). The idea is simple: when a bank manages its resources well, it operates at a lower cost. Because of this cost advantage, efficient banks can offer better loan rates, charge fair prices, attract more customers, and still earn higher profits. Berger (1995) strengthened this idea through the Efficient-Structure Hypothesis, showing that differences in efficiency, not just market concentration, explain why some banks dominate the market and earn more.

Over the time, the theory has expanded. Earlier, efficiency mainly came from branch networks and traditional operations. Today, efficiency is also about digital banking, better risk-management systems, and low-cost service delivery (Berger & Mester, 2003). In developing countries like Pakistan, where banks use technology at different levels, efficiency gaps are even more visible (Khan & Khan, 2022). This makes the theory very relevant for understanding why some banks perform better than others.

Efficiency Structure Theory clearly supports my study because it explains how operational efficiency (BOPO) affects bank profitability (ROA), and how capital structure can change this relationship. In my model, I am studying how credit risk (NPL), liquidity risk (LDR), and operational efficiency influence profitability in Pakistani banks. The theory says that banks with lower BOPO are more efficient, and efficient banks earn higher profits because they control their costs better. This also helps them reduce the negative impact of NPL and LDR on profitability (Berger, 1995; Sufian & Habibullah, 2009).

The theory also explains that when banks are not efficient, they sometimes take more risk to increase profits. This connects with my expectation that higher NPL and LDR will reduce profitability. Capital structure also matters. Efficient banks can use more debt safely and still stay profitable, while inefficient banks with high debt face more problems and more risk (Berger & Mester, 2003).

2.2.4 Trade-Off and Agency Cost Theories of Capital Structure

Trade-Off Theory explains that firms try to find the right balance between using debt and avoiding the problems that come with too much debt. Debt is useful because the interest paid on it reduces taxes, which increases the firm's value (Kraus & Litzenberger, 1973; Myers, 1984). But if a firm takes on too much debt, the risk of financial distress and bankruptcy increases. So, the theory says firms try to choose a level of debt where the benefits are higher than the costs. Over time, firms slowly move toward optimal level of debt as market conditions change (Fischer et al., 1989).

Agency Cost Theory adds another explanation by focusing on the conflicts between managers and owners. Managers may not always act in the best interests of shareholders; they may overspend or invest in weak projects. Debt helps reduce this problem because regular interest payments force managers to use firm resources more carefully (Jensen & Meckling, 1976; Jensen, 1986). But too much debt can also create new conflicts, because shareholders may push managers to take risky decisions to benefit equity holders at the cost of creditors (Myers, 1977). Both theories together explain why firms, including banks, avoid taking either too much or too little debt.

In my study, Trade-Off Theory explains why capital structure changes the strength of the relationship between risks and profitability in Pakistani banks. This theory says that banks choose their level of debt by balancing two things: the benefit of debt and the cost of debt. Debt can help banks improve profitability, but when debt becomes too high, the bank becomes more sensitive to credit risk (NPL) and liquidity risk (LDR). So, if a bank is highly leveraged, even a small rise in NPL or LDR can reduce ROA more strongly (Kraus & Litzenberger, 1973; Myers, 1984). This supports the hypothesis that capital structure moderates these relationships.

In my study, Agency Cost Theory helps explain the role of operational efficiency (BOPO). This theory says debt can force managers to use resources more responsibly because they must meet fixed interest payments. Like, debt puts pressure on managers to avoid waste and work more efficiently (Jensen, 1986). When efficiency improves, profitability (ROA) also improves. However, if a bank is already inefficient, high debt can make the negative effects of NPL and LDR even worse because the managers cannot handle the added pressure (Jensen & Meckling, 1976).

Both these theories explain why capital structure affects the link between risk, efficiency, and profitability. In Pakistan, where banks face credit risk, liquidity stress, and rising operating costs,

these theories help explain why some banks can still perform well under high leverage while others struggle.

2.3 Empirical Literature Review

2.3.1 Credit Risk and Bank Profitability

Arifaj and Baruti (2023) research on Western Balkan region show a clear pattern between credit risk and bank profitability. The author used data from 26 commercial banks from 2010 to 2022 including Kosovo, Albania, North Macedonia, Serbia, Croatia, Montenegro, and Bosnia and Herzegovina. They found that banks with a higher level of bad loans tend to report lower ROA and ROE. This pattern appears across different types of banks in the region. Apochi and Baffa (2022) also note that when credit risk increases, the bank's overall financial health becomes weaker, mainly because non-performing loans reduce the bank's ability to earn stable profits. Previous evidence supports this view, showing that banks with stronger credit risk controls are better able to maintain positive results, while those facing more problem loans often experience drops in profitability.

Another research on US commercial banks also highlights the strong link between credit risk and profitability. Using data from 83 banks between 2010 and 2017, Sun and Chang (2019) examined credit risk through the Capital Adequacy Ratio and the Non-Performing Loan Ratio and measured profitability using ROA and ROE. Their results show a clear result: as credit risk rises, bank profitability falls. Higher levels of non-performing loans were especially important, as even a small increase in bad loans led to noticeable declines in both ROA and ROE. The study stresses that managing loan quality is essential for maintaining stable earnings, and it provides useful guidance for regulators and policymakers who focus on improving the financial strength of the banking sector.

However, a study from South Asia provides different results on how credit risk affects bank profitability. Using data from 20 commercial banks across four South Asian countries (2018–2022), Nabi (2023) applied a structural equation modeling approach to examine the impact of credit and operational risks. The author found a significant positive relationship between credit risk and profitability, suggesting that banks can earn more when they increase lending and take on

more credit exposure. Operational risk and some bank-specific factors showed weak or negative effects, but credit risk remained the most influential factor.

Another study conducted by Saeed, Muhammad & N, Zahid. (2016), on five major UK commercial banks from 2007 to 2015, using ROA and ROE as measures of profitability and net charge-offs and non-performing loans as indicators of credit risk. This study found a positive relationship between credit risk and profitability that shows that even during and after the 2008 financial crisis, banks could take calculated credit risks and earn profits from interest. Also, bank size, leverage, and growth were found to be positively related to each other, reflecting that larger and well-managed banks were better able to handle credit risk. This study supports the idea that the impact of credit risk can vary across regions and banking practices, but carefully managed lending remains a key driver of profits.

Haris et al. (2024) conducted research on how the COVID-19 pandemic affected the relationship between credit risk and bank profitability. The author used data from 37 banks from 2018 to 2021, and they found that credit risk had a negative and significant impact on profitability indicators, including ROA, ROE, and net interest margin, during the COVID period. Liquidity risk showed mixed effects, but credit risk consistently reduced bank earnings. These results support with earlier findings from the US and Balkan countries, where higher credit risk was linked to lower profitability (Sun & Chang, 2019; Arifaj & Baruti, 2023; Furhmann, 2022), highlighting that in times of economic stress, poor credit quality directly harms financial performance. The Pakistan study highlights that external shocks like a pandemic can change the impact of credit risk on profitability, emphasizing the need for stronger risk management and regulatory policies during crises.

2.3.2 Liquidity Risk and Bank Profitability

There is a vast previous literature showing that liquidity risk plays an important role in shaping bank profitability, especially in developing countries where financial markets face frequent economic and policy challenges. Strong liquidity is essential because it allows banks to meet short-term obligations, continue normal operations, and avoid sudden financial stress. Abbas and Ullah (2023) examined 35 listed banks from Pakistan and India over a ten-year period (2011–2020) to understand how liquidity risk affects overall performance. Their findings show that liquidity risk has a major impact on profitability, when banks struggle to maintain adequate liquidity, their

earnings suffer. Their study highlights that regular monitoring and better supervision are necessary for banks to maintain stable liquidity positions, strengthen financial performance, and handle unexpected market pressures. This adds to the growing evidence that effective liquidity management is a key requirement for long-term banking stability.

Another Study by F. Abbas et al. (2019) analyzed commercial banks in developed Asian economies and compared them with the US banking industry during the post-crisis period (2011–2017). Their findings show that liquidity has a positive impact on profitability in Asian commercial banks, as the banks with stronger liquidity positions were able to generate higher profits. As compared to liquidity, that had a negative effect on profitability for large US commercial banks, which means that the role of liquidity can vary depending on banking structures and market conditions. The study also noted that the strength of this impact differs by bank size: large banks gain profit with smaller increases in liquid assets, while small banks need larger increases to achieve the same effect. Their results support the evidence that liquidity is a powerful driver of profitability, and its influence can change across regions but remains significant to stable banking operations.

Another research that was conducted by Damanik (2025), explores how credit risk and liquidity risk shape profitability, while also considering operational efficiency as a mediating factor. It focuses on Conventional Commercial Banks listed on the Indonesia Stock Exchange (IDX) during 2021–2024. The data comes from secondary sources, mainly the annual reports of financial institutions for these years. The analysis is carried out using the SEM-PLS 4.0 technique, and the hypotheses are formed based on earlier research and related theories. The results show that liquidity risk does not significantly influence profitability. Operational efficiency itself has a negative and significant effect on profitability.

In addition to past evidence, Saleh and Afifa (2020) research also shows that credit risk, liquidity risk, and bank capital are key factors of bank profitability in emerging markets. Their study covered data from 2010 to 2018 and used panel data and GMM methods to analyze banks' performance. Their results show that liquidity risk has a negative effect on ROAA and ROAE, while its impact on net interest margin was negative but not statistically significant. The study explained that banks with larger financial gaps often rely on liquid assets or external funding to

meet obligations, which can reduce profits. These findings align with earlier research of Chen et al. (2017), regarding the negative correlation between liquidity risk and bank profitability.

2.3.3 Operational Efficiency and Bank Profitability

Operational efficiency is widely recognized as a key factor influencing bank profitability. It refers to how effectively a bank manages its expenses and utilizes its resources to generate revenue. Mehzabin et al. (2022) research on the Asian banking sector have shown that better operational efficiency significantly enhances profitability. The study covered 492 banks across 28 Asian countries from 2004 to 2018 found that effective management of operating expenses directly increases the profit margin of banks. These findings suggest that banks that control costs and optimize their operations can achieve higher returns, highlighting the critical role of operational efficiency in sustaining bank profitability.

Aranda and Wardani (2024) conducted a study on Islamic banks listed on the Indonesia Stock Exchange between 2019 and 2023, examining the impact of operational efficiency measured by technical efficiency and scale efficiency on profitability. The results show that technical efficiency had no significant effect on profitability, while scale efficiency had a significant negative effect. When considered together, technical and scale efficiency significantly influenced profitability. These findings suggest that expanding operations beyond an optimal scale can reduce profitability, highlighting the importance of managing the size and structure of operations carefully. Their study highlights that operational efficiency is not only about cost control but also about optimizing operational scale to enhance sustainable profitability in banks.

Another study by Christaria and Kurnia (2016) on banks listed on the Indonesia Stock Exchange between 2012 and 2014 examined operational efficiency using the Operational Expense to Operating Income Ratio (BOPO) and profitability measured by Return on Assets (ROA). The results show that operational efficiency has a significant positive impact on profitability, indicating that banks that manage their operating costs effectively can achieve higher returns. Their study highlights the importance of cost management and efficient operations in enhancing bank profitability and maintaining public confidence in the banking sector.

Chen (2025) examined the factors affecting the profitability of commercial banks in the United States from 2013 to 2017, using data from 50 banks. The study employed a quantitative approach

with panel data analysis. The results show that operational efficiency, measured by the cost-to-income ratio, negatively affects bank profitability. Credit risk and bank size also negatively impact profits, with larger banks facing higher costs that reduce their profitability. Macroeconomic factors like GDP growth and inflation were found to have little effect, although GDP growth had a slight positive influence and inflation a small negative effect. This study highlights that bank-specific factors, particularly operational efficiency, play a key role in determining profitability.

Lamothe et al. (2024) studied the factors affecting bank's profitability globally and by region. They used samples of 2,091 commercial banks from 110 countries and applied random effect regression models. Their findings indicate that internal factors, such as bank efficiency, listed status, impaired loans, gross interest margin, and capitalization, significantly influence profitability. From a regional perspective, efficiency and credit risk (impaired loans) were consistently important determinants across most regions. The study suggests that improving operational efficiency and managing credit risk are essential for banks to enhance profitability. These results support the view that operational efficiency, as a bank-specific factor, plays a critical role in driving profits and maintaining financial stability

2.3.4 Moderating Role of Capital Structure

Capital structure, usually measured by ratios like the capital adequacy ratio (CAR) or debt-to-assets ratio, plays an important role in banks because it helps manage financial leverage and meets regulatory requirements. Banks often use high leverage to increase returns but having the right balance of capital acts as a safety buffer, affecting how credit risk, liquidity risk, and operational efficiency impact profitability, such as return on assets (ROA) or return on equity (ROE) (Linggadjaya et al., 2025). Well-capitalized banks can absorb losses better, reducing negative effects, while banks with too much debt may face higher risks, which can lower profitability (Meliza et al., 2024).

Bahrawe (2025) study investigates the impact of capital structure on the profitability of Saudi Arabian banks from 2010 to 2021. Using panel least squares (PLS) analysis on eight banks, capital structure was measured mainly through the Debt-to-Asset Ratio (DAR), while profitability was measured by Return on Assets (ROA). The results show that DAR has a positive effect on profitability, indicating that effective use of debt can enhance bank returns. Other measures like the Debt-to-Equity Ratio (DER) negatively affected profitability, highlighting the risks of

excessive equity financing. The study confirms that a well-managed capital structure is crucial for improving bank profitability.

Another study by Fersi and Boujelbène (2023) looked at how capital structure affects the link between risk-taking and the financial performance of Islamic and conventional microfinance institutions (MFIs) from 2005 to 2015. The researchers used fixed and random effects models and found that high risk-taking, like fast loan growth, low interest margins, and small loan loss provisions, hurt financial performance. They also found that capital structure, especially the amount of debt, reduced the negative effect of bad loans on performance in conventional MFIs. This shows that the right level of debt can help banks and MFIs manage risks and protect profitability.

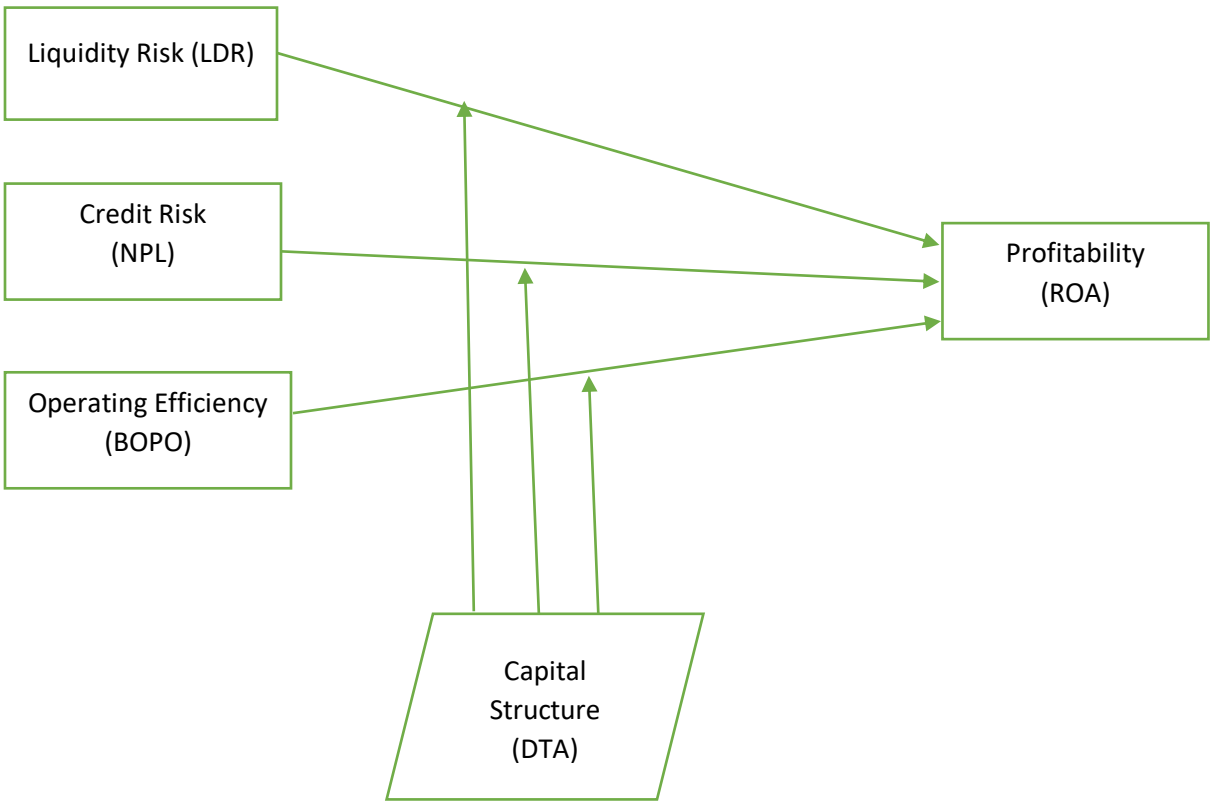
Khatri (2024) study examined how capital structure affects the profitability of Nepalese commercial banks from 2013/14 to 2021/22. The researcher used data from 12 banks and looked at returns on assets (ROA) and returns on equity (ROE) as measures of profitability. They considered capital structure variables like debt-to-equity ratio (DER), debt-to-asset ratio (DAR), and capital adequacy ratio (CAR). Their results showed that a higher debt-to-equity ratio reduces ROA, meaning that relying too much on debt relative to equity can hurt profitability. In contrast, a higher debt-to-asset ratio increases both ROA and ROE, suggesting that using debt effectively within total assets can improve performance. Similarly, a larger capital adequacy ratio positively impacts ROA, indicating that well-capitalized banks are more profitable. Other findings on asset and deposit growth showed negative effects on profitability, highlighting that uncontrolled growth or high deposits do not always lead to higher returns. This study confirms that capital structure plays a key role in determining bank profitability.

Al-Nimer et al. (2022) study examines how capital structure affects financial performance in Jordanian banks, with liquidity risk acting as a mediator. Using data from 13 Jordanian banks over 2015–2022, the study applies structural equation modeling (SEM) to see how capital structure measures (equity-to-asset, debt-to-loan, and deposit-to-asset ratios) influence financial performance (return on assets and net income-to-expenditure ratio). The results show that capital structure has a positive effect on bank performance, but this effect works mainly through liquidity risk. In other words, capital structure affects performance because it changes the bank's liquidity risk profile. The mediation by liquidity risk is strong, indicating that managing liquidity is very

important for improving bank performance. This study adds to the literature by showing not only that capital structure matters, but also how it influences performance through liquidity management, offering practical insights for bank management.

2.5 Research Framework Development

The research framework of this study looks at how credit risk measured through non-performing loans and liquidity risk measured through loan-to-deposit and operational efficiency affect bank profitability (ROA) in Pakistani commercial banks. Capital structure (DTA) is included as a factor that can change or influence these relationships. The framework is based on financial intermediation and efficiency structure theories, which explain that banks earn profits by managing risks, using their resources efficiently, and making smart borrowing decisions. According to previous studies, higher credit and liquidity risks usually reduce profitability, while better operational efficiency increases it. Capital structure can make these effects stronger or weaker. Based on above discussion following framework for the study is proposed.



H1: Credit risk (NPL) has a significant impact on bank profitability (ROA).

H2: Liquidity risk (LDR) has a significant impact on bank profitability (ROA).

H3: Operational efficiency (BOPO) has a significant impact on bank profitability (ROA).

H4: Capital structure (DTA) moderates the relationship between credit risk (NPL) and bank profitability (ROA).

H5: Capital structure (DTA) moderates the relationship between liquidity risk (LDR) and bank profitability (ROA).

H6: Capital structure (DTA) moderates the relationship between operational efficiency (BOPO) and bank profitability (ROA).

2.6 Summary of the Chapter

This chapter reviewed the literature and theoretical background for all the variables in the study, including capital structure, operational efficiency, credit risk, and liquidity risk, as well as their impact on bank profitability. It also discussed previous empirical findings for the proposed relationships.

CHAPTER NO. 03
METHODOLOGY

3.1 Introduction to Chapter

This chapter discusses research design demonstrating research approach, type of data set and time period for the data collection. Besides, population measurement and data collection methods are also explained comprehensively. Econometric models are also explained for the achievement of research objective and hypothesis. At last, there are data analysis methods and panel models with summary of the chapter at the end.

3.2 Operational Definitions of Variables

Operational Definitions of variables constructing the framework discuss the way in which these variables tend to be measured in the current study As, supported by previous literature. Following table 3.1 represents the operational definitions of dependent, independent, mediator and moderating variable.

VARIABLES	**DEFINATIONS**
Profitability	Profitability is defined as how much money banks earn after covering their expenses, showing their financial health and efficiency (Akhtar et al., 2024) The profitability metric Return on Assets (ROA) tells you how good a bank is at turning its money (assets) into profit. It's simply net profit divided by total assets. (Penman, 2010)
Liquidity Risk	Liquidity risk reflects a bank's vulnerability to failure in fulfilling maturing responsibilities, typically through cash flow funding sources or high-quality liquid assets. LDR (Loan to Deposit Ratio) is a common indicator used to determine a bank's liquidity level. (Damanik, 2025).

Credit Risk	Credit risk is generally described as the deterioration in loan portfolio quality, which results in loan losses. It represents the loss a financial institution incurs because a debtor is unable to repay a loan or meet other obligations. The variable NPL (Non-Performing Loan) is a widely used indicator for assessing credit risk. (Saleh & Afifa, 2020)
Operational Efficiency	Operational efficiency generally refers to a firm's capability to effectively manage its resources and expenditure. This is the most frequently mentioned measure, comparing operating expenses against operating income. (Mehzabin et al., 2022)
Capital Structure	Capital structure refers to the proportion of a firm's financing that comes from debt and equity. The Debt-to-Total-Assets (DTA) ratio is commonly used to measure the share of a company's assets that is financed through debt. (Ngatno et al., 2021)

3.3 Research Design

Research design refers to the overall plan or structure that guides the entire research process. It covers every step, from selecting the research methodology to conducting data analysis and drawing final conclusions (Flick, 2022). The research design for the present study is structured to effectively address the stated research questions and objectives.

According to Sekaran and Bougie (2016), there are two common ways to conduct research: deductive and inductive. The deductive approach starts with existing theories and then develops hypotheses to test those theories (Wiles et al., 2011). This approach moves from general ideas to specific testing (Kothari, 2004). On the other hand, the inductive approach works the opposite way. It starts with specific observations and uses them to develop new ideas or theories (Bell et al., 2022).

This study uses numerical and quantitative data and aims to test relationships that are already explained in past theories. Therefore, this research follows the deductive approach, where existing theories are tested through hypotheses and statistical analysis.

3.4 Nature and Sources of Data

This research is based on secondary data, which means the information is already published and available. All data has been collected from the State Bank of Pakistan (SBP) reports and the annual financial statements of all the commercial banks listed on Pakistan Stock Exchange (PSX). These reports are reliable because they are officially prepared, audited, and published every year. The study uses panel data, meaning it includes several banks observed over many years. According to Wooldridge (2015), panel data is useful because it shows how things change over time and how different banks compare with each other. Gujarati (2009) also explains that panel data helps reduce common errors and gives stronger results. This type of data is suitable for my study because it allows me to properly examine how credit risk, liquidity risk, operational efficiency, and capital structure affect the profitability of commercial banks in Pakistan.

3.5 Population and Data Collection

The population of this study consists of the commercial banks listed on the Pakistan Stock Exchange (PSX), because their financial reports are easily available and regularly published. This helps to ensure accuracy and consistency in data collection. The study covers a 15-year period from 2010 to 2024, which allows me to observe long-term trends over time. All the required data has been collected from the annual financial statements of these banks and official reports issued by the State Bank of Pakistan (SBP). These sources provide authentic and reliable financial information needed for analysis.

3.6 Sample Selection Criteria and Justification

The sample for this study includes 16 commercial banks in Pakistan. These banks were chosen because they have continuous financial data and are important for research. Commercial banks were selected because they make up most of Pakistan's banking sector and play a key role in lending, managing funds, and supporting economic activity. Only banks that publish complete, audited, and publicly available annual reports were included, so the analysis would be accurate and trustworthy. This approach is also supported by Abid et al. (2024) and Mahmood et al. (2023), who explain that complete and comparable data is important for analyzing banking performance and risk.

The study uses a 15-year time period (2010–2024**)**. This long period helps to see major changes in the banking sector, such as monetary policy shifts, regulatory updates, and different market conditions. It also avoids short-term fluctuations, making the results more stable and reliable.

The data was collected using the following criteria:

- Banks must have complete and audited financial statements for all years from 2010 to 2024.
- Only listed banks were included because they publish reliable and accessible annual reports every year.
- A 15-year period helps cover different economic cycles and policy changes, leading to stronger empirical results.
- Specialized banks were excluded from the sample.

3.7 Measurement of Variables

Variables	**Variable type**	**Proxy**	**Formulation**	**References**
Profitability	Dependent Variable	ROA	$\frac{Net\ Income}{Total\ Assets}$	(Das and Uppal, 2021)
Liquidity Risk	Independent Variable	LDR	$\frac{Total\ Loans}{Total\ Deposits}$	(Karadayi, 2023)
Credit Risk	Independent Variable	NPL	$\frac{Total\ Non-Performing\ Loans}{Total\ Loans}$	(Salas et al., 2024)
Operating Efficiency	Independent Variable	BOPO	$\frac{Total\ Operating\ Expenses}{Total\ Operating\ Income}$	(Gutie´rrez-Lo´pez and Abad-Gonzalez, 2020)
Capital Structure	Moderating Variable	DTA	$\frac{Total\ Debt}{Total\ Assets}$	(Yuan et al., 2022)

3.8 Econometric Models

3.8.1 Model 1 (Main Effects):

This model examines the direct effects of credit risk, liquidity risk, operational efficiency, and capital structure on bank profitability.

$$ROA_{it} = \beta_0 + \beta_1 LDR_{it} + \beta_2 NPL_{it} + \beta_3 BOPO_{it} + \varepsilon_{it}$$

Where,

ROA_{it} = Represents the profitability of bank *i* at time *t*.

β_0 = Constant Term

$\beta_1 NPL_{it}$, $\beta_2 LDR_{it}$, $\beta_3 BOPO_{it}$ = Jointly measure the impact of credit risk, liquidity risk, and operational efficiency on (ROA).

ε_{it} = Error Term

3.8.2 Model 2 (Moderated Model):

This model examines whether capital structure (DTA) changes the strength or direction of the relationship between risk and efficiency variables and profitability.

$$ROA_{it} = \beta_0 + \beta_1 LDR_{it} + \beta_2 NPL_{it} + \beta_3 BOPO_{it} + \beta_4 DTA_{it} + \beta_5 (LDR_{it} x\ DTA_{it}) + \beta_6 (NPL_{it} x\ DTA_{it}) + \beta_7 (BOPO_{it} x\ DTA_{it}) + \varepsilon_{it}$$

3.9 Data Analysis Method

This study employed both descriptive and inferential statistical techniques to analyze the panel data of Pakistani commercial banks. Descriptive statistics were first used to summarize the data and understand the basic characteristics of the variables, including mean, minimum, maximum, and standard deviation. These measures help in identifying general trends and variations in profitability, credit risk, liquidity risk, operational efficiency, and capital structure across banks and over time. Correlation analysis was also conducted to examine the initial relationships among variables and to detect any potential multicollinearity issues. (Damanik, 2025)

After the descriptive analysis, panel regression techniques were applied to examine the impact of credit risk, liquidity risk, and operational efficiency on bank profitability, as well as the moderating role of capital structure. Several diagnostic tests will be performed to ensure the reliability of the regression results, including variance inflation factor (VIF) tests for multicollinearity, tests for heteroskedasticity, and autocorrelation. The Hausman specification test was used to determine the appropriate panel regression model, leading to the selection of either the fixed effects or random effects model based on statistical evidence (Ayalew, 2021). All analyses were conducted using STATA version 17, to ensure robust and reliable empirical results.

3.10 Summary of Chapter

This chapter explains how the study was done. It says what data was used, where it came from, and how it was organized. It shows the plan for the research and lists all the important things that were measured. The chapter also makes clear hypotheses about what the study expects to find. All econometric models are designed for panel data analysis. Furthermore, to specifically examine how capital structure moderates the central relationships, separate econometric equations are developed and discussed in this section.

CHAPTER NO 04:

FINDINGS & ANALYSIS

4.1 Introduction of the Chapter

This chapter presents the empirical analysis of the study. It explains the statistical methods used to examine the research objectives and hypotheses. The analysis is divided into two main parts. The first part discusses the results of descriptive statistics, which provide an overview of the key characteristics and behavior of the study variables. The second part uses panel regression models to examine the impact of explanatory variables on bank profitability. The results are interpreted carefully to provide meaningful insights and to support the overall findings of the study.

4.2 Descriptive Statistics

Descriptive statistics are used in research that summarize and describe the main features of the data in a simple and easy-to-understand way. They don't try to explain causes or make predictions; they just give a clear picture of what the data looks like. This is the first step in any empirical research. It helps you quickly understand the data before doing advanced tests (Bhattacherjee, 2012; Trochim, 2023).

Table 4.1 reports the number of observations, means, standard deviation, minimum, and maximum values for profitability (ROA), credit risk (NPL), liquidity risk (LDR), operational efficiency (BOPO), and capital structure (DTA). All variables consist of 240 observations, indicating a balanced panel dataset with no missing values, which enhances the reliability of the empirical analysis.

The mean value of ROA is 0.008, showing that banks earn an average return of 0.8% on their assets, which indicates relatively low but positive profitability. But the standard deviation of 0.014 and the minimum value of –0.089 shows significant variation in profitability across banks and time, with some banks experiencing losses. This variation proposes differences in financial performance and management efficiency within the banking sector.

Credit risk that is measured by NPL, has a mean value of 0.114, meaning that, on average, 11.4% of loans are non-performing. The high standard deviation and the maximum value of 0.70 indicate

large differences in credit risk management across banks. Liquidity risk that is measured by LDR has an average value of 0.557, which means that banks lend about 55.7% of their deposits, indicating a generally conservative, liquidity position. But the wide range of LDR values shows that some banks face higher liquidity risk than others. Operational efficiency, measured by BOPO, has a mean value of 0.651, indicating that banks spend around 65% of their operating income on operating costs. The high standard deviation and extreme minimum and maximum values suggest significant disparities in cost efficiency across banks.

Capital structure that is measured by DTA, has a relatively low meaning of 0.067, showing limited reliance on debt financing, while its moderate variability supports its role as a moderating variable in the analysis.

Table 4.1 Descriptive Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
ROA	240	0.008	0.014	-0.089	0.045
LDR	240	0.557	0.15	0.158	1.075
NPL	240	0.114	0.112	0.01	0.7
BOPO	240	0.651	0.376	-1.698	1.892
DTA	240	0.067	0.048	-0.167	0.261

4.3 Correlation Analysis

Pairwise correlations refer to the calculation of correlation coefficients between every possible pair of variables in a dataset. It measures the strength and direction of the linear relationship between two variables at a time, while ignoring the influence of other variables. It helps researchers understand whether variables move together in same direction that is positive correlation or in opposite directions that is negative correlation (Gujarati & Porter, 2009; Wooldridge, 2016).

Table 4.2 reports the pairwise correlation coefficients among profitability (ROA), liquidity risk (LDR), credit risk (NPL), operational efficiency (BOPO), and capital structure (DTA).

The correlation between ROA and LDR is negative and statistically significant (–0.325, $p < 0.01$), indicating that higher liquidity risk is associated with lower bank profitability. Also, ROA shows a strong negative correlation with NPL (–0.616, $p < 0.01$), suggesting that an increase in credit risk significantly reduces profitability. ROA is also negatively correlated with BOPO (–0.530, $p < 0.01$), suggesting that higher operating costs and lower efficiency adversely affect bank performance. But the ROA is positively and significantly correlated with DTA (0.483, $p < 0.01$), indicating that capital structure plays an important role in enhancing profitability.

The relationships among the independent variables show mixed results. LDR has a positive and significant correlation with BOPO (0.232, $p < 0.01$), suggesting that banks with higher lending activity tend to incur higher operational costs. However, LDR has an insignificant correlation with NPL (0.026, $p > 0.10$) and DTA (0.119, $p > 0.05$), indicating that liquidity risk is largely independent of credit risk and capital structure in this sample.

Credit risk (NPL) is positively and significantly correlated with BOPO (0.286, $p < 0.01$), implying that higher non-performing loans increase operating inefficiencies. NPL is negatively and significantly correlated with DTA (–0.433, $p < 0.01$), suggesting that better capital structure may help banks manage credit risk more effectively. Additionally, BOPO shows a negative and significant correlation with DTA (–0.263, $p < 0.01$), indicating that well-capitalized banks tend to operate more efficiently.

The correlation coefficients are below the commonly accepted threshold of 0.80, indicating that severe multicollinearity is not present in the model (Gujarati & Porter, 2009). The results provide preliminary evidence that liquidity risk, credit risk, operational efficiency, and capital structure are meaningfully related to profitability confirming that the variables are suitable for regression analysis.

Table 4.2 Pairwise correlations					
Variables	**ROA**	**LDR**	**NPL**	**BOPO**	**DTA**
ROA	1.000				
LDR	-0.325*	1.000			
	0.000				
NPL	-0.616*	0.026	1.000		
	0.000	-0.693			
BOPO	-0.530*	0.232*	0.286*	1.000	
	0.000	0.000	0.000		
DTA	0.483*	0.119	-0.433*	-0.263*	1.000
	0.000	-0.067	0.000	0.000	
****** p<0.01, ** p<0.05, * p<0.1***					

4.4 Variance Inflation Factor

The Variance Inflation Factor (VIF) is a statistical tool used to detect multicollinearity among independent variables in a regression model. It measures how much the variance of a regression coefficient is increased because of correlations with other predictors. A VIF value of 1 indicates no correlation, while higher values show greater multicollinearity. Typically, a VIF below 5 is considered acceptable, and values above 10 may signal serious multicollinearity that could affect the accuracy of regression results. (Hair et al., 2019; Field, 2018).

4.4.1 VIF for Baseline Model

Table 4.3.1 Variance Inflation Factor		
	VIF	**1/VIF**
LDR	1.059	0.945
NPL	1.091	0.917
BOPO	1.152	0.868
Mean VIF	**1.101**	

Table 4.3.1 presents the results from Variance Inflation Factor (VIF) in the baseline regression model without including the moderating variable, DTA, or any interaction terms. The regression analysis was conducted prior to the VIF test.

The VIF values for BOPO, NPL, and LDR are 1.152, 1.091, and 1.059, respectively, with a mean VIF of 1.101. These values are all well below the commonly accepted threshold of 5, indicating that there is no significant multicollinearity among the independent variables (Hair et al., 2019; Field, 2018).

The reciprocal values (1/VIF) are also close to 1, that confirms the absence of collinearity. This shows that each independent variable provides unique information in explaining variations in profitability (ROA) and that the estimated regression coefficients will be reliable and not distorted by overlapping information among predictors. The low VIF values indicate that the model is suitable, and multicollinearity is not an issue in this baseline model.

4.4.2 VIF for Model with Interaction Terms

Table 4.3.2 Variance Inflation Factor		
	VIF	**1/VIF**
LDR	1.182	0.846
NPL	2.775	0.36
DTA	2.464	0.406
BOPO	1.709	0.585
LDR * DTA	1.528	0.655
NPL * DTA	6.174	0.162
BOPO * DTA	3.404	0.294
Mean VIF	**2.748**	

Table 4.3.2 presents the Variance Inflation Factor (VIF) for the independent variables, the moderating variable (DTA), and their interaction terms after centering the variables. Centering was applied to reduce potential multicollinearity between the main effects and the interaction terms and to improve the interpretability of the coefficients. The regression analysis was conducted prior to the VIF test.

The VIF values for the main independent variables are LDR = 1.182, NPL = 2.775, BOPO = 1.709, and DTA = 2.464. These values are all below the commonly accepted threshold of 5, indicating that multicollinearity among the main effects and the moderator is not a serious concern.

The VIF values for the interaction terms are slightly higher, as expected due to their multiplicative nature: LDR×DTA = 1.528, NPL×DTA = 6.174, and BOPO×DTA = 3.404.

The high VIF for the NPLxDTA interaction term (6.174) is expected and is a known statistical outcome in moderation analysis. It occurs because an interaction term is created by multiplying two variables, which inherently creates correlation between the interaction and its components. This does not invalidate the model, as the mean VIF (2.748) remains within acceptable limits. The significant p-value (0.004) and strong theoretical rationale confirm that this result is meaningful,

not a statistical artifact. Although the NPL×DTA interaction shows a VIF slightly above 5, this is common in moderation analysis and is not considered problematic (Aiken & West, 1991; Hayes, 2017).

The mean VIF for the entire model is 2.748 that is below critical thresholds, shows that the model is suitable for regression analysis. These results confirm that the inclusion of interaction terms does not introduce significant multicollinearity and that the model can reliably test the moderating effect of DTA on the relationship between the independent variables and profitability.

4.5 Hausman Test

The Hausman Test also called the Hausman specification test is a widely used statistical test in econometrics, especially in panel data analysis, to help decide between two competing estimation models: the fixed effects (FE) model and the random effects (RE) model (Hausman, 1978). The Hausman test was conducted to determine the appropriate panel estimation technique. The chi-square statistic is 7.30 with 7 degrees of freedom, and the associated p-value is 0.3986. Since the p-value exceeds 0.05, we fail to reject the null hypothesis that the differences between the FE and RE coefficients are not systematic. This indicates that the random effects model is consistent and efficient for this study. Therefore, the final regression results are reported using the random effects model.

Table 4.4 Hausman Test Results

Variable	FE Coefficient	RE Coefficient	Difference	Std. Error of Difference
LDR	-0.0025	-0.0029	0.0004	0.0001
NPL	-0.0032	-0.0043	0.0011	0.0006
BOPO	-0.0068	-0.0060	-0.0007	0.0009
DTA	0.0029	0.0030	-0.0001	0.0006
LDR * DTA	0.0015	0.0013	0.0002	0.0001
NPL * DTA	0.0009	0.0007	0.0002	0.0001
BOPO * DTA	-0.0022	-0.0019	-0.0003	0.0003
Chi-square			**7.3**	
p-value			**0.3986**	

4.6 Random Effects Regression Results

The random effects model was selected based on the Hausman specification test and used to estimate the relationship between risk factors, capital structure, and profitability.

The selection of the Random Effects (RE) model over the Fixed Effects (FE) model was statistically validated using the Hausman specification test. The test produced a chi-square statistic of 7.30 with a p-value of 0.3986. Since the p-value is significantly greater than the conventional threshold of 0.05, we fail to reject the null hypothesis. This indicates that the unobserved, time-invariant bank-specific effects are not correlated with the explanatory variables in the model. Under this condition, the Random Effects model is both consistent and efficient. The RE estimator is preferred in this context as it provides more precise estimates by utilizing information both within banks over time and between different banks, thereby maximizing the informational value of the panel dataset without introducing bias.

Table 4.5 reports the Random Effects regression results. These results indicate that the model is statistically significant overall, as confirmed by the chi-square value (187.033, $p < 0.01$), and explains a substantial proportion of variation in profitability, with an overall R-square of 0.627.

Liquidity risk (LDR) shows a negative and highly significant relationship with profitability ($\beta = -0.019$, $p < 0.01$). This implies that an increase in the loan-to-deposit ratio reduces return on assets. Economically, this suggests that banks that expand lending aggressively relative to their deposit base face higher liquidity pressure, which ultimately lowers profitability. The result highlights the importance of maintaining an optimal liquidity position to avoid excessive risk-taking that can harm financial performance.

Credit risk (NPL) also has a negative and statistically significant effect on profitability ($\beta = -0.038$, $p < 0.01$). This indicates that a rise in non-performing loans significantly reduces ROA. In practical terms, poor loan quality increases provisioning costs and reduces interest income, thereby lowering bank profitability. This finding emphasizes that effective credit risk management is crucial for sustaining financial performance.

Operational efficiency (BOPO) has a strong negative and highly significant impact on profitability ($\beta = -0.016$, $p < 0.01$). This result suggests that higher operating expenses relative to operating income reduce ROA. Among all explanatory variables, BOPO shows one of the strongest effects,

indicating that cost inefficiency is a major determinant of lower profitability. This highlights the need for banks to control operating costs and improve internal efficiency.

Regarding the moderating effects, the interaction term between liquidity risk and capital structure (LDR × DTA) is statistically insignificant ($p = 0.122$), indicating that capital structure does not significantly influence the relationship between liquidity risk and profitability. This suggests that changes in leverage do not meaningfully alter how liquidity risk affects bank performance.

In contrast, the interaction between credit risk and capital structure (NPL × DTA) is positive and statistically significant ($\beta = 0.176$, $p < 0.01$). This indicates that capital structure moderates the negative impact of credit risk on profitability. Specifically, banks with stronger capital positions are better able to absorb losses arising from non-performing loans, thereby reducing the adverse effect of credit risk on ROA.

The interaction between operational efficiency and capital structure (BOPO × DTA) is negative and statistically significant ($\beta = -0.105$, $p < 0.01$). This implies that capital structure strengthens the negative relationship between operational inefficiency and profitability. In other words, higher leverage combined with poor cost management further reduces profitability, suggesting that inefficient banks suffer more when they rely heavily on debt financing.

The Random Effects results demonstrate that liquidity risk, credit risk, and operational inefficiency significantly reduce bank profitability, while capital structure plays both a direct and moderating role. The findings underline the importance of balanced risk management, cost efficiency, and optimal capital structure decisions in enhancing bank performance.

Table 4.5 Random Effect Model Results

ROA	Coef	St.Err.	t-value	p-value	[95% Conf	Interval]
LDR	-0.019***	0.004	-5.08	0	-0.027	-0.012
NPL	-0.038***	0.009	-4.19	0	-0.056	-0.02
BOPO	-0.016***	0.003	-6.27	0	-0.021	-0.011
DTA	0.063**	0.02	3.16	0.002	0.024	0.102
LDR * DTA	0.135	0.087	1.54	0.122	-0.036	0.306
NPL * DTA	0.176**	0.061	2.89	0.004	0.057	0.295
BOPO * DTA	-0.105***	0.029	-3.69	0	-0.161	-0.049
Constant	0.008***	0.001	7.79	0	0.006	0.01

Mean dependent var	0.008	SD dependent var	0.014
Overall r-squared	0.627	Number of obs	240
Chi-square	187.033	Prob > chi2	0
R-squared within	0.308	R-squared between	0.82

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

4.6 Summary of Hypothesis Testing

Table 4.6 below shows the expected relationship what theory and previous studies predict before conducting the analysis. The empirical result represents what the actual data reveals after running the regression model. By comparing both, the study checks whether theoretical expectations are supported by real-world evidence. If the empirical result matches the expected relationship, the hypothesis is accepted. If it does not match or is insignificant, the hypothesis is rejected. This comparison helps validate the study's findings.

This table presents the final verification of all six research hypotheses. It not only shows whether each hypothesis was accepted or rejected but also includes the key beta coefficient (β) from the regression model. The coefficient quantifies the precise strength and direction of each relationship, moving beyond simple significance to reveal the magnitude of the effects. For example, the strong positive moderating effect of capital structure on credit risk (β = +0.176 for H5) is clearly visible,

as is the insignificant result for the LDR interaction (β = +0.135, p = 0.122 for H4). This integrated format provides a complete and transparent summary of the study's empirical findings.

Table 4.6 Hypothesis Testing

Hypothesis	Relationship Tested	Beta Coefficient (β)	Empirical Result	Significance	Decision
H1	LDR → ROA	-0.019	Negative	Sig (p < 0.01)	**Accepted**
H2	NPL → ROA	-0.038	Negative	Sig (p < 0.01)	**Accepted**
H3	BOPO → ROA	-0.016	Negative	Sig (p < 0.01)	**Accepted**
H4	LDR x DTA → ROA	0.135	Positive	Not Sig (p = 0.122)	**Rejected**
H5	NPL x DTA → ROA	0.176	Positive	Sig (p < 0.01)	**Accepted**
H6	BOPO x DTA → ROA	-0.105	Negative	Sig (p < 0.01)	**Accepted**

CHAPTER NO 05:

CONCLUSION AND RECOMMENDATION

5.1 Introduction to Chapter

This chapter presents a detailed discussion of the study's findings by explaining the results of the hypothesis testing in light of previous research. The results are interpreted with support from relevant theories and empirical studies. This chapter also highlights the theoretical and practical implications of the findings. Finally, the limitations of the study are discussed, followed by recommendations for future research related to the proposed research framework.

5.2 Conclusion

This research investigated how key risk and efficiency factors influence the profitability of Pakistani commercial banks listed on the Pakistan Stock Exchange during the period 2010–2024. Bank profitability was measured using return on assets (ROA), while credit risk, liquidity risk, and operational efficiency were captured through the non-performing loans ratio (NPL), loan-to-deposit ratio (LDR), and BOPO ratio, respectively. Capital structure, measured by the debt-to-asset ratio (DTA), was incorporated as a moderating variable. The results obtained from the random effects panel regression indicate that most of the proposed hypotheses are empirically supported. The findings show that both credit risk and liquidity risk have a statistically significant and negative impact on profitability, suggesting that rising non-performing loans weaken asset quality and increase provisioning costs, while higher loan-to-deposit ratios expose banks to greater funding and liquidity pressures, ultimately reducing returns (Shair et al., 2019; Abid et al., 2025).

The analysis further reveals that operational efficiency plays a critical role in determining bank profitability. A higher BOPO ratio, reflecting increased operating expenses relative to income, is associated with lower ROA. This implies that banks with effective cost management practices and efficient use of resources are better positioned to achieve higher profitability and maintain competitive advantage. These results are consistent with prior research emphasizing that cost efficiency is a key driver of financial performance in the banking sector (Berger, 1995; Saeed, 2014).

This study also highlights the moderating role of capital structure in the relationship between credit risk and profitability. The findings indicate that higher leverage intensifies the negative effect of non-performing loans on profitability, meaning that banks with greater reliance on debt are more vulnerable to credit losses. This outcome supports the trade-off theory, which argues that while debt can provide benefits, excessive leverage increases financial distress costs, especially in the presence of elevated credit risk (Myers, 1984; Haris et al., 2020). However, capital structure does not significantly alter the relationship between liquidity risk and profitability, suggesting that liquidity risk affects bank performance primarily through operational funding challenges rather than through leverage levels. Similar conclusions have been reported in recent empirical studies focusing on emerging banking markets (Al-Nimer et al., 2022; Latif et al., 2022).

The negative impact of liquidity risk on profitability mainly comes from funding pressures and mismatches between deposits and loans, rather than being affected by the bank's level of debt. Unlike credit risk, where high debt can make losses worse, Pakistani banks seem to handle liquidity risk through operational measures and short-term borrowing rather than relying on capital buffers. This finding agrees with earlier studies in emerging markets, which show that liquidity risk directly affects performance and is not strongly influenced by capital structure (Al-Nimer et al., 2022; Meliza et al., 2024). It also suggests that regulations like liquidity coverage ratios under Basel III may be more effective than capital requirements alone in protecting profitability against liquidity issues.

These results offer important insights for Pakistan's banking industry, which operates under conditions of moderate profitability, persistent credit quality challenges, and stringent regulatory capital requirements under Basel III (State Bank of Pakistan, 2013). The findings underline the need for stronger credit risk controls, improved operational efficiency, and practical capital structure decisions to sustain profitability and financial stability. Banks that balance leverage effectively while maintaining sound risk management practices are more likely to enhance performance and support long-term economic growth.

5.3 Limitation of the Study

This study has several limitations that should be acknowledged. First, the sample size is limited to 16 listed commercial banks in Pakistan, covering a 15-year period (2010–2024). Although the time

span is sufficient for panel analysis, the relatively small number of banks may limit the generalization of the findings to the entire banking sector, particularly specialized and Islamic banks, which were excluded from this study.

Second, the study relies only on secondary data obtained from audited annual reports and official sources. While these sources are reliable, they may still reflect reporting practices and accounting policies that vary across banks and overtime. This study applies static panel regression techniques, which do not fully capture dynamic adjustments in profitability over time. Despite these limitations, the study provides valuable insights into the profitability behavior of Pakistani commercial banks and offers a solid foundation for future empirical research.

5.4 Theoretical and Practical Contributions

This study offers distinct contributions to both academic literature and banking practice. Theoretically, it extends the application of financial intermediation and trade-off theories within the Pakistani context by empirically validating the contingent role of capital structure. The findings demonstrate that leverage is not a uniform determinant but a conditional variable that can simultaneously shield against credit risk and amplify operational inefficiency, thereby enriching the discourse on risk-capital interactions in emerging markets.

From a practical perspective, the research provides bank managers and regulators with actionable, evidence-based insights. For managers, it underscores that strategic leverage decisions must be preceded by operational efficiency improvements, as debt exacerbates the profitability penalty of high costs. For policymakers, particularly the State Bank of Pakistan, the study advocates for an integrated regulatory approach that links capital adequacy assessments with operational efficiency metrics, moving beyond static capital ratios to a more nuanced, stability-focused supervisory framework.

5.5 Recommendation and Future Direction

This study opens several opportunities for future research in the area of bank profitability and risk management. Future studies can extend the model to include broader economic and institutional factors that may influence bank profitability. They can also examine alternative model

specifications and conduct cross-country comparisons that would help improve the robustness and generalizability of the findings, particularly for emerging economies like Pakistan.

- Future studies may include macroeconomic variables such as interest rates, inflation, and GDP growth to examine how overall economic conditions influence the relationship between bank-specific risks, operational efficiency, and profitability in Pakistan.
- Future researchers may apply alternative econometric techniques or dynamic models to address potential endogeneity and to provide more robust evidence on risk–profitability relationships.
- Comparative studies across other emerging or developing economies can be conducted to test whether the findings from Pakistan are consistent in different regulatory and economic environments.
- Future research may also include Islamic banks to compare whether the relationships between risk, operational efficiency, capital structure, and profitability differ between Islamic and conventional banking systems in Pakistan.

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RC-04

MBA

1st Half Semester Progress Report

Name of Student(s)	Hira Sabir
Enrollment No.	01-321242-010
Thesis/Project Title	Examining the Impact of Credit risk, Liquidity risk and operational efficiency on Bank Profitability. the moderating role of Capital Structure in Pakistan

Supervisor Student Meeting Record

No.	Date	Place of Meeting	Topic Discussed	Signature of Student
1	11 sep	office	Stata, Tests and implementation	
2	26 sep	office	checked the results of tests	
3	15 oct	office	Started working on the analysis part.	
4	23 oct	office	Complemated the analysis part	

Progress Satisfactory ☑ Progress Unsatisfactory ☐

Remarks: _____

Signature of Supervisor: _____ Date: 17th Dec-25

Name: Dr Lubna Note:

Students attach 1st & 2nd half progress report at the end of spiral copy.

Bahria University
Islamabad Campus

RC-04

MBA

2nd Half Semester Progress Report & Thesis Approval Statement

Name of Student(s)	Hira Sabir
Enrollment No.	01-321242-010
Thesis/Project Title	Examining the impact of credit risk, liquidity risk, and operational efficiency on bank profitability. Moderating role of capital structure in Pakistan

Supervisor Student Meeting Record

No.	Date	Place of Meeting	Topic Discussed	Signature of Student
5	6 Nov	Office	Chap 4:- Analysis and Results.	
6	18 Nov	Office	Chap 5 Conclusion & changes in the written part.	
7	8 Dec	Office	Finalization of thesis	

APPROVAL FOR EXAMINATION

Candidates' Name: Hira Sabir Enrollment No: 01-321242-010

Project/Thesis Title:

I hereby certify that the above candidates' thesis/project has been completed to my satisfaction and, to my belief, its standard appropriate for submission for examination. I have also conducted plagiarism test of this thesis using HEC prescribed software and found similarity index at _____ that is within the permissible limit set by the HEC for thesis/ project BBA/MBA. I have also found the thesis/project in a format recognized by the department of Business Studies.

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Name: Dr Lubna