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# IMPACT OF RISK MANAGEMENT ON THE PROFITABILITY OF LICENSED COMMERCIAL BANKS IN SRI LANKA

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***Abstract***

In today's rapidly evolving financial environment, banks face many risks that can significantly affect their profitability and overall stability. Effective risk management has emerged as a critical factor in maintaining a bank's long-term success and competitive advantage. To overcome these challenges and improve the performance of commercial banks, it is necessary to investigate the factors that influence their operations. The purpose of this study is to analyze the impact of risk management on the performance of commercial banks in Sri Lanka, using return on assets and net interest margin as proxies. The study looks at different aspects of risk management, such as credit risk, liquidity risk, bank capital, and operational risk as well as how they affect a bank's profitability. Panel regression analysis is used in the study to investigate the impact of risk management on commercial banks in Sri Lanka. The study included 10 Sri Lankan commercial Banks listed in the Colombo Stock Exchange (CSE). According to the study's findings, credit risk, bank capital, operational risk had a statistically significant impact on Return on Assets (ROA) and operational risk had a statistically significant impact on Net Interest Margin (NIM). The result highlights that the overall models are statistically significant. The study found that there is a strong impact of risk management on the financial performance of commercial banks in Sri Lanka. The study also established that credit risk management and operational risk management had a strong relationship with financial performance (ROA and NIM). This study concludes that the ROA model can be used as a best-fit proxy for risk management when measuring financial performance.

*Keywords: Bank Capital, Credit Risk, Liquidity Risk, Net Interest Margin, Operational Risk, ROA*

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# 1. INTRODUCTION

## 1.1 Background of the Study

The banking industry contributes significantly to the economic growth of every nation. By offering financial services, well-regulated banks contribute significantly to the economy of any given nation (Kolapo, Ayeni, & Oke, 2012). The most profitable asset of credit organizations is their lending operations, which are core banking activities. The primary objective of managing banks is to improve bank performance to maximize shareholders' returns. This goal is achieved at the expense of higher risk, which is occasionally accompanied by lower returns and may therefore result in underperformance.

According to Gallati (2003), risk is a state felt in an adverse environment or if there is a chance that an expected or hoped-for outcome may differ. Risk, according to Kanchu and Kumar (2013), is anything that prevents the attainment of specific predetermined goals. The business dictionary defines risk as the likelihood or threat of harm, injury, liability, loss, or any other adverse outcomes brought on by external or internal vulnerabilities that may be prevented through preventative action. Banks face a variety of risks in the dynamic and complicated business world of today that could have a big influence on their overall financial health and profitability. To safeguard their interests and improve performance, banks all over the world have come to view risk management as a critical discipline. The performance and operations of banks are impacted by a wide variety of hazards in the banking sector. Risk is categorized as systematic, unsystematic, financial, or non-financial risk. More specifically, these groups include various risks depending on what generates them, including credit risk, liquidity risk, operational risk, market risk, political risk, currency risk, and strategic risk (Imane, 2014).

One important indicator that demonstrates a bank's profitability is the return on assets (ROA). According to Khrawish (2011), it is a ratio of revenue to total assets. Therefore, the corporation is better at generating profits if its ROE is higher. Because they are indicators of financial institution strength and efficient resource use, respectively, the current study will use ROA and ROE as the metrics of profitability in commercial banks. Academics, practitioners, and regulators all agree that effective risk management is a key component of bank management. In response to this reality and the need for a comprehensive strategy to address bank risk management, the Basel Committee on Banking Supervision adopted the Basel I Accords, followed by the Basel II Accords, and most recently the Basel III Accords, to address the issue (Sensarma & Jayadev, 2009). As Sri Lanka's banking sector grows, banks must prioritize risk management to sustain long-term profitability and aid in the country's overall economic growth. Therefore, the primary goal of this study is to find out how risk management impacts bank profitability in Sri Lanka, a rapidly rising South Asian nation.

## 1.2 Research Problem Identification and Justification

The research problem addressed in this study is the impact of risk management on the profitability of banks in Sri Lanka. Understanding how internationally accepted risk management techniques affect Sri Lankan banks' profitability provides insight into how these tactics interact with the particularities of the nation's financial environment. The purpose of this study is to better manage risk in Sri Lankan banks by analysing how it affects profitability. The results will enhance financial stability and guide policy. Such insights can inform the development of more robust risk management frameworks and policies that can contribute to the sustainable profitability and resilience of the banking sector in the country.

## 1.3 Problem Statement

Risk management is essential to finding better performance because most banks are in the risk business. This goal is achieved at the cost of higher risk, which is not always accompanied by strong returns and can occasionally result in underperformance.

There are many researchers: Budhathoki et al., (2020); Iannotta et al., (2007) conducted studies based on this topic for different contries. When following research articles that are published on web sites, credit risk is the primary focus of risk management in the majority of banks worldwide. To ensure improved performance, there is a need for comprehensive and holistic risk management in all financial institutions, particularly in commercial banks. According to KPMG Sri Lankan Banking Report in year 2020 highlights the necessity of thorough risk management in banks, particularly in Sri Lanka, where there is a dearth of research integrating several risk factors to examine their combined effect on financial performance. The study aims to close the empirical gap in previous research on the profitability of the banking industry in Sri Lanka by examining a wider range of factors in addition to credit risk.

## 1.4 Main Objective

To examine the impact of risk Management on the profitability of commercial Banks in Sri Lanka

## 1.5 Specific Objectives

1. To find the impact of credit risk management on the return on assets (ROA) & net interest margin (NIM) of banks in Sri Lanka.
2. To find the impact of liquidity risk management on the return on assets (ROA) & net interest margin (NIM) of banks in Sri Lanka.
3. To find the impact of bank capital management on the return on assets (ROA) & net interest margin (NIM) of banks in Sri Lanka.
4. To find the impact of operational risk management on the return on assets (ROA) & net interest margin (NIM) of banks in Sri Lanka.

### 1.6 Significance of the Research

By examining the impact of risk management on the profitability of Sri Lankan banks, with a particular emphasis on credit risk and common exposures, this study seeks to enhance the body of existing work. The results are highly relevant to investors, industry players, regulators, and bank managers. They also offer useful information that helps policymakers, shareholders, external investors, bank managers, and lenders make decisions. The study adds to the body of knowledge in this and related fields, which helps to address issues with efficient risk management in commercial banks.

## 2. LITERATURE REVIEW

With an emphasis on credit risk and common exposures, this study explores how risk management affects the profitability of banks in Sri Lanka. Its conclusions are important because they provide information that helps shareholders, bank management, legislators, regulators, and investors make well-informed decisions. By addressing issues with efficient risk management in commercial banks, the research advances our understanding of these and related fields. The purpose of this review of the literature is to investigate how risk management affects the financial profitability of Sri Lankan banks.

### 2.1 Theoretical Review

#### 2.1.1 Credit Risk Management and Profitability

One of the most premier and significant categories of banking risk is credit risk (Colquitt, 2007). Credit risk management is the possibility that a contractual counterparty won't fulfill its obligations because of a reduction in the ability to pay or reluctance to uphold the terms of the agreement. Accordingly, credit risk manifests itself when a bank fails to recoup the money it lent to a borrower, counterparty, or oblige (Colquitt, 2007). According to Hempel and Simonson (1999) Credit risk is the possibility that the bank may not be able to collect the principal or interest on loans and securities as pledged.

Through efficient risk management, which includes a thorough credit risk analysis based on scanning and monitoring of the most reliable loan applications, the amount of collateral, diversification of the loan portfolio, and accurate loan pricing based on the borrower's repayment ability and intentions, banks are able to completely eliminate the credit risk. (Karim, 2006; Greuning and Bratanovic, 2009). A financial institution may suffer significant losses due to the default of a small number of borrowers, which might cause severe financial turmoil throughout the whole economy (Bessis, 2003).

#### 2.1.2 Liquidity Risk Management and Profitability

According to Saunders and Cornett (2008), liquidity risk is the sudden increase in depositor withdrawals that could lead banks to quickly sell up their holdings. This risk, according to the State Bank of Pakistan (2003), is the possible loss brought on by a bank's failure to fulfil its obligations. In other words, liquidity risk results from unanticipated outflows of cash and the lack of enough liquidity to satisfy a bank's short-term obligations (Diamond & Rajan, 2005). As a result, banks run the danger

of not being able to fulfil their projected and unforeseen cash needs and borrow more money when necessary. On the other hand, liquidity risk also incites several financial risks such as market risk, interest rate risk, credit risk and strategic risk. For instance, liquidity risk provokes interest rate risk due to unknown rates of future funding and investment (Tahir, 2006). A sample of 25 Bangladeshi banks was observed by Rahman et al. (2015) between the years of 2003 and 2006. The findings showed a correlation between liquidity risk and bank performance that was positive, indicating that banks need to have more liquidity to operate more efficiently.

### 2.1.3 Bank Capital Management and Profitability

Based on Abdullahi (2013), Reorganizing banks' current capital structures is the beginning of capital, which will shield the banking sector from generalized hardship. Furthermore, the capital offers the chance to raise the bar in any business establishment. It divides up corporate effort and produces excellent results. As a result, capital encourages recapitalization when it seems to satisfy the needs of specific banks by raising the minimum paid-up capital, enabling banks to interact with consumers more effectively and efficiently. Also, Greater bank capital helps in maintaining financial stability. Also, it reduces financial distress on the banks (Berger & Bouwman, 2009).

According to Altunbas et al. (2007), the profitability of banking firms is also likely to have an impact on capital and risk. A positive relationship between capital and risk is referred to as the "regulatory hypothesis," which states that regulators encourage banks to increase their capital in proportion to the amount of risk they are taking. A negative relationship may be referred to as the "moral hazard hypothesis," which states that banks have incentives to take advantage of current flat deposit insurance schemes. Furthermore, Islam and Nishiyama (2016) examined a sample of 230 banks from four Southeast Asian countries, which prompted them to discover that equity capital has a positive influence on profitability.

### 2.1.4 Operational Risk Management and Profitability

Operational risk is defined as the risk of direct or indirect loss resulting from inadequate or failed internal processes, people and systems or from external events. Further, Operational risk, according to the State Bank of Pakistan (2003), refers to the direct or indirect losses incurred by a banking organization as a result of inadequate or unsuccessful internal systems, processes, and personnel as well as from environmental factors on the outside. The likelihood of adverse effects on the bank's financial performance as well as its capital as a result of staff members' negligence, inadequate internal procedures, inadequate management information systems, or unpredictable and undesirable external events is related to operational risk, according to several other opinions.

To ensure the stability of the financial systems, the Basel Accord Committee has formulated three pillars which help to create an international standard that banking regulators can use when creating regulations about how much capital banks need to put aside to guard against the types of financial and operational risks banks face (Basel, 2004).

### 2.1.5 Determinants of Financial Performance

According to Silva (2009) and Yudistira (2004), all financial institutions and the financial sector that are active in an economy strive to operate effectively to achieve economic growth and financial system stability. Efficiency may be used to determine a company's or decision-making unit's performance level. Efficiency may be divided into three categories: more, equal, and less than real or projected efficiency level (Lovell, 1993). The current literature has placed a strong emphasis on the value of researching the effectiveness of Decision Making Units (DMU). The number of studies on bank efficiency has also increased recently. The risk variables should be considered jointly when analyzing bank efficiency since banks need to be both effective and secure. Because of this, the ideas of efficiency and risk are connected (Pastor, 2002).

ROA is regarded as the best indication of profitability by many authorities. The ROA reveals how much revenue the management can produce from the assets. As a result, ROA may be used to assess how well bank management turns assets into income (Goddard et al., 2004). According to Rivard and Thomas (1997), ROA is the most accurate indicator of bank profitability. This is because big equity multipliers do not influence ROA. The difference between net interest revenue and net interest costs relative to total assets is known as the net interest margin (NIM). The bank engages in both deposit collection and lending. It uses the money it receives from depositors at a lower interest rate to make loans to borrowers at a higher rate of interest. To calculate the NIM, we must subtract the net interest expenditure from the net interest income. If the asset quality is kept solid, a high NIM signals a stronger bank profitability performance.

## 2.2 Empirical Review

This survey of the literature examines risk management and highlights its importance in the wake of the world financial crisis. It highlights the importance of excellent risk management in boosting transparency, financial stability, and investor awareness of companies' risk policies and underlines the increased disclosure by banks on high-risk exposures. According to Esther (2016), risk management procedures need to be improved because they have a beneficial impact on the profit banks earn at any particular time. This study shows how crucial liquidity risk management is in affecting the income statements of Kenya's commercial banks, leading to the conclusion that managers who want to boost their company's earnings should keep an eye on anything that could affect the liquidity of their companies. More importantly, to increase profitability in situations of short-term debt, the loan percentage supplied by banks must be kept at a controllable level. This research got their Sample as The 14-year term was chosen based on Tarus and Omandi's (2013) business case of corporate governance, which stated that using five years would have resulted in a limited sample size and was therefore inappropriate for their analysis than five years.

Aboagye and Otieku, (2010) conducted a study on Credit Risk Management and Profitability in financial institutions in Sweden. The major goal was to determine whether managing credit risk has an impact on the financial institution's capacity to make money. They discovered that Basel II's implementation as well as the current

global financial crisis have increased the importance of credit risk management in financial institutions. Adeusi & Stephen Oluwafemi, (2014) found that there is a strong connection between risk management and bank performance. higher risk management through managed funds, lower costs for doubtful and bad loans, and a lower Debt equity ratio lead to higher bank performance. Therefore, banks must engage in responsible risk management preserve bank assets and defend the interests of investors 10 Nigerian banks were the subject of annual observations for this study between 2006 and 2009. Maaka, (2013) carried out a study to investigate the liquidity faced by commercial banks in Kenya and to establish the relationship between liquidity risk and the performance of banks in Kenya. The research findings established that profitability was negatively affected due to the increase in liquidity gap and leverage. The level of customer deposits was found to positively affect the bank's profitability.

## 3. RESEARCH METHODOLOGY

### 3.1 Research Design

#### 3.1.1 Research Philosophy

Research philosophy refers to the beliefs and assumptions that underpin the researcher's approach to knowledge and understanding. The positivist philosophy is adopted for this research because this study's reality is dependent on only one truth.

#### 3.1.2 Research Logic

Research logic refers to the logical framework and reasoning that guides the research process. quantitative research. Accordingly, this research is associated with the deductive method. This study goes from general to specific (Top-down approach).

#### 3.1.3 Research Approach

This research is also associated with the quantitative approach because this research is positivist and deductive. This research works with statistics or numbers and tries to do theory testing by using secondary data from annual reports of banks.

## 3.2 Conceptual Framework

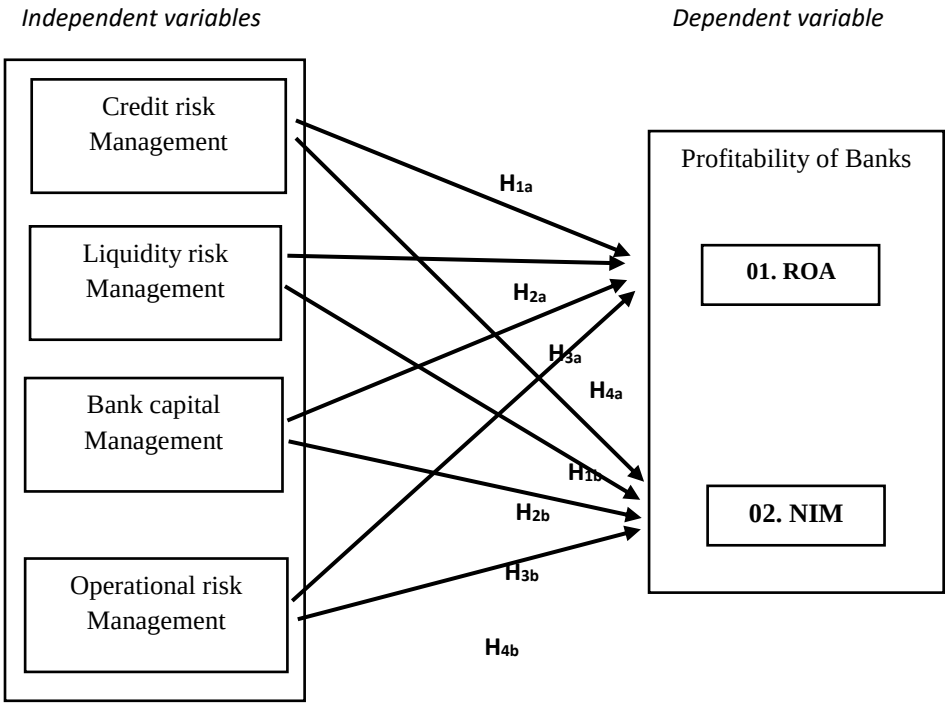


**Figure 1: Conceptual Framework**

## 3.3 Operationalization

**Table 1: Operationalization Table**

| Construct | Variable | Measurement | Source |
|---|---|---|---|
| Independent Variables | | | |
| | Credit Risk Management | $\frac{\text{Loan Loss Provison}}{\text{Total Loan}}$ | Githaiga (2013) |
| Bank Specific Risk Measures | Liquidity Risk Management | $\frac{\text{Liquidity Assets}}{\text{Total Assets}}$ | Olalekan et al (2019) |
| | Bank Capital Management | $\frac{\text{Equity}}{\text{Total Assets}}$ | Isam & Malik Abu (2020) |
| | Operational Risk Management | $\frac{\text{Operating Income}}{\text{Operating Expenses}}$ | Piyananda, Chandrasena & Fernando (2015) |

| | | | |
|---|---|---|---|
| Dependent Variable | | | |
| Risk Management Outcome | Return on Assets (ROA) | $\frac{\text{Net income}}{\text{Total assets}}$ | Olalekan et al (2019) & Isam & Malik Abu (2020) |
| | Net Interest Margin | $\frac{Interest\ income - Interest\ expense}{Total\ Assets}$ | Prem et al (2020) & San & Heng (2013) |

### 3.4 Population and Sample Selection

The target population for this study was the 24 commercial banks listed in the Central Bank of Sri Lanka (CBSL) as of December 2022. Research represents the entire commercial banks listed in the Central Bank of Sri Lanka (CBSL) as the population. The scope of this research study is limited to 10 Commercial Banks out of 24 LCBs as the sample selected. The argument based on the highest market capitalization. Data is collected for 10 years from 2013-2022. The purposive sampling method is used to select 10 commercial banks that have been listed in the Colombo Stock Exchange (CSE).

### 3.5 Data collection method

This study is conducted based on secondary data for the period of 10 years (2013 to 2022) to examine the hypothesis defined by the researcher.

### 3.6 Analysis of Data

The data collected from the annual reports of the banks were analyzed using multiple regression analysis the relation of one dependent variable to multiple independent variables. Then the data was analyzed by the use of Descriptive statistics using STATA.

### 3.7 Hypotheses Development

**$H_{1a}$:** There is a significant impact of credit risk on a bank's return on assets (ROA).
**$H_{1b}$:** There is a significant impact of credit risk on a bank's net interest margin (NIM).

**$H_{2a}$**: There is a significant impact of liquidity risk on a bank's return on assets (ROA).
**$H_{2b}$**: There is a significant impact of liquidity risk on the bank's net interest margin (NIM).

**$H_{3a}$:** There is a significant impact of bank capital on the bank's return on assets (ROA).
**$H_{3b}$:** There is a significant impact of bank capital on the bank's net interest margin (NIM).

**$H_{4a}$:** There is a significant impact of operational risk on the bank's return on assets (ROA).

**$H_{4b}$:** There is a significant impact of operational risk on the bank's net interest margin (NIM).

## 4. ANALYSIS AND DISCUSSION

Descriptive statistics and regression analysis are used as the analytical tools of this study. Finally, this chapter includes the discussion part concerning findings and the results of subjected study.

### 4.1 Findings

### Descriptive Statistics

**Table 2: Descriptive Statistics**

| Variables | Obs | Mean | Std. Dev. | Min | Max | Skew. | Kurt. |
|---|---|---|---|---|---|---|---|
| ROA | 100 | .01 | .004 | .004 | .016 | -.143 | 1.78 |
| NIM | 100 | .037 | .006 | .029 | .047 | .282 | 1.837 |
| CR | 100 | .011 | .007 | .003 | .024 | .541 | 2.018 |
| LR | 100 | .065 | .014 | .048 | .084 | .247 | 1.606 |
| BC | 100 | .102 | .027 | .074 | .154 | .862 | 2.43 |
| OR | 100 | 2.175 | .511 | 1.43 | 3.106 | .387 | 2.148 |

Note: ROA, Return on Assets; NIM, Net Interest Margin; CR, Credit Risk; LR, Liquidity Risk; BC, Bank Capital; OR, Operational Risk
Source: STATA Software

Table 2 above summarizes the descriptive statistics of the variables included in the regression models as presented. It represents the variables of 10 Commercial Banks operating in Sri Lanka whose financial results were available for the years 2013-2022. The average value of ROA of the 10 selected listed commercial banks mean stood at 0.01, while the minimum stood at 0.004 and the maximum was 0.016. The average value of NIM of the 10 selected listed commercial banks mean stood at 0.037, while the minimum stood at 0.029 and the maximum was 0.047. The provided descriptive statistics offer valuable insights into six key financial variables within a dataset consisting of 100 observations. The mean value of the Credit risk (CR) for the selected sample was 0.011, while 0.003 was the minimum and 0.024 was the maximum. The mean value of the Liquidity risk (LR) for the selected sample was 0.065, while 0.048 was the minimum and 0.084 was the maximum. The mean value of the Bank capital (BC) for the selected sample was 0.102, while 0.074 was the minimum and 0.154 was the maximum. The mean value of the Operating risk (OR) for the selected sample was 2.175, while 1.43 was the minimum and 3.106 was the maximum. These statistics provide an initial understanding of the data's central tendencies, spread, and shape of the distributions for these variables.

## 4.2 Diagnostic Tests

### 4.2.1 Normality

The normality test helps to determine how likely it is for a random variable underlying the data set to be normally distributed. All dependent and independent variables' skeweness values are not beyond ± 2 and kurtosis values are not more than 5. The data set is normally distributed.

### 4.2.2 Serial Autocorrelation

**Table 3: Wooldridge Test for Autocorrelation**

| Wooldridge test for autocorrelation in panel data | **ROA** | **NIM** |
|---|---|---|
| H0: no first-order autocorrelation | | |
| F( 1, 9) | 1.869 | 3.490 |
| Prob > F | 0.2087 | 0.0985 |

Source: STATA Software

Since the p-value (0.2087) is greater than the typical significance level of 0.05, we do not have enough evidence to reject the null hypothesis. Therefore, we do not have strong evidence to suggest the presence of first-order autocorrelation in this panel data based on the Wooldridge test.

Since the p-value (0.0985) is greater than the typical significance level of 0.05. Still, we have no strong evidence that suggests the presence of first-order autocorrelation in the data set based on the Wooldridge test.

### 4.2.3 Stationarity

**Table 4: Levin-Lin-Chu Unit-Root Test for Stationarity**

Ho: Panels contain unit roots

Ha: Panels are stationary

| **Variables** | **Unadjusted t** | **Adjusted t*** | **p-value** |
|---|---|---|---|
| ROA | -9.5323 | -4.3782 | 0.0000 |
| NIM | -12.2230 | -7.5324 | 0.0000 |
| CR | -8.0659 | -5.0657 | 0.0000 |
| LR | -9.5511 | -2.9163 | 0.0018 |
| BC | -10.5623 | -6.8259 | 0.0000 |
| OR | -9.4318 | -3.7729 | 0.0001 |

Source: STATA Software

The Levin-Lin-Chu unit root test results suggest strong evidence that variables such as ROA, NIM, CR, LR, BC and OR are likely stationary. This conclusion is supported

by low p-values, indicating a lack of a unit root. While LR also shows evidence of stationarity, the support is somewhat weaker compared to the other variables. The unadjusted t-statistics of all variables suggest that there may be evidence of stationarity, as it is significantly different from zero in the negative direction and assumes a typical significance level of 0.05.

### 4.2.4 Test for Multicollinearity

Multicollinearity is a statistical issue that occurs when two or more independent variables in a regression model are highly correlated with each other. It can cause problems in regression analysis, including unstable coefficient estimates, reduced statistical significance, and difficulties in interpreting the effect of individual predictors.

The VIF quantifies the extent to which the variance of an estimated regression coefficient is increased due to multicollinearity. Calculate the VIF for each independent variable. VIF values greater than 10 in a large sample suggest multicollinearity, with higher values indicating more severe multicollinearity. VIF is calculated as follows.

**Table 5: VIF Test**

| Variable | VIF | 1/VIF |
|---|---|---|
| Operational Risk | 1.42 | 0.706546 |
| Credit Risk | 1.34 | 0.746911 |
| Bank Capital | 1.09 | 0.918297 |
| Liquidity Risk | 1.00 | 0.995599 |
| Mean VIF | 1.21 | |

Source: STATA Software

If VIF is greater than 10 in a large sample, then multicollinearity could exist in the variables. Above table 4.4 shows result for regression VIF is lower than 10 in model, then there is no multicollinearity.

## 4.3 Regression Analysis for ROA

The dependent variable (ROA) and independent variables are mathematically examined in this study using regression analysis, which yields regression estimates of coefficient values that are displayed in a coefficient table. Both fixed effect and random effect models are included in the analysis; the researcher uses a Hausman test to choose which model best fits the goal of the investigation.

### 4.3.1 Fixed effect Model Regression

**Table 6: Fixed Effect Model Regression**

| ROA | Coef. | St.Err. | t-value | p-value | [95% Conf | Interval] | Sig |
|---|---|---|---|---|---|---|---|
| CR | -.366 | .04 | -9.22 | 0 | -.444 | -.287 | *** |
| LR | -.026 | .02 | -1.29 | .199 | -.067 | .014 | |
| BC | .036 | .017 | 2.19 | .031 | .003 | .069 | ** |
| OR | .005 | .001 | 6.53 | 0 | .004 | .007 | *** |
| Constant | .001 | .002 | 0.28 | .781 | -.004 | .005 | |

| | | | |
|---|---|---|---|
| Mean dependent var | 0.010 | SD dependent var | 0.004 |
| R-squared | 0.561 | Number of obs | 100 |
| F-test | 27.527 | Prob > F | 0.000 |
| Akaike crit. (AIC) | -977.894 | Bayesian crit. (BIC) | -964.868 |

*** p<.01, ** p<.05, * p<.1 Notes: ROA, Return on Assets; NIM, Net Interest Margin; CR, Credit Risk; LR, Liquidity Risk; BC, Bank Capital; OR, Operational Risk
(Source: STATA Software)

According to the results of the research study, the overall value of R -squared in table 4.5 is 0.561, which indicates that the four variables in the fixed effect model explain about 56.1% of the Return on Assets. The findings indicate that while Bank Capital and Operational Risk both statically significantly influence ROA, Credit Risk significantly and negatively influences ROA while Liquidity Risk does not reach statistical significance. The F-statistic of 27.527 with a p-value of 0.000 suggests that the overall model (with all independent variables) is statistically significant.

### 4.3.2 Random Effect Model Regression

**Table 7: Random Effect Model Regression**

| ROA | Coef. | St.Err. | t-value | p-value | [95% Conf | Interval] | Sig |
|---|---|---|---|---|---|---|---|
| CR | -.379 | .039 | -9.65 | 0 | -.455 | -.302 | *** |
| LR | -.04 | .02 | -2.02 | .043 | -.079 | -.001 | ** |
| BC | .007 | .014 | 0.52 | .604 | -.02 | .035 | |
| OR | .006 | .001 | 8.10 | 0 | .004 | .007 | *** |
| Constant | .003 | .002 | 1.42 | .155 | -.001 | .008 | |

| | | | |
|---|---|---|---|
| Mean dependent var | 0.010 | SD dependent var | 0.004 |
| Overall r-squared | 0.432 | Number of obs | 100 |
| Chi-square | 104.167 | Prob > chi2 | 0.000 |
| R-squared within | 0.546 | R-squared between | 0.351 |

*** p<.01, ** p<.05, * p<.1 Notes: ROA, Return on Assets; NIM, Net Interest Margin; CR, Credit Risk; LR, Liquidity Risk; BC, Bank Capital; OR, Operational Risk

Source: STATA Software

The results of Table 4.6 show that the overall R-squared value is 0.432, which means that the independent variables collectively explain 43.2% of the variation in ROA. This indicates a moderate level of explanatory power. The results of the study show that while operational risk has a substantial positive link with ROA, credit risk has a considerable negative impact on ROA. At the 1% level, operational risk and credit risk are both statistically significant. Even at the 5% threshold of statistical significance, liquidity risk has a negative impact on return on assets (ROA). Bank Capital, on the other hand, does not demonstrate a discernible effect on ROA. The Chi-square statistic is 104.167, and the associated p-value is 0.000, indicating that the model as a whole is statistically significant.

### 4.3.3 Hausman Specification Test

**Table 8: Hausman Specification Test for ROA**

| | **Coef.** |
|---|---|
| Chi-square test value | 12.791 |
| P-value | .012 |

Hausman test results show a 0.0123 probability value at a 95% significant level where the null hypothesis is rejected. According to that random effect, the model is rejected, and the fixed effect model is selected as the best-fitted model for the study. Therefore, the results of the fixed effect model are discussed in the data analysis.

### 4.3.4 Testing for fixed effects - To run F test

**Table 9: Testing for Fixed Effects for ROA**

| *test CreditRisk LiquidityRisk BankCapital OperationalRisk* |
|---|
| F(4, 86) = 27.53 |
| Prob > F = 0.0000 |

Source: STATA Software

According to the result of the F- the p-value was 0.0000. So according to the OLS model is rejected. And the Fixed effect is accepted as the best-fit model for the study. F-test values come to 27.53 with a probability of F = 0.0000 indicating that the fixed effect model is better than the pooled OLS model. Therefore, the results of the fixed effect model are discussed in the data analysis.

## 4.4 Regression Analysis for NIM

### 4.4.1 Fixed effect Model Regression

**Table 10: Fixed Effect Model Regression**

| NIM | Coef. | St.Err. | t-value | p-value | [95% Conf | Interval] | Sig |
|---|---|---|---|---|---|---|---|
| CR | -.087 | .089 | -0.00 | .999 | -.177 | .176 | |
| LR | .059 | .046 | 1.29 | .199 | -.032 | .15 | |
| BC | .055 | .037 | 1.47 | .145 | -.019 | .128 | |
| OR | .005 | .002 | 2.99 | .004 | .002 | .009 | *** |
| Constant | .016 | .005 | 3.23 | .002 | .006 | .026 | *** |

| | | | |
|---|---|---|---|
| Mean dependent var | 0.037 | SD dependent var | 0.006 |
| R-squared | 0.256 | Number of obs | 100 |
| F-test | 7.403 | Prob > F | 0.000 |
| Akaike crit. (AIC) | -816.713 | Bayesian crit. (BIC) | -803.687 |

*** p<.01, ** p<.05, * p<.1 Notes: ROA, Return on Assets; NIM, Net Interest Margin; CR, Credit Risk; LR, Liquidity Risk; BC, Bank Capital; OR, Operational Risk
(Source: STATA Software)

According to the regression results, bank capital, liquidity risk, and credit risk do not statistically significantly affect the dependent variable (net interest margin) in a fixed-effect model. Operational risk, however, has a very favourable effect. With an approximate explanation of 25.6% of the variance in the dependent variable, the whole model is statistically significant. The overall model is statistically significant at a 5% level, as indicated by the F-test, and it explains approximately 25.6% of the variance in the dependent variable.

### 4.4.2 Random Effect Model Regression

**Table 11: Random Effect Model Regression**

| NIM | Coef. | St.Err. | t-value | p-value | [95% Conf | Interval] | Sig |
|---|---|---|---|---|---|---|---|
| CR | .019 | .084 | 0.23 | .818 | -.146 | .185 | |
| LR | .05 | .043 | 1.18 | .238 | -.033 | .134 | |
| BC | .042 | .031 | 1.35 | .178 | -.019 | .103 | |
| OR | .005 | .002 | 3.15 | .002 | .002 | .008 | *** |
| Constant | .019 | .005 | 3.80 | 0 | .009 | .028 | *** |

| | | | |
|---|---|---|---|
| Mean dependent var | 0.037 | SD dependent var | 0.006 |
| Overall r-squared | 0.037 | Number of obs | 100 |
| Chi-square | 26.684 | Prob > chi2 | 0.000 |
| R-squared within | 0.255 | R-squared between | 0.088 |

*** p<.01, ** p<.05, * p<.1 Notes: ROA, Return on Assets; NIM, Net Interest Margin; CR, Credit Risk; LR, Liquidity Risk; BC, Bank Capital; OR, Operational Risk
(Source: STATA Software)

Credit risk, liquidity risk, and bank capital do not show statistically significant impacts on the dependent variable (net interest margin) in the random effects regression model. On the other hand, operational risk shows a notable benefit. The overall R-squared value is 0.037, indicating that only 3.7% of the variance in the dependent variable is explained by the independent variables in the model. The chi-square statistic is 26.684 with a p-value of 0.000, suggesting that the overall model is statistically significant at a 5% level. In summary, research can conclude that operational risk has a significant positive impact on the dependent variable, while credit risk, liquidity risk, and bank capital do not appear to have statistically significant effects. The overall model is statistically significant, as indicated by the chi-square test, but it explains only a small proportion (3.7%) of the variance in the dependent variable.

### 4.4.3 Hausman Specification Test

**Table 12: Hausman Specification Test for NIM**

| | **Coef.** |
|---|---|
| Chi-square test value | 4.558 |
| P-value | .336 |

Source: STATA Software

The Hausman test yields insufficient evidence to reject the null hypothesis, as indicated by its chi-square test result of 4.558 and p-value of 0.336. As such, the fixed-effects model does not have enough statistical support to be preferred over the random-effects model. As a result, the study continues using the random-effects model's results.

### 4.4.4 Testing for Random Effects: Breusch-Pagan Lagrange Multiplier

Breusch and Pagan Lagrangian multiplier test for random effects

NIM[Bank,t] = Xb + u[Bank] + e[Bank,t]

**Table 13: Estimated Results**

| | **Var** | **sd = sqrt(Var)** |
|---|---|---|
| NIM | .0000362 | .0060152 |
| e | .0000175 | .0041815 |
| u | .000022 | .0046891 |

Test: Var(u) = 0

chibar2(01) = 70.86

Prob > chibar2 =0.0000

Source: STATA Software

According to the result of LM test p-value was 0.0000. So according to OLS model is rejected. And the random effect is selected as the best fit model for the study. Therefore, the results of the random effect are discussed in the data analysis.

### 4.5 Mathematical Model

$$ROA_{it} = \alpha + B_1X_1 + B_1X_2 + B_1X_3 + B_1X_4 + U_i$$

*ROA = 0.001 -0.366*Credit Risk -0.026*Liquidity Risk +0.036*Bank Capital +0.005* Operational Risk* + Ɛ

Table 4.5 also shows that the relation between the Return on Asset (ROA) and independent variables (Credit Risk, Liquidity Risk, Bank Capital, Operational Risk) are F-test (27.527) tests the overall significance of the model 0.05 level. According to Table 4.2, we can drive the above mathematical function for (ROA)model. (ROA)model.

$$NIM_{it} = \alpha + B_1X_1 + B_1X_2 + B_1X_3 + B_1X_4 + U_i$$

*NIM = 0.019 + 0. 019*Credit Risk + 0.05*Liquidity Risk + 0.042*Bank Capital + 0. 005* Operational Risk* + Ɛ

Table 4.10 also shows that the relation between the Net Interest Margin (NIM) and independent variables (Credit Risk, Liquidity Risk, Bank Capital, Operational Risk) chi-square statistic (26.684) tests the overall significance of the model. The low p-value ($p < 0.05$) indicates that the model is statistically significant. R-squared within (0.255) and R-squared between (0.088) provide information on the proportion of variance explained by fixed effects and random effects, respectively. According to Table 4.7, we can drive the above mathematical function for (NIM) model.

### 4.6 Hypothesis Testing

**Table 14: Hypothesis Testing**

| **Hypothesis** | **Regression Analysis** | | |
|---|---|---|---|
| | **Outcome** | **Coef.** | **P-Value** |
| **$H_{1a}$:** There is a significant impact of credit risk on ROA. | Accepted | -0.366 | 0 |
| **$H_{2a}$:** There is a significant impact of liquidity risk on ROA. | Rejected | -0.026 | 0.199 |
| **$H_{3a}$:** There is a significant impact of bank capital on ROA. | Accepted | 0.036 | 0.031 |

| | | | |
|---|---|---|---|
| **$H_{4a}$:** There is a significant impact of operational risk on ROA. | Accepted | 0.005 | 0 |
| **$H_{1b}$:** There is a significant impact of credit risk on NIM. | Rejected | 0.019 | 0.818 |
| **$H_{2b}$**: There is a significant impact of liquidity risk on NIM. | Rejected | 0.05 | 0.238 |
| **$H_{3b}$:** There is a significant impact of bank capital on NIM. | Rejected | 0.042 | 0.178 |
| **$H_{4b}$:** There is a significant impact of operational risk on NIM. | Accepted | 0.005 | 0.002 |

Source: STATA Software

This chapter especially gives attention to data Presentation and Analysis using the multiple analysis approaches. This chapter discusses several major analyses of this study according to the impact of Risk Management on the Profitability of Banks in Sri Lanka for the period from 2013 to 2022. According to the results analysis and discussion of the chapter, the hypothesis has been tested. It denotes the relevancy and consistency of the study with prior studies and the theories relating to this field.

The two dependant variables show different results for ROA & NIM.Out of four dimestions for ROA accepted only three; whereas for NIM one accepted out of four hypothseses. Therefore, the for Sri Lankan context more viable measurement is comparatively ROA as per the study to measure risk management for licensed banks. Accordingly, the section will summarize and interpret the conclusions and recommendations.

## 5. CONCLUSION

The main conclusions of the study about how risk management affects the profitability of Sri Lanka's listed commercial banks are succinctly summarized in this chapter. It outlines the conclusions and suggestions drawn from the data and points out areas that might be the subject of further study.

The discussion of this research draws from its objective as stated in Chapter One and the study's findings as discussed in Chapter Four. The objective of the study is to examine whether risk management would have an impact on the profitability of listed commercial banks in Sri Lanka. From the analysis, the overall outcome reveals that risk management should have an impact on the returns that banks make in any given period.

According to the study, there is a significant impact between credit risk management and bank profitability measured variables. Bank management can increase bank profitability through various aspects by adopting credit risk management policies.. This study highlights the significance of managing liquidity risk concerning the income statement of commercial banks operating in Sri Lanka. Consequently, managers who aim to enhance their organization's earnings should closely monitor

any factors that may impact their firm's liquidity. More importantly, the loan proportion given by banks needs to be maintained at a manageable level to boost profitability in cases of shortfalls. This is to say that banks need to be watchful of the way they issue long-term to their customers since a properly managed credit level of risk will for sure yield more returns to the firm.

According to the study, bank capital and bank profitability show a significant impact between the measured variables. Therefore, it is possible to approve the Null hypothesis ($H_3$). High-capitalised bank can gable more business opportunities. It is able and flexible in handling the risk and lowers the risk of going insolvent which will reduce the need for borrowing and subsequently increase bank profitability. Further, the study leads to a conclusion that the null hypothesis is there is a significant impact between the operational risk management and banks profit (ROA/NIM) should be accepted since the results have demonstrated the importance and positivity of the relationship between the two variables. Banks that want to achieve large and increased returns on their assets and investments should be concerned about the critical examination of overhead items. Since this is the main objective of shareholders in all businesses, banks are left with little choice but to make sure that operational efficiency is upheld, and associated risk is controlled to a reasonable degree.

Among these two models, the ROA model generates the highest R square, 0.561, which means that 56.1% of the variance in ROA is explained by the four independent variables considered in this paper. The NIM model generates the lower R squares. The R square for the NIM model is 0.256. For the NIM model, the independent variables explain 25.6% of NIM. From the analysis, it is concluded that the ROA model is the most reliable model among the two profitability measures. The ROA model provided the highest R square and it is better explained by bank-specific risk variables that were employed in our analysis. According to Rivard and Thomas (1997) and Golin (2001), they found that ROA is the best measurement of bank profitability as compared to ROE and NIM.

### 5.2 Recommendations

It is clear from the examination of how risk management affects Sri Lankan banks' profitability that these institutions' financial performance is significantly influenced by their use of efficient risk management techniques. We suggest that Sri Lankan banks concentrate on improving their risk management methods considering our findings, especially about credit risk and liquidity risk, as these were found to be significant variables adversely affecting net interest margin and return on assets. Moreover, it is necessary to sustain a substantial amount of bank capital to enhance profitability. Return on assets can also be positively impacted by giving good operational risk management top priority. To strengthen their financial stability, and to implore banks to invest in strong risk assessment, monitoring, and mitigation systems. Make suggestions to Sri Lankan banks on how to raise profitability and strengthen risk management procedures considering your findings. The given suggestions provide a direction for Sri Lankan banks success and remain sustainable over the long run in a fast-paced and cutthroat financial market.

### 5.3 Suggestions for Further Research

The study suggests that a further study can be done on the impact of Risk Management on Financial Performance of indicators on the financial performance of other financial institutions like the microfinance institutions (MFIs) and financial institutions (FI)s. This is to ascertain if the model can be applied as a proxy for risk management on the other financial institutions in the Sri Lankan market. Further studies can also be undertaken on risk management practices followed by commercial. The study can comprise data collected through both, primary as well as secondary sources to use primary source data to check the extent to which different risk management practices have been followed by commercial banks through the use of questionnaires.

### 5.4 Limitations of the Study

The primary limitation in this study is that the data collection focused on only one sector in one country and there is a relatively narrow ten-year period for the data collection. This study analyses the ten years and 10 banks' impact on risk disclosure on the listed commercial banks. Future researchers can study the long-run effect when using the twenty years of data. However, this study provides future opportunities for extending similar research on different business sectors and different countries with similar financial and banking sectors. Since there are additional variables affecting ROA and NIM with the same level of prediction, there may be more independent variables than four.

This study only included ten listed commercial banks in Sri Lanka and in this study, government commercial banks are not included because those banks are not listed. It is possible that the market conditions and distinctive features of the Sri Lankan banking sector are not well represented by conventional risk and financial performance metrics. These ought to be taken into account during analysis.

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