IMPACT OF CREDIT PERFORMANCE ON THE PROFITABILITY OF COMMERCIAL BANKS IN NEPAL

A Dissertation Submitted to the Office of the Dean, Faculty of Management in partial fulfillment of the requirements for the Master's Degree

By

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CERTIFICATION OF AUTHORSHIP

This dissertation is a presentation of my original research work for fulfillment of Master Degree. Wherever contributions of others are involved, every effort is made to indicate this clearly, with due reference to the literature, and acknowledgements of collaborative research and discussions. The work was done under the guidance of Lecturer, Basu Dev Adhikari, Faculty of Management N.R. College, Nepaltar, Kathmandu.

I certify that the work in this dissertation has not been previously submitted for degree or it has been submitted as part of requirement for a Master Degree of those selected commercial banks except as fully acknowledgement.

I also certify that the dissertation has been written by me. Any help that I have requested during the study and preparation of the work has been acknowledged. In addition, I certify that all the required information sources and literature used are indicated in the bibliography section of a dissertation.

Bimal Tamang
Signature:
September, 2022

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ABBREVIATIONS

ADBL	:	Agriculture development bank limited
BFIS	:	Bank and financial institutions
CAR	:	Capital adequacy ratio
CDR	:	Credit-deposit ratio
CLA	:	Cost per loan advance ratio
CMP	:	Credit management policy
CP	:	Credit performance
CRM	:	Credit risk management
CRR	:	Credit reserve ratio
EPS	:	Earnings per Share
FEM	:	Fixed Effect Model
MBS	:	Master of business studies
MGT	:	Management
NBL	:	Nepal bank limited
NIBL	:	Nepal investment bank limited
NO.	:	Number
NPR	:	Net premium reserve
NPL	:	Non-performing loan
NRB	:	Nepal rastra bank
RBB	:	Rastiya banijya bank
Regd.	:	Registration
ROA	:	Return on assets
ROE	:	Return on equity
RS	:	Rupees
SCB	:	Standard chartered bank limited
T.U	:	Tribhuvan university
WCM	:	Working capital management
%	:	Percentage
&	:	And

ABSTRACT

The main purpose of the study was to examine the impact of credit performance on the profitability of commercial banks in Nepal. The study variables were Credit deposit ratio, Non-performing loan and Credit adequacy as Independent variable and profitability indicators Return on equity (ROE) and Earning per share (EPS) as dependent variable. The study used quantitative research approach and secondary financial data for the period covering 2011/12-2020/21 since implementation of core banking system to examine the financial impact of nonperforming loan on bank's performance. Descriptive and explanatory research design was employed and data were analyzed using descriptive statistics and multiple linear regression models by using SPSS software. . Credit loans is one of the key sources of income of commercial banks, therefore managing the risk related to credit greatly impacts the bank's profitability. Based on the analysis result the Commercial Bank enhance current lending practice through hiring consultant who have special expertise on major priority areas like Agriculture, Manufacturing and able to provide expert advice before the bank is going to finance. And to protect the bank from financial risk also recommended credit management to continue strengthening its monitoring mechanisms through regular follow up strategies and commitment, CRM to provide advices, counselling to borrowers to protect customer from business failure and the management also to provide training to all credit performers to improve their business knowledge so that the bank will reduce the size of non-performing loan and in effect will improve its financial performance. The study thus recommends an effective credit risk management for commercial banks of Nepal based that maintains an optimum level of capital adequacy ratio

KEYWORDS: Return on Assets, Earning per Share, Credit Deposit Ratio, Capital Adequacy Ratio, and Non-performance loan

CHAPTER - I
INTRODUCTION

1.1 Background of the study

Modern banking is an essential industry that operates within the periphery of national as well as the international financial system. Financial systems allow funds to be allocated, invested, or moved between economic sectors. The health of national as well as global economy largely depends on a highly regulated financial system. Banks as a vital section of such system. Rose (2002) mentioned that it is one of the most heavily regulated businesses in the world therefore, many authors use to argue that no institution has shaped the economic development of the world more than the bank.

A commercial bank is financial institution which performs the functions of accepting deposits from the general public and giving loan for investment with the aim of earning profit. They generally trade and commerce with short term loans.

Depending on the definition, the world's oldest banks is either Banca Monte deipaschi di siena or Berenberg bank. Banca Monte Deipaschi di Siena was founded in its present from in 1624 but traces its history to a mount of piety founded in 1472. The Berenberg Company was founded in 1590. And has operated continuously ever since with the same family as owners or co-owners. Berenberg bank is the world's oldest merchant bank or investment bank. The world's oldest central bank is the Sveriges Riks bank which was founded in 1668. The commercial bank was founded in 1924 by local businessmen in Oglethorpe country with the mission of serving the financial needs of the citizens and businesses of the area. Much has changed since 1924.

The primary function of commercial bank is the credit management. But management of credit is not an easy job. There are tremendous risks associated with credit. Such risk is very popular in the name of "credit risk" in the banking industry. Gieseche (2004) stated that credit risk is a situation of unexpected changes in the credit quality of counterparty in a financial agreement. It is a risk of financial loss if a borrower or counterparty fails to honor commitments under an agreement and any such failure has an adverse effect on the financial performance of the bank. A credit risk is the risk of default on a debt that may go up from a borrower refuse to make necessary payments. The risk is that of the bank and includes lost principal and interest, disruption to cash flows, and increased collection costs.

As mentioned in Investopedia.com, credit risk is the probable risk of loss resulting from a borrower's failure to repay a loan or meet contractual obligations. Traditionally, it refers to the risk that a lender may not receive the owed principal and interest, which results in an interruption of cash flows and increased costs for collection. Although it is impossible to know exactly who will default on obligations, properly assessing and managing credit risk can lessen the severity of loss. As mentioned in the publication of Basel Committee on Banking Supervision (2000), the goal of credit risk management is to maximize a bank's risk-adjusted rate of return by maintaining credit risk exposure within acceptable parameters. Banks need to manage the credit risk inherent in the entire portfolio as well as the risk in individual credits or transactions. Banks should also consider the relationships between there sustainability, credit risk, and other risks. According to Basel Committee on Banking Supervision (2000), "Granting credit involves accepting risks as well as producing profits. Banks should assess the risk/reward relationship in any credit as well as the overall profitability of the account relationship.

For most of the banks, loans are the largest and most obvious source of credit risk; however, credit risk could stem from activities like both on and off balance sheet. Coyle (2000) defines credit risk as losses from the refusal of credit customers to pay what is owed in full and on time. It arises mainly from direct lending and certain off-balance sheet products i.e. guarantees, letter of credits, foreign exchange, forward contracts & derivatives and also from the bank's holding of assets in the form of debt securities. The management of credit risk is a critical component of a comprehensive approach to risk management and is essential to the long-term success of a commercial bank.

Credit risk is the uncertainty associated with borrower's loan repayments. In general, when borrowers‟ asset values exceed their indebtedness they repay loans but when borrowers‟ assets values are less than loan values, they do not repay and they could, therefore, exercise their option to default (Sinkey Jr, 2002).

Therefore, it is a requirement for every bank worldwide to be aware of the need to identify measure, monitor, and control credit risk and again determining how credit risks could be lowered. More capital can compensate for risks taken; this means that a bank should hold adequate capital against these risks (Sethi, Sahoo & Sucharita, 2003).

Credit or default risk is the risk that the promised cash flows from loans and securities held by financial institutions may not be paid in full. Should a borrower default, both the principal loaned and the interest payments expected are at risk. The potential loss a financial institution can experience suggests that financial institutions need to collect information about borrowers whose assets are in their portfolios and to monitor those borrower overtime (Saunders & Cornett, 2003).

Credit risk doesn't occur in isolation. The same source that endangers credit risk for the bank may also expose it to other risks. For instance, a bad portfolio may attract liquidity problem. Credit risk management is necessary to minimize the risk and maximize financial institutions risk-adjusted rate of return by assuming and maintaining credit risk exposure within the acceptable parameters (Pandey, 2004).

Extra flexible credit rationing policy can also be a source high NPLs rate in the highly competitive banking environment of today's world. Hence it is clear why banks need to manage credit risk which is mainly from NPLs as it is very crucial for banks survival and profitability (Juliana, 2017).

Credit risk may cause cash flow problems and affects banks liquidity. Credit risk is the most important area in risk management. More than 80% of all banks balance sheet relates to credit. All exposure to credit risk has led to many bank failures. Effective management of credit risk can enhance banks goodwill and depositors confidence. Thus, good credit risk policy is an important condition for banks performance.

Every bank needs to identify measure, monitor, and control; credit risk and also determining how credit risks could be lowered. The findings of this study may enable bank executives to understand how credit risk affects the bank performance and they may adopt the appropriate credit risk strategies. The largest commercial bank in terms of paid of capital. Some of the commercial bank takes for this thesis for the fulfillment of my master degree those are as follows.

1.2 Statement of the problem

Various investigators have studied the impact of credit risk on banks return in changing dimensions with the sample from different country context. It is apparent that there are different measures of credit risk as well as banks return or profitability. Accordingly, the use of variables in the available works addressing credit risk and banks' profitability is also not consistent. As a result, there is a scant of unanimity in findings.

Therefore, this study is oriented toward solving the problem by answering what the impact of credit risk exp osure on the rate of return of sunrise bank limited, based on the contemporary data.

Some researcher found credit risk to impact positively on bank's performance, others found a negative relationship and other's highlighted other factors instead of credit risks which impact on bank performance. As concluded by Kithinji (2010), the bulk of the profits of commercial banks are not influenced by the credit risk suggesting that additional variables other than the credit risk related variables impact on profits. Commercial banks that are keen on making high profits should concentrate on other factors other than focusing more on credit risk. On the other hand, based on the data from 2010 to 2020 of the selected sample commercial banks of Nepal, Bhattarai (2016) concluded that there is a significant relationship between bank performance and credit risk indicators. These are some of the examples of contrasting results that are available in the academia. Furthermore, there is no evidence of study by taking contemporary data of Nepalese commercial banks. Accordingly, such a situation is actually the main reason of motivation for this study and source of the identification of the problem.

The above-mention argument shows that there are some gaps in the literature. Hence, this study focuses to fill a gap, examining the impact of credit risk and their impact on the return of sunrise bank limited in Nepal. In this regard, following will be the specific research questions.

i. What is the position of credit risk exposure in the commercial banks operating in Nepal?
ii. What is the existing status of profitability among the commercial banks of Nepal?
iii. Does credit performance really matter to the commercial bank's profitability?

1.3 Objectives of the study

The main objective of this study will be to investigate the impact of credit risk on the return of commercial bank limited in Nepal. Accordingly, the specific objectives will be as follows:

1. To assess the credit risk exposure of the commercial banks operating in Nepal.
2. To analyze the impact of the profitability of the commercial bank in Nepal.
3. To examine the credit performance & profitability of commercial bank in Nepal.

1.4 Hypothesis

Accordingly, this study will be oriented toward testing the hypothesis as mentioned below:

i. The profitability of the banks depends upon the extent to which it grants loan and advances to customers. Higher the ratio of loan and advance, higher will be the bank's profitability. Based on it, this study develops the following hypothesis:

H1: Credit deposit ratio has a significant and positive effect on profitability of commercial banks.

ii. Profitability of the bank depends on the performance of the loan that has been granted to the customers. Higher the ratio of non-performing loan lower will be the bank's profitability and vice-versa. Based on it, this study develops the following hypothesis:

H2: Non-performing loan ratio has a significant and negative effect on profitability of commercial banks.

iii. Minimum capital adequacy ratios are critical to ensure bank have enough cushion to absorb a reasonable amount of losses before they become insolvent and consequently lose depositors' funds. Therefore, higher the ratio of capital adequacy, higher will be the bank's profitability and vice-versa. Based on it, this study develops the following hypothesis:

H3: Capital adequacy ratio has a significant and positive effect on profitability of commercial banks.

1.5 Significance of the study

The significance of our research is the reason for conducting the study. The significance should answer the need for conducting the said research. It is very important part of our research as it justifies the significance and novelty of the study. Investigating the impact of credit risk management on the return of sunrise bank limited operating in Nepal is the main purpose of this study. It is expected that this study will make a good contribution to the existing literature in the academia. Accordingly, it will help to extend the current literature. In addition, this study is about the subject of financial matters and related with the applied field of the banking industry. Therefore, the significance of the study can be expressed by the following points.

1. Students are one of the important sections of the society. It is expected that this study report gives good insight to them, specifically to the students of business management and economics.
2. Investors are good actors in the field of overall economy. They are much concerned with the risk and return of organizations. Therefore, this study can provide reliable information to them
3. There is a greater role of professionals in the banking industry. This study is closely associated with the part of their professional activities. Hence, this report can be expected as one of the bases for their decision making.

1.6 Limitation of the study

This report is for the partial fulfillment of master degree of business studies. The efforts have been made to present and analyze the fact clearly and truly and within a specific boundary. But the reliability of tools, lack of research experience, time limit and lack of data are the primary limitation of this report. The scope and limitations of this study include:

a. Limitations in research area

Financial sector of Nepal includes commercial banks, development banks, finance companies, micro-finance financial institutions, savings and credit cooperatives and non-government organizations which are all licensed by Nepal Rastra Bank (Central bank of Nepal). However, this research is limited only to the study of commercial banks of Nepal and ignores the other types of financial institutions. The reason as to why commercial banks are chosen for this study is that they have guidelines to follow and are monitored regularly by the central bank of Nepal. They also hold the most part of the assets of the sector.

b. Time period

This research includes data on Nepalese commercial banks for the period 2011/12 to 2020/21 which is 10 years' financial period. The time frame includes the data on banks' performance after the implementation of policies that is geared towards the improvement of the standard of Nepalese commercial banks.

c. Data

The whole study is based on secondary data, annual reports, and publication of respective bank and also articles and journals of the respective topic, which may or

may not provide the exact vision of the field. So, the reliability of this research will highly depend upon the accuracy of information. If available data are not accurate, the whole findings of the study will be meaningless.

d. **Motivation**

It was straightforward for me to decide my research area of study to be finance. I have been a student of finance in both my undergraduate and postgraduate studies. However, the decision on choosing the appropriate topic in this area was not very easy for me. I decided to finalize the topic that combines my knowledge.

Furthermore, this topic is of importance to the Commercial banking sector as there are only a few research conducted in the context of Nepal.

e. Sampling method

Sampling is a technique of selecting individual members or a subset of the population to make statistical inferences from them and estimate characteristics of the whole population. Different sampling methods are widely used by researchers in market research so that they do not need to research the entire population to collect actionable insights. The sampling method is the way the sample units are selected. So, far the sampling method applied in this study is concerned; it has followed the non-probability sampling method. Accordingly, purposive sampling design has been used for the study. Specifically, the study will follow the judgmental sample technique.

CHAPTER - II

REVIEW OF LITERATURE

2.1 Introduction

The idea of "literature" usually conjures up images of dusty books that you are required to read for English, American, or World literature classes. The "literature" in a literature review, however, refers to all the previous research and scholarship on a particular topic, no matter what discipline you are studying; the "review" is your explanation of what the literature says. A literature review is the synthesis of the available literature regarding your research topic. This synthesis merges the conclusions of many different sources to explain the overall understanding of the topic, thus laying a foundation for both the research question and primary research. Although a literature review will cite sources and should discuss the credibility of the sources included, it is more than an annotated bibliography. Literature review needs to review all the significant sources on a topic, regardless of whether or not they support the claims you will eventually be working toward.

A literature review functions as a tool to:

i. Provide a background to your work by summarizing the previously published work on topic.
ii. Classify the research into different categories and demonstrate how the research in a particular area has changed over time by indicating historical background if applicable (early research findings in an area) as well as explaining recent developments in an area.
iii. Clarify areas of controversy and agreement between experts in the area as well as identify dominant views
iv. Evaluate the previous research and identify gaps (i.e. unexplored or under-researched areas)
v. Help justify your research by indicating how it is different from other works in the same area.

2.2 Theoretical review

A theoretical review is a scheme of concepts or variables which the researcher will operationalize in order to achieve set objectives. It is a pictorial demonstration of the theory portrayed as a model where researcher shows the link between variables and renders reveal the relationship between the independent, extraneous and dependent

variables. Poudel (2012) studied the factors affecting commercial banks performance in Nepal for the period of 2001-2012 and used a linear regression analysis technique. The study revealed a significant inverse relationship between commercial bank performance measures by ROA and credit risk measured by default rate and capital adequacy ratio. In this study, assumption is that credit risk (non-performing loans, loan loss provision, loans and advances) has a negative impact on profitability (ROA and ROE) of a bank. The impact of independent variables on dependent variables. Independent variables are capital adequacy ratio, non-performing loan ratio, loan loss provision ratio and loan and advance to deposit ratio. Dependent variables are return on assets (ROA) and return on equity (ROE).

As stated by Rose (2002) credit risk is the danger of default by borrower to whom a bank has extended credit. Bank capital and risk are intimately related each other. Therefore, the concepts of capital adequacy have been a subject of discussion among the academia as well as professionals since many years. The main sources of credit risk include limited institutional capacity, inappropriate credit policies, volatile interest rates, poor management, inappropriate laws, low capital and liquidity levels, and directed lending, massive licensing of banks, poor credit assessment. Credit risk exposure means the total amount of credit extended to a borrower by a lender. Basel Committee on Banking Supervision (2000) states that financial institutions have faced difficulties over the years for a multitude of reasons, the major cause of serious banking problems continues to be directly related to lax credit standards for borrowers and counterparties, poor portfolio risk management, or a lack of attention to changes in economic or other circumstances that can lead to a deterioration in the credit standing of a bank’s counterparties. The rational level of capital helps bankers and regulators to absorb any shocks that the bank may experience. Capital adequacy plays an important role in reducing the number of bank failures and losses to depositors. It plays a crucial role in reducing different risk components in the banking industry, and it is necessary to reduce moral hazard and competitiveness. Relating to the banking industry, many publications have mentioned that bank capital represents the value of a bank's equity instruments that can absorb losses and have the lowest priority in payments if the bank liquidates.

While bank capital can be defined as the difference between a bank's assets and liabilities, national authorities have their own definition of regulatory capital. The main

banking regulatory framework consists of international standards enacted by the Basel Committee on Banking Supervision through international accords of Basel I, Basel II, and Basel III. These standards provide a definition of the regulatory bank capital that market and banking regulators closely monitor. As defined in Financial Times, capital adequacy ratio is a measure of the financial strength of a bank, expressed as a ratio of its capital to its assets. Capital adequacy ratio is a ratio that can indicate a bank's ability to maintain equity capital sufficient to pay depositors whenever they demand their money and still have enough funds to increase the bank's assets through additional lending. Banks list their capital adequacy ratios in their financial reports. It is stated in terms of equity capital as a percent of assets. Capital requirements imposed by regulators tend to be simple mechanical rules rather than applications of sophisticated risk models. As stated in publications of NRB, prior to 1988, there was no uniform international regulatory standard for setting bank capital requirements. In 1988, the Basel Committee on Banking Supervision (BC)enveloped the Capital Accord, which is known as Basel I, to align the capital adequacy requirements applicable especially to banks in G-10 countries. Basel, I introduced two key concepts. First, it defined what banks could hold as capital, as well as designates capital as Tier 1 or Tier 2 according to its loss-absorbing or credit or protecting characteristics. The second key concept introduced in Basel I was that capital should be held by banks in relation to the risks that they face.

Credit risk is a financial exposure resulting from a Bank's dependence on another party (counterparty) to perform an obligation as agreed (National Bank of Ethiopia 2010). The main sources of credit risk include limited institutional capacity, inappropriate credit policies, volatile interest rates, poor management, inappropriate laws, low capital and liquidity levels, and directed lending, massive licensing of banks, poor credit assessment. Credit risk exposure means the total amount of credit extended to a borrower by a lender.

The word Performance" means'' to do" to carry out" or" to render". It refers the act of performing; execution, accomplishment, fulfillment, etc. In border sense, performance refers to the accomplishment of a given task measured against preset standards of accuracy, completeness, cost, and speed. In other words, it refers to the degree to which an achievement is being or has been accomplished. Bank profit is an appropriate measure of bank performance. The primary focuses of financial reporting are

information about an enterprise's performance provided by measures of earnings and its components. The non–performing loan ratio and capital adequacy ratio are the indicators of credit risk and earnings per share (EPS) are the indicator of bank's performance. The most of the related studies reported that bank performance is affected by capital adequacy ratio, non-performing loan etc. Banks‟ performance moreover may be affected by cash reserve ratio and book value per share. Similarly, in this study, earning per share is a dependent variable which determines the bank's performance whereas non-performing loan, capital adequacy ratio, cash reserve ratio, book value per share are independent variables. This study shows the impact of credit risk on the performance of Nepalese selected commercial banks.

2.2.1 The concept of credit

Credit is the amount of money lends by Creditor (bank) to the borrower (customer) either on the basis of security or without security. Credit is the faith lender has in a borrower so that resources can be transferred to the borrower without immediate payment. This means the lender gives a borrower an asset with the intention of getting an equal asset in value on the day of payment in a later date. The term credit refers to a promise by one party to pay another party for money or goods on demand at some future date.

Vasudevan et al. (1979)**,** the term credit is used precisely to refer the confidence lender have in a borrower by prolonging a loan which may take the form of money, goods or securities. And also sees credit more as the belief a creditor entrusts in a borrower that whatever given him will be paid. Essentially, when a loan is made, 10 the lender is said to have credit to the borrower and he automatically accepts the credit of the borrower. In the financial parlance, Credit also refers to the giving out of loans and the making of debt. Other researchers who look at commercial trade define credit as the approval for deferred payment for goods acquired. The credit facility may take the form of a liquid asset (cash) or fixed asset. In the banking arena for which this research is based, credit is the advancement of funds based on some financial expectation a borrower believes to gain and the assurance that the debt (principal and interest) will be paid in full.

2.2.2 Credit evaluation

This is very sensitive stage because it helps ensure loan quality. In simple terms, the giving of credit rest on the sureness the lender has in the borrower's ability to pay

(credit worthiness). Credit worthiness is the ability and the readiness of a borrower to settle his or her debt. This is one of numerous issues which determine what should go into the credit policies of a lender. A lot of financial models come into play when assessing the credit worthiness of the deficit units. The most commonly used is the five financial analysis tools which include character, capital, capacity, condition and collateral. These tools are generally known as the 5c's of credit (Machiraju, 2004).

(i) Character

According to Machiraju (2004), Character signifies the customer's preparedness and willpower to settle his or her debt. Character is usually known when the lender engages a one on one talk with the borrowers; scrutinize their debt history and also how they manage their finances and operational aspect of their business. Character is considered as the most important of the five c's because refusal to do due diligence will lead to a clear case of moral hazard.

(ii) Capacity

Capacity is a quantitative financial analysis to decide whether the customers have the capacity to payback what they have taken. According to Machiraju (2004), capacity is the ability of the borrower to generate cash from the overall operations to pay for the loans given. Capacity is very important to the lender because it serves as a form of assurance that the loan can be recovered.

(iii) Capital

Capital is also referred to as the net worth which represents funds set aside to cater for unexpected losses. Thus it serves as a cushion for the business. The lender is much interested in the capital adequacy of the borrower. (Machiraju, 2004).

(iv) Condition

Condition are the outward factors that can have an impact on the credit portfolio of a business. This can take the form of economic policies prevailing in the country and the international market at large. Lenders will be in a safe position if they consider the effect of the economic conditions both the borrowers and themselves (Machiraju, 2004).

(v) Collateral

Machiraju (2004), defines collateral as the properties a lender in exchange for the loan given. It serves as insurance for the lender when the borrower could not settle his or her debt. Collateral is considered as insulation against default but it is not advisable for a lender to give out loans based on collateral. Credit officers should

not only consider these 5C's but to gain better understanding on how to analyze the credit risk factors, some principal economic determinants that control the performance of a loan portfolio and the impact these economic factors have on one another must be determined. These factors include inflation, interest rate, GDP, market value of collaterals.

2.2.3 The concept of risk

Financial institutions through their role as a financial intermediary help circulate funds deposited by the various surplus units to the deficit units. In the course of performing this role, they are confronted with risk which remains one of the topical issues of current financial studies that had attracted special attention from both scholars and professionals.

One key factor that determines the success of any banking institution is risk management. According to Boahene et al (2012), the business of banking is full of risk and hence a banks' ability to generate profit and maximize the wealth of their shareholders depends on their attitude toward risk and management of the risk. Risk is the profitability that the actual will be different from the expected value. Thus it is the possibility that the actual may be different from the expected return. In banking.

a. Credit risk

Lending involves a number of risks. Among these risks, credit risk plays the major role since by far largest asset item for banks is loans, which generally account for half to almost three-quarters of the total value of all bank assets. Credit risk has long been an important and widely studied topic in bank lending decisions and profitability. According to Greuning et al (2003), credit risk means, payment may be delayed or ultimately not paid at all which can in turn cause flow problems and affect a bank's liquidity. From these researchers' point of view, credit risk is the risk of loss that might occur if one party to an exchange fails to honor the terms under which the exchange was to take place. Credit risk comes up from uncertainty in a given counterparty to meet up with the obligation of honoring the terms and conditions of the credit arrangement. In essence, credit risk arises from uncertainty in counterparty's ability or willingness to meet his/her contractual obligations. Banking Risk Credit Other forms of risk Operational Liquidity Interest rate 13 From the above definitions and meanings given by these researchers, they bore down to the fact that, credit risk is a cancer which causes serious financial problems when it is not properly managed.

b. Interest rate risk

Every single monetary organization face interest rate risk. Changes in premium rates influence both bank's procuring and costs furthermore the monetary estimation of its advantages and liabilities. The impacts coming about because of these progressions are reflected in the bank's capital and salary. Bank controllers and administrators place awesome accentuation on the assessment of bank premium rate hazard administration. These have started to develop in significance since the usage if business danger based capital charges suggested by the Basel Committee. Premium rate hazard administration contains different strategies, activities, and methods that banks utilization to decrease the danger of lessening of its net value as a consequence of unfavorable changes in premium rates.

As indicated by Kortewege and Polson (2008), "the net premium salary, the distinction between premiums wage and premium cost, is the principle determinant of the benefit of banks. It is dictated by interest rates on resources and paid for trusts, volume of stores, and as an outcome the adjustments in interest rate influence the net interest salary. Interest rate risk is the potential negative effect on the net interest salary and it alludes to the powerlessness of a foundation's monetary condition to the development in interest rates. Changes in premium rate influence profit, estimation of benefits, obligation shaky sheet things and income. Consequently, the goal of premium rate hazard administration is to look after profit, enhance the capacity, the capacity to retain potential misfortune and to guarantee the ampleness of the remuneration got for the danger taken and influence danger return exchange off.

c. Liquidity risk

Liquidity risk can be described as the risk of funding which is related to an unexpected event, for example large charge off or currency crisis. Specifically, a bank is reducing the ability to meet expected and unexpected current and future cash flows which indicates the liquidity risk. Or it is unable to meet collateral needs without impacting regular operations and financial condition of the institutions (Santomero, 1997). 14 Bharath (2008) covered that "Liquidity of bank may be characterized as the capacity to meet expected and unexpected money needs. Money needs emerge from withdrawal of stores, obligation development and credit disbursals. The necessity for money is met by expansions in stores and borrowings, advance reimbursements, venture

development and the offer of advantages. Insufficient liquidity can prompt unforeseen shortages that must be taken care of at exorbitant expense which decreases gainfulness.

d. Operational risk

Operational risk relates to the issues of precisely processing, setting and taking delivery on trades for the exchange of cash. It also involves the record keeping, processing system failures and fulfillment the diversified regulations. So that, individual operating problem is small portion for a well-managed institution but causes effect which may be quite costly. This internal definition should respect the individual situation of every bank, for instance, its size, and refinement, its propensity and multifaceted nature of its activities in a money related manner, considering the full extent of material operational threats standing up to the bank and gets the tremendous explanations behind amazing operational incidents (Santomero, 1997).

2.2.4 Credit risk management

Many researchers had come out with reasons of bank failures and recognized numerous issues. According to Kitua (1996), majority of bank's equity is made up of loans. This means any decline in the quality of loans can bring serious problems in the banking business. One factor that exists between financial institutions and borrowers is information asymmetry. This phenomenon makes it difficult for banks to identity creditable borrowers from bad ones. Therefore, bank must put systems in place in order to analyze and evaluate the creditworthiness of borrowers to avoid adverse selection and moral hazard (products of information asymmetry) which cause enormous accumulation of non-performing loans in their records.

CRM helps to detect measure and supervise the activities of a bank. This means, credit risk management aids banks in monitoring the number of activities so as to avoid credit risk. Most banks have chalked successes as a result of an effective CRM system used in their daily operations. In the same dimension, the author also described CRM as a 15 tool used by management to increase its returns by bringing credit risk to its lowest minimum.

Santomero (1997), bring the importance of having an affective CRM in place. According to this researcher, the presence of CRM limits the probability of distinctive losses by erasing risks that does not bring reasonable return. He pointed out that, CRM has led to a uniform assessment across borrowers.

Credit risk management is an essential element of a bank's financial standings. That is to say, the performance of bank is highly dependent on effective and efficient credit risk management (Poudel, 2012). CRM is very important in the banking sector because, it forms a fundamental part of the credit process. However, there are disadvantages that will scare some banks from engaging in CRM. These bottlenecks in the initial stages affect the financial position of these financial institutions but in the long run yield offsetting benefits.

2.2.5 Credit risk management strategies

The credit risk management strategies are procedures banks adopted in the mitigation or reducing the negative effect of credit risk. A comprehensive credit risk management structure is vital because as stated it helps increase the revenue and survival. Some of approaches for preventing credit include the following.

i. Selection According to Gestel et al (2009), a sound CRM begins with a proper choosing of borrowers and the products that suit them. For this to be possible, a competent loan officers and operative models of estimating risk should be in place. This is a very crucial stage because decisions are taken by the entire committee member. Here, borrowers that are likely to default are either denied or asked to secure the loan with more collateral to limit the effect of default.
ii. Limitation: This method aids the bank by reducing the amount of loss suffered from a borrower. It prevents the event where the failure of counterparty to meet his or her obligation will heavily affect the financial performance of the bank. The number of riskier transactions is brought to the bearer minimal (Gestle et al., 2009). 16
iii. Diversification: Gestle et al. (2009) stressed that banks should deal with different counterparties ranging from individuals, industries. This helps to spread the risk across various borrowers so that banks can reduce the impact of loss. It is much workable for large and international banks.
iv. Credit Enhancement According to Gestle et al. (2009) when a bank realizes it is exposed to too much risk when dealing with a particular kind of borrower, it solves this by acquiring an insurance policy to cover for the any future losses. Through this, the quality of the loan facility is improved. It is called credit risk mitigation. These strategies do not prevent credit risk totally; however, they can reduce the level of credit risk the banks are exposure to. And this will increase the profitability of the banks.

2.2.6 Credit risk measurement

The successful management of credit risk is dependent on the ability to measure it. The main challenge of banks is how to precisely measure credit risk exposure and portfolio level because as the level of credit risk rises, the realized rate of return on the loan portfolio is reduced and the required level of capital increases (Kolapo et al, 2012).

There are two important tools that can be used in assessing or measuring credit risk. These include Default ratio (DR) and Cost per loan advanced.

a. Default Ratio (DR): DR is a ratio that determines the amount of non-performing loans as against the total loans and advance over a period. It shows the percentage of loans and advances that were not paid over a period. It also shows the efficiency of management has performed in controlling their loan portfolio over a period. (Kolapo et al, 2012). DR ratio can be calculated as:
DR ratio = Non-performing Loans/ Total Loan and advances.

a. Cost per Loan Advance Ratio (CLA): CLA is the average cost per loan advanced to customer in monetary terms. The function of this is to point out efficiency in distributing loans to customers (Kolapo et al, 2012). CLA ratio can be calculated as:
CLA Ratio = Total Operating Cost/ Total Amount of Loans

2.3. Profitability

Banking profitability may also show managers attitude towards risk. Banks that make huge profits are not scared when venturing into risky activities. In a similar fashion, banks that are not effective in their management encounter higher bad debt. Profitability measure is important to the investors. The level of profitability is very significant for shareholders of a bank because it shows how effective management has utilized their investments. In determining the financial strength of a commercial bank, the level of profitability is predominant. Profitability performance will concentrate on the income statement which shows how much is generated (revenue), how much is spent (expenses) net income. This may be prepared by the bank on a monthly, quarterly or annual basis (Devinaga, 2010).

Profitability can be measured in a number of ways. They include return on assets (ROA), return on equity (ROE). But over the year, most researchers prefer using return on assets (ROA). It was disclosed that; the performance of a bank was negatively affected by the level of nonperforming ratio. In theory, ROA shows the capacity of a

bank's management to make profits using the level of assets available. It may be unfair because of the other events that take place outside the balance sheet (Devinaga, 2010). Moreover, the performance of a business is normally estimated using their profitability standings. Most of the researchers use return on asset as a measure for profitability. In their defense, researchers select ROA over ROE because it is free of financial leverage and the risks associated with it. Additionally, it is possible to compare companies in the same industry or diverse industry when ROA is employed as a proxy for profitability. This makes ROA a strong measure for profitability.

2.3.1 Determinant of profitability of commercial banks

The determinants of bank performances can be classified into bank specific (internal) and macroeconomic (external) factors. These are stochastic variables that determine 18 the output. Internal factors are individual bank characteristics which affect the banks performance. These factors are basically influenced by internal decisions of management and the board. The external factors are sector-wide or country-wide factors which are beyond the control of the company and affect the profitability of banks.

2.3.2 Non-performing loan

Non-performing loan (NPL) can be defined as the non-productive assets of the banks. In other words, it is the loan or bad and doubtful debts that doesn't repay timely. Generally, the loan, which doesn't repay within three months, is known as nonperforming loan. If the debtor starts making payments again on a nonperforming loan, it becomes a performing loan, even if the debtor has not caught up on all the missed payments. Institutions holding non-performing loans in their portfolios may choose to sell them to other investors in order to get rid of risky assets and clean up their balance sheets. Sales on non-performing loans must be carefully considered since they can have numerous financial implications, including affecting the company's profit and loss, and tax situations (Dahal, 2002).

2.3.3 Capital adequacy ratio

Capital is one of the bank specific factors that influence the level of bank profitability. Capital is the amount of own fund available to support the bank's business and act as a buffer in case of adverse situation. Banks capital creates liquidity for the bank due to the fact that deposits are most fragile and prone to the bank runs. Moreover, greater bank capital reduces the chance of distress. However, it is not without drawbacks that

it induces weak demand for liability, the cheapest sources of fund. Capital adequacy is the level of capital required by the banks to enable them withstand the risks such as credit, market and operational risks they are exposed to in order to absorb the potential loses and protect the bank's debtors. Capital adequacy ratio shows the internal strength of the bank to withstand losses during crisis. Capital adequacy ratio is directly proportional to the resilience of the bank to crisis situations. It has also a direct effect on the profitability of banks (Dahal, 2002).

2.3.4 Credit deposit ratio

Loans and advances can be arranged from banks in keeping with the flexibility in business operations. Traders may borrow money for day to day financial needs availing 19 of the facility of cash credit, bank overdraft and discounting of bills. The amount raised as loan may repaid within a short period to suit the convenience of the borrower. Thus business may be run efficiently with borrowed funds from banks for financing its loan and advances working capital requirements are utilized for making payment of current liabilities, wage and salaries of employees, and also the tax liability of business. Loan and advances from banks are found to be economical for traders and businessmen, because banks charge a reasonable rate of interest on such loans/advances (Dahal, 2002).

2.3.5 Loan loss provision ratio

Loan loss provisions represent the bank's expectation of future loan losses. It is a contra income account that enables banks to recognize in their profit and loss statement the expected loss from particular loan portfolio. Depositors are protected against unexpected loss through capital adequacy reserve and protected against anticipated loss through loan loss provision reserve. The basic assumption behind LLP is that bank managers reflects their belief towards the bank's assets quality. When the amount of loan loss provision increases, the quality of assets will decrease and vice-versa (Dahal, 2002).

2.4. Review of empirical study

Theories are formulated to explain, predict, and understand phenomena and, in many cases, to challenge and extend existing knowledge, within the limits of the critical bounding assumptions. The theoretical framework is the structure that can hold or support a theory of a research study. The theoretical framework introduces and describes the theory which explains why the research problem under study exists. The

theoretical framework must demonstrate an understanding of theories and concepts that are relevant to the topic of your research paper and that will relate it to the broader fields of knowledge in the class you are taking. Literature for theories and analytic models that are relevant to the research problem you are investigating. The selection of a theory should depend on its appropriateness, ease of application, and explanatory power.

2.4.1 Review of related books

Jimmy Skoglund & Wei Chen (2015), '*Financial risk management applications in market, credit, assets and liability management and firm wide risk'* for many financial institutions the credit risk in the banking and trading book represents by far the largest financial risk exposure. The 2007 financial crisis is of course a prominent example of the importance of managing credit risk and as a result of the experiences in the 2007 financial crisis regulators have been very active in developing new, stricter regulations for credit risk under the heading of Basel III. Many of the new regulations were driven by reports on the (failed) risk management practices during the crisis. See, for example, the Senior Supervisors Group (2008) and Financial Stability Forum (2008) reports. As we have discussed in the introduction to this book credit risk capital requirements have a long history. The larger banks use the advanced internal ratings base approach originating from Basel II to calculate risk weighted assets for credit risk. The advanced Basel charge for credit risk is model based, though the model is prescribed by regulators, and require banks to estimate model input parameters such as the probability of default, loss given default and exposure at default for the credit exposures. In 2009, with Basel 2.5, banks were also allowed to develop fully internal model base charges for bond trading exposures termed the incremental risk charge. The incremental risk charge assigns liquidity trading horizons to the bonds and uses the banks own bond portfolio credit risk model. Credit risk is also a main part of the CCAR and EBA firmwide stress tests and requires banks to project expected credit losses and risk weighted assets under regulatory, multi-horizon, macroeconomic stress scenarios. A financial institutions credit risk exposure includes both issuer credit risk in the banking and trading book as well as counterparty credit risk in derivatives transactions such as swaps. Our focus in this chapter is however only on the issuer credit risk while we will return to counterparty credit risk in the next chapter. The

issuer credit risk can be divided into Retail exposures such as mortgages, loans, and credit cards

Large corporate (wholesale) exposures such as commercial loans and credit facilities Trading exposures such as bonds as we mentioned above, for the larger banks the banking book retail and wholesale credit exposures uses the prescribed Basel model framework while the (bond) trading book exposures use an internal model V & R based charge similar to the internal model based on V & R charge for market risk. A complicating factor for measurement of issuer credit risk is that default data are relatively rare, which obviously makes statistical validation of credit risk models difficult. For consumers and small companies one can consider credit risk models estimated on large pools of obligors and thereby derive relatively accurate estimates of probability of default. The situation for large corporates is of course more difficult and usually relies on external ratings and structural credit risk models such as the Merton (1974) model for credit risk assessment. Due to scarcity of default data, it is especially complex to validate correlations in credit risk models. Indeed, one of the main failures of the credit risk models used before the 2007 crisis was the underestimation of default correlations versus the realized number of joint defaults during the crisis.

Jorion (2009), for an interesting discussion of deficiencies in risk models used during the crisis. In the context of market risk, we have seen that it is generally a first-order important component of a model to capture the stylized fact of univariate financial returns volatility clustering (and to some extent fat tails of the conditional residuals). The specific model for the codependency (the copula) is generally a second order important effect. This result can, however, not be applied to credit risk models. This is because credit risk models are in general based on monthly, quarterly, or even yearly financial data versus daily data for market risk. Temporal aggregation of data enforces the central limit theorem such that financial returns on, for example, a monthly basis are closer to (unconditionally) normal. However, since defaults are rare events we should in the context of credit risk expect the model for correlated defaults and in particular the tail dependency to have a significant impact on credit risk. Moreover, since credit risk default and migration models usually focus on risk measurement over a long period such as a year or multiple years the credit correlation is driven by co-movement of economic variables during business cycle swings rather than day to day co-movements as in market risk analysis. The fact that correlated defaults in a portfolio

credit risk model arises from long-term joint behavior of financial economic indicators complicates the use of traditional market risk back testing methods for validating portfolio credit risk models as they require many time series observations. Expert examination and scenario testing is therefore critical in the validation of portfolio credit risk models default correlation.

The analysis of credit migration and default is usually viewed as distinct from the analysis of the short-term credit spread risk (with no credit migration) of a financial instrument which is treated as a market risk factor. Credit migration and default risk models can of course include credit spread variation risk in the analysis framework but then the models for credit spread volatility uses the relatively long time horizons of the portfolio credit risk model. Portfolio credit risk models proposed in the literature can roughly be divided into structural models and reduced form or intensity base models. In the structural approach corporate liabilities are contingent claims on the assets of the firm and the firm defaults when its assets fall below its liabilities. The approach is hence based on the specific balance sheet of the firm. Consequently, the model is usually applied to large corporates and hence to large corporate issued loans and bonds. Portfolio models based on the structural approach specify dependence between the default events of firms based on dependence between firm assets or proxies such as firm equity or financial indices factor models for firms. The reduced form approach does not attempt a microeconomic-based explanation of default but rather a macroeconomic view of the key factors that can drive default risk. The default intensity is exogenously modeled, for example using a Poisson process. The reduced form approach is frequently used for consumer and small business portfolios as regression evidence of which economic factors that drive default can be established for large cohorts. In reduced form portfolio models default dependence is traditionally modeled using codependency between the driving economic factors. However, the distinction between structural and reduced form models may not be that important in practice. For example, Duffie and Lando (2001) show the link between intensity and structural-based models by assuming that firm asset values are imperfectly observed. Another categorization of the credit risk models, as used by Basel (1999), is the default-only mode versus mark-to-market model. The mark-to-market model approach is frequently used for bonds and wholesale exposures. In the mark-to-market approach, the financial institution can suffer credit losses not only from the default event but also from the

rating migrations. In default mode models the credit loss is only realized in the event of the default and based on the loss given default. Moreover, there is no credit migpration that can over time eventually lead to a default. Historically, this approach has been widely used in the retail banking book assuming the loans are held until maturity. Many traditional credit scoring models and portfolio credit risk models—for example, the actuarial approach models like the Credit Risk model—are default only models. However, after the 2007 financial crisis financial institutions have started to use credit migration models in the retail banking books as well. Sometimes with an associated model for measuring (unexperienced) loss in the event of downgrade. That is a mark-to-model method of assigning loan value. pp

Multiple credit states also arise naturally in retail credit models that capture the delinquency status of loans. For example, a loan may be delinquent 30 days or delinquent 90 days but not yet in default. The tracking of loan delinquency also has implications for how state cash flows and losses are booked. Clearly, when the loan is delinquent, scheduled cash flows accrue and may be lost. The loan may, however, also go back to current and repay the accruals. In this chapter we consider market standard models used to price and risk manage credit risk portfolios. We first focus on market pricing of issuer credit risk in trading book and credit portfolio models for trading book exposures and wholesale loan exposures. Consistent with large corporate exposures, the model we employ for portfolio credit risk has its foundation in the Merton structural model of the firm balance sheet. We then consider credit models and credit analysis for the retail banking book exposures. For retail and the small business segment of the bank credit exposures, reduced form credit scoring models, with the addition of common economic factors, are the natural basis for credit portfolio models. At the end, a financial institution also needs to consider its firmwide portfolio credit risk and combine the different credit risk models. Consequently, we explain how the structural and reduced form models can be integrated using correlation and more generally copulas. Other important topics we cover in this chapter include stress testing using the credit models and a summary of the required features of new generation credit portfolio models. For many banks the portfolio credit risk models that are in use today were largely developed about 10 years ago with the introduction of Basel II risk weighted assets. However, new regulations such as the CCAR and EBA stress tests require for example multi-horizon models, the prediction of both loss and revenue as

well as regulatory capital impact. The introduction of credit derivatives has allowed financial institutions to hedge their credit risk exposure. Single name credit default swaps or credit guarantees allow financial institutions to hedge an issuer's specific credit risk—both from a market value perspective and default loss perspective. iTraxx (Thomson Reuters Eikon code 'ITRAXX'; Bloomberg code 'ITRX') is the brand name for the family of credit default swap index products covering regions of Europe, Australia, Japan and non-Japan Asia. Credit derivative indexes form a large sector of the overall credit derivative market. Index based credit default swaps such as the iTraxx and CDX indices can be used for approximate macroeconomic hedging of credit portfolios. This is also true for basket credit default swaps. In basket credit default swaps the assumed credit correlations are the most important driver of the market price. Finally, we end the chapter with a discussion of the Basel II capital requirements for credit risk with a focus on banking book requirements.

Dr. Ir. Tony Van Gestel, Prof. Dr. Bart Baesens (2016), '*Credit risk management (basic concepts: financial risk components, rating analysis, models, economic and regulatory capital)'* introduces risk management and defines some basic banking concepts needed in the subsequent chapters. It starts by giving an overview on banking history. Next, the economic role of banks as financial intermediaries and brokers is reviewed. The bank's organization and balance sheet reflect the different activity types. These activities are not without risk: banks are exposed to different risk types, of which the most important are credit, market and operational risk. The key concepts of sound risk management practices to control these risks are then reviewed. Because banks have a central role in the economy, they are regulated to make sure that their capital cushion is aligned to their risk profile. This capital cushion serves to absorb losses and to protect the depositors' funds. The chapter is concluded with an overview of financial products, each with its different risk characteristics. Chapter 2 provides an introduction to credit scoring. The different types of scoring that are nowadays being observed in industry, and how they relate to one another, are discussed first. Scores are used at different stages of the customer life cycle: marketing, application, performance, collection and profit scoring. Another classification is based upon the properties of the score the purpose, risk type and risk entity, and internal/external score author. Credit bureaus are a popular external reference source for credit scores. The practical use of scoring systems is discussed in the remainder of this chapter. When scores are assigned

automatically, human expert judgment may adjust the score outcome and credit decisions. The reason and number of overrides provides useful information on the quality perception of the scoring system. Credit scores are used for many purposes. In a credit risk context, their use concerns credit xiv chapter by chapter overview decisions and portfolio risk monitoring, to advice in the pricing and to support securitization transactions. Their limitations are discussed in. Chapter 3 on credit ratings complements the chapter on scoring. Like scores, credit ratings order the credit risk. In addition, ratings represent the risk level into a limited number of categories. Ratings are so important that a specific terminology has developed. Ratings express credit quality on different maturities; on issuer and issue level; in terms of probability of default, loss given default, exposure, or expected loss; in terms of local or foreign currency; in terms of stand-alone risk, support or sovereign risk with these elements, the generic architecture of a rating system is described. The ratings can be expressed using different philosophies: point-in-time ratings take into account the current economic conditions for rather short-term horizons. Chapter 4 on risk modelling and measurement gives an overview of the entire model development life cycle, discussing every step in detail, without focusing on mathematical and technical aspects. This chapter is especially useful for financial practitioners who are involved in the development, management, implementation and use of risk models. An overview is provided of the different aspects of risk measurement and modelling: data, modelling techniques and implementation for use. Once the data is collected, the model development starts and involves the model choice, the score function construction, the segmentation into risk classes or ratings, and the calibration into quantified risk levels. Next, implementation aspects are discussed. Credit scoring models are not static applications, but dynamic instruments that are used in continuously evolving and changing environments. Therefore, model maintenance and follow-up are required. Because the quality of the rating models has an important impact on the bank's operations, models are subject to strong internal and external control before being put into operation, and during operation. The different, but also partially overlapping aspects of model validation, quality control and back testing. Chapter 5 introduces portfolio models. Whereas scores and ratings concern the risk of individual transactions, portfolio models analyze the loss risk on a portfolio of credits. The loss distribution of a portfolio is the aggregated result of the risk of different securities in the portfolio, each with individual risk components: exposure at default, loss given

default and probability of default. Common risk measures for portfolio risk are the expected loss, the loss standard deviation, the value-at-risk, and expected shortfall. The portfolio risk depends not only on the risk of the individual facilities, but also on concentration and correlation. Although high concentrations do not impact the expected loss, they increase the value-at-risk. Joint credit quality downgrades and defaults due to correlation also increase the portfolio risk. Portfolio model formulations are either based on simplified mathematical models or apply Monte Carlo simulations to generate joint losses due to correlated defaults and possibly also market losses. Popular industry formulations like Credit Metrics, Portfolio Manager, Portfolio Risk Tracker, Credit Portfolio View and Credit Risk are reviewed. Next, the Basel II portfolio model for regulatory capital calculation is explained. Implementation and application aspects are reviewed. The chapter is concluded with the concepts of economic capital calculation, capital allocation and risk-adjusted performance measures. Chapter 6 concludes this book with a detailed overview on the Basel II Capital Accord. The capital accord consists of three mutually reinforcing pillars. First, the components of bank capital are described. Pillar 1 defines the minimum capital requirements for credit, market and operational risk. Pillar 2 describes the supervisory review process to verify whether the bank holds sufficient capital to cover all its risks xvi Chapter by chapter overview. Pillar 3 defines the market disclosure to catalyze prudential risk management and sufficient capitalization. After the description of the new capital accord, the practical impact is discussed. It has important implications for the bank's information and communication technology: data needs to be collected on various levels: risk information, exposure, loss measures; computation engines calculate the risk on transactions and portfolios; data needs to be transferred correctly between different levels; and risk reports need to be communicated to regulators, senior management and the financial markets. The Basel II rules make capital requirements more risk sensitive, which will impact, a.o. (amongst other), the credit pricing and capital needs for banks with different risk profiles. A discussion on future evolutions concludes this chapter

Panayiota Koulafetis (2017), *'Modern credit risk management*' credit, if managed prudently, can build an economy, produce an efficient allocation of capital and wealth and bring prosperity. It is an absolute must in the financial system, affects everyone and drives the global economy. Credit accommodates one of the main functions of financial markets, that of channeling funds from savers to spenders; it allows funds to

move from people that lack productive investment opportunities to the ones that have such opportunities. Credit allows individuals to finance their needs of acquiring a house, car, furniture, etc., assists companies to start or expand their business, and enables governments to finance public interest projects such as utilities, schools, roads etc.

The allocation of credit is performed by financial intermediaries. Financial intermediaries are crucial to the healthy functioning of financial markets. They determine who gets credit and at what price. Financial intermediaries consist of commercial and investment banks, saving and loan associations, insurance companies, mutual funds, pension funds and finance companies. Over the past three decades there has been an immense growth of innovative financial contracts and sophisticated products offered by financial intermediaries. However, if they are not used prudently and their full risk not understood fully, they can have devastating repercussions on the financial system. After the 2007 financial crisis financial intermediaries have been subject to significant developments, there have been changes in the financial markets and an increased focus on the importance of credit and its management. Financial intermediaries have always been regulated, but given the size of bailouts and the nationalization of many financial institutions, their regulation has had to change dramatically.

Credit risk can be defined as the risk of financial loss due to the borrower's, bond issuer's or counterparty's (the "obligors") failure to honor their financial obligations. The obligors' failure to honor their obligations can arise due to inability or unwillingness. Financial loss arising from the unwillingness of the obligors to pay is less common compared to the inability to pay. The unwillingness of the obligors to pay can stem from disputes over the validity or/and the terms of a financial contract, but can also arise in high-leverage transactions, where equity participation is non-existent. Credit risk in the majority of cases comes from the inability of the obligor to pay. Inability to pay is linked with the concepts of default, insolvency and bankruptcy. Insolvency refers to the situation where the obligor's liabilities exceed its assets and is a legal term meaning that the obligor is unable to pay its debts. Bankruptcy is the legal term that imposes court supervision over the financial affairs of those who are insolvent or in default. Bankruptcy occurs when the court steps in after the obligor files for protection under, when the obligor reaches the point of bankruptcy his assets have lost

value, but the bankruptcy process reduces the asset value even more. Although the court will try to keep the obligor in business, in reality clients, suppliers and counterparties are less inclined to continue to do business. Assets are sold quickly at prices below fair value and intangible assets, such as brand name, have no value. As a result creditors will receive less than what they are owed. The extent of the financial loss of creditors will depend on their payment priority and the jurisdiction they are in. Bankruptcy laws vary from country to country and—as a consequence—bankruptcy costs, such as legal and accounting fees, also differ from country to country. All things being equal, in creditor friendly jurisdictions such as the UK or the Netherlands the bankruptcy related costs tend to be less than in borrower friendly jurisdictions such as Italy, Portugal or Greece. As a result the credit risk and financial loss in creditor friendly jurisdictions is lower.

Default can be defined as a missed or delayed payment of a contractual obligation or a bankruptcy filing or legal receivership of the obligor that will probably cause one or more missed or delayed future payment(s). Furthermore, default can be considered as a distressed exchange whereby the obligor offers creditors restructured debt, securities or assets that result in a diminished financial obligation relative to the original obligation. There are also "technical defaults" that can occur if certain financial covenants are breached, such as maximum leverage or minimum debt coverage covenants as defined in the contractual agreements. These are put in place to restrict the obligor's leverage above a certain level and maintain a minimum ratio of income received versus debt repayment. Although these do not usually lead to a financial loss, they do however give power to creditors to accelerate the debt owed to them if the obligor fails to resolve the covenant breach within a grace period. Defaults on long-term obligations due to purely "administrative" errors which are not related to the ability or willingness to make the payments and are resolved in 1–2 business days do not usually lead to financial loss; however, if they are not resolved quickly there can be interest income foregone. However, the payment due is not on time either due to inability or unwillingness of the obligor then this will lead to financial loss. The extent of loss will depend on how delayed the payment is.

Credit risk also involves credit quality deterioration, which although is less severe than default will increase the future default probability. Credit risk is characterized throughout any exposure's lifetime by the probability of default, the recovery or the

loss given the default, and by the credit exposure, which is the replacement value of the asset. The replacement value of the asset is mainly driven by market risk. It is closely related to the Mark to Market (MtM) of a transaction coupled with other considerations such as liquidity issues, if applicable, netting etc.

Quantitative Financial Risk Management

Michael B. Miller, (2018), '*Determining the probability of default'* How do we determine the probability of default for a given bond issuer? We could try to back out the default rate. But, as discussed, because investors are risk averse, this will only give us the risk-neutral implied default rate, not the actual default rate. We could look at the historical default rate for a bond issuer, but for any particular bond issuer, defaults are likely to be rare. Many bond issuers have never defaulted. If we are going to forecast the probability of default for a given issuer, we cannot rely on the history of defaults for that issuer. We will need some other approach. In this section we consider two basic approaches. First, the traditional approach, which relies on a mix of quantitative and qualitative data. Second, the quantitative approach, which is model-based and strictly quantitative.

i. Traditional ratings approach

The traditional approach to forecasting defaults is for rating agencies to assess the creditworthiness of an issuer. In assessing the creditworthiness of the issuer, the rating agency takes into account a number of factors. For corporations, the factors are likely to include financial ratios, such as debt-to-equity ratios and interest-coverage ratios. The factors could also include some qualitative assessments, such as the firm's business prospects, or, in the case of sovereigns, how fiscally responsible the government is likely to be. Ultimately, how the data are combined and how the final assessment is made is often highly subjective.

ii. Transition matrices

A ratings transition matrix provides the probability that a bond's rating will change or stay the same over a given time period, given its rating at the start of that period. Table 8.3 is a simple one-year ratings transition matrix. From this matrix, we can tell that an A-rated bond has a 90% probability of still being A-rated after one year, an 8% probability of migrating to a B rating, and a 2% probability of ending up with a C rating.

iii. Quantitative approach

Over time a number of practitioners and academics have tried to develop a more systematic, quantitative approach to predicting default. In this section we explore the widely used distance-to-default model, first proposed by Robert Merton in 1974. What is a firm worth? One way to calculate the value of a firm would be to add up the value of all of its assets (e.g., its factories, intellectual property, the goodwill of its customers, etc.) and subtract any liabilities (e.g., money that the firm owes to suppliers, future pension or tax obligations, etc.). This is a perfectly legitimate way to proceed, but it poses a number of challenges, not least of which is valuing intangibles such as intellectual property and pension obligations. Another way to proceed would be to ask what value does the market place on the firm. For a firm that has issued both stocks and bonds the answer is simply the total value of its stock plus the value of its bonds. We refer to this total value as the enterprise value.

iv. The Merton model of default

The Merton model has many advantages when compared to the traditional ratings approach. By observing equity prices, we can update default probabilities on a continuous basis. Because all of the inputs are market based, there are no subjective inputs and the results are free from human biases. This also makes it easy to automate the entire process of updating default probabilities. The default probabilities produced by the Merton approach can take on any value between 0% and 100%—unlike the traditional letter ratings, which are discrete—potentially allowing investors to better differentiate between various bonds. One disadvantage of the Merton approach is that it makes many simplifying assumptions—for example, that the log returns of the enterprise value are normally distributed. More sophisticated versions of the model can improve on the assumptions of the basic model, but there will always be simplifying assumptions. The more flexible ratings-based approach is not constrained in this way. Another problem with the Merton approach is that it cannot be easily extended to private firms or governments, both of which lack publicly traded equity, and represent a large share of the fixed-income market. Public firms with thinly traded equity may also be difficult to model using the Merton approach. Which approach is better? In practice, asset managers with large fixed-income holdings often use both ratings and quantitative models. They are also likely to supplement public ratings and commercially available quantitative models with their own internal ratings and models. One of the best examples of how the two approaches are viewed in practice can be

seen in the history of KMV. Prior to 2002, KMV was one of the leading firms offering software and ratings based on Merton-type quantitative models. KMV suggested that its approach was superior to the approach of the rating agencies, and the rating agencies shot right back, insisting that their approach was in fact superior. In 2002, one of those rating agencies, Moody's purchased KMV. Moody's now offers products and services combining both approaches.

Michalis Doumpos, Christos Lemonakis, Dimitrios Niklis, Constantin Zopounidis, (2019), '*Determining the probability of default'* credit is a fundamental tool for financial transactions in the private and public sector, involving both corporations and consumers. Credit provides the liquidity needed to develop all forms of economic activity, as well as funding sources for daily operations and long-term investments. While credit has a long history that dates to the early dates of civilization, over the past decades it has undergone major changes, not only in terms of its volume, but also as far as it concerns the channels through which credit is provided, the types of credit that are available, as well as the regulatory framework that defines how credit is provided.

In this new context, the risk that is associated with providing credit has become a major point of concern for all organizations that are involved with credit transactions and their supervision. In simple terms, credit risk refers to the likelihood that a borrower (obligor) will not meet future debt obligations in accordance with the terms agreed when credit was provided by a lender.

Typically, credit risk is considered in the context of financial institutions, such as banks, that provide credit to their customers in the form of corporate and consumer loans. However, credit risk is also relevant for the non-financial sector. For example, in their daily operation, firms in industry and commerce, receive credit from their suppliers and provide credit to their customers. Firms collaborating with partners of low creditworthiness may face severe financial and operating difficulties, in case their suppliers or customers face financial distress and failure.

The past couple of decades, and it still evolves at all levels. These changes are mostly evident in financial institutions (e.g., banks) and providers of credit risk management solutions, but implicitly they affect all organizations exposed to credit risk.

A first major development that has transformed the area of credit risk managements, involves the regulatory framework, mainly as far as credit institutions (e.g., banks) are

concerned. In 1988, the Basel Committee on Banking Supervision, introduced the first set of rules regarding the capital requirements that banks should meet. This set of rules, known as the Basel I Accord (or simply Basel I), imposed simplistic guidelines for credit risk management based on a weighting scheme of a bank's assets, depending on their level of risk. In 2004, the Basel II Accord introduced a much more refined framework, covering not only credit risk, but also operational and market risks. Moreover, it added guidelines and rules regarding supervisors as well as reporting and market discipline. The third accord (Basel III) is currently under development and it is expected to be implemented until 2019, bringing more strict capital requirements together with provisions about liquidity and bank leverage (i.e., the use of equity capital versus total risk exposure). A key point of this brief historical overview is that credit risk is a highly regulated topic in financial services, with a very broad set of rules and requirements imposed on the design, implementation, and monitoring of credit risk management practices.

The second major development involves the widespread use of analytical methods for credit risk modeling and management. Early credit risk management was primarily based on empirical evaluation systems. CAMEL has been the most widely used system in this context, which is based on the empirical combination of several factors related to Capital, Assets, Management, Earnings, and Liquidity. It was soon realized however, that such empirical systems cannot provide a solid and objective basis for credit risk management. This led to a growing need for the development of more advanced approaches. The roots of such approaches can be traced back to the 1960–1970s with the development of the first bankruptcy prediction models and the late 1980s with the introduction of the first credit scoring model by Fair Isaac Co., in the USA (FICO score). The use of analytical models, intensified with the tightening regulatory framework described above, which promoted the use of analytical systems by providing incentives to credit institutions to implement such approaches. These incentives involved relaxed capital requirements for institutions that used sophisticated analytical models, as opposed to the implementation of simpler empirical alternatives. This trend towards analytical credit risk modeling, was further facilitated by the rapid advances in a wide range of analytical disciplines, including mathematical finance, data science, as well as operations research.

Analytical credit risk modeling applies both to individual loans as well as credit portfolios. In the former case, the objective is to assess the creditworthiness of an obligor and the expected loss from granting credit. At this stage credit scoring and rating models and systems are used. He outputs of the analysis at the loan level constitute the fundamental basis for credit portfolio management. At this higher level, the analysis extends to a collection (portfolio) of loans that an organization has. The portfolio analysis provides loss estimates for all loans, thus guiding decisions for setting targets for capital requirements, portfolio diversification, and facilitates the preparation of reports for internal/external audit and control.

Of course, with the outbreak of the global credit crisis in 2007–2008, credit risk models (and other financial models, too) received a lot of criticism about their role in promoting the credit expansion prior to the crisis and their failure to provide reliable estimates of the true risk exposure. On the one hand, it is true that the widespread adoption and use of credit risk models has facilitated the expansion of credit, by lowering risk premiums for corporate clients and consumers. Thus, access to credit financing became cheaper. Moreover, despite the advances made in the theory and practice of credit risk measurement, there have been some noticeable misses that have naturally casted doubts and raised criticism. On the other hand, it should be pointed out, that credit risk models are not crystal balls and limitations do exist. Similarly, to all financial models, credit risk models involve complex socio-economic phenomena, which are, by definition, impossible to describe in full accuracy. Despite that, analytical decision making, strategic planning, supervisory control, the design of new financing products and services would all be impossible without credit risk models.

2.4.2 Review of journal and articles

Credit risk plays an important role in banks‟ profitability since a large chunk of banks” revenue accrues from loans from which interest is derived. Therefore, various researchers have examined the impact of credit risk on banks in varying dimensions. There are plenty of studies available about the effect of different variables on the financial performance of commercial banks.

A thorough review of literature has been carried out to examine the impact of credit performance of the profitability several dimensions. As this study is focused on credit risk management in banking, the review mainly concentrated on the studies related to the analyses of the impact of credit risk management on bank’s performance in the

context of various countries. Table 1 presents a summary of the empirical studies undertaken by authors who have investigated the relationship between credit risk management and bank performance along with the variables and methods used by them.

Table 2.1

Summary of selected empirical studies

S.N	Author/s (Year)	Variables		Method
		Independent variables (x)	Dependent variables (y)	
1	Kithinji, A. M. (2010)	Amount of Credit Non-Performing Loan	Average Profit	Regression Model
2	Aduda, J. and Gitonga, J. (2011)	Non-Performing Loan Ratio	Return on Equity	Regression Analysis and Questionnair
3	Afriyie, H. O. and Akotey, J. O. (2012)	Non-Performing Loan	Return on Equity	Panel Data Analysis
4	Nawaz, M., Munir, S., Siddiqui, S. A., Tahseen-Ul-, Ahad, Afzal, F., Asif, M. and Ateeq, M. (2012)	Non-Performing Loan/ Loan & Advances Loan & Advances/ Total Deposit	Return on Assets	Correlation and Multiple Regression models
5	Kaaya, I. and Pastory, D. (2013)	Loan Loss to Gross Loan Non-Performing Loan Loan Loss to Net Loan Impaired Loan to Gross Loan	Return on Assets	Regression Model
6	Ogboi, C. and Unuafe, O. K. (2013)	Loan Loss Provision Non-Performing Loan Capital Adequacy Ratio	Return on Assets	Panel Data Estimation Technique

7	Kurawa, J. M. and Garba, S.,(2014)	Default Rate Ratio Cost per Loan Asset Ratio Capital Adequacy Ratio	Return on Assets	Random Effect Genralized Least Square Regression
8	Li, F. and Zou, Y. (2014)	Capital Adequacy Ratio Non-Performing Loan Ratio	Return on Assets	Multivariate Regression Analysis
9	Alshatti, A. S. (2015)	Capital Adequacy Ratio	Return on Equity	Panel
		Credit Interests/Credit Facilities	Return on Assets	Regression Model
		Provision for Facilities Loss/Net Facilities		
		Leverage Ratio		
		Level of Non-Performing Loans		
10	Ndoka, S. and Islami, M. (2016)	Non-Performing Loan Ratio Capital Adequacy Ratio	Return on Assets Return on equity	Multiple Regression Model
11	Pradhan and Shrestha (2017)	Loan Loss Provision Bank Operating Efficiency Capital Adequacy Ratio	Return on Assets	Regression Model
12	Elshaday et al., (2018)	Non-performance Loan Debt to Equity Ratio	Return on Equity	Regression Model
13	Kofarmata, Y. I., & Danlami, A. H. (2019)	Credit ratio	Return on Assets	multinomial logit model

14	Mulyungi, W.D. & Mulyungi, M. P. (2020)	Loan Loss provision	Return on Asset	Credit scoring models
15	Smarika Jain, Dr. Sangeetha R. (2021)	Non-performance Loan	Return on Asset	Descriptive Analysis
16	Yeasin, H. (2022)	Loan to deposit Capital Adequacy ratio	Return on Assets	Regression Model

Kithinji **(2010),** examined the relationship between credit risk management and profitability of commercial banks in Kenya from the period 2004 to 2008 using regression analysis. The independent variables specified by the author include the amount of credit and non-performing loans, whereas the dependent variable used is return on total assets. In contrast to the finding of other studies, the results of this study shows that there is no relationship between bank profit and the amount of credit and level of non-performing loans. This means that the bulk of banks' profitability is not influenced by the amount of credit and non-performing loan. Hence, the author suggests for commercial banks aiming to enhance profitability to focus on factors other than the amount of credit and non-performing loans.

Aduda and Gitonga (2011), investigated the relationship between credit risk management and profitability of thirty commercial banks in Kenya using both primary and secondary data. Primary data was collected through a questionnaire while secondary data was obtained from bank's annual report and financial statements from 2000 to 2009. The authors used non-performing loan ratio as an independent variable representing credit risk management and ROE as a dependent variable as a measure of bank profitability. The method used in this study is regression analysis. The responses from the questionnaire show that profitability ratios greatly affect credit risk management. Similarly, the findings from regression analysis show that NPLR is negatively related and statistically significant to ROE. The study concludes that credit risk management has an effect on profitability at a reasonable level in the sample commercial banks of Kenya.

Afriyie and Akotey (2012), examined the impact of credit risk management on the profitability of rural and community banks in Ghana using panel regression model for

the period 2006 to 2010. The authors have taken non-performing loan and capital adequacy ratio as indicators of credit risk management, and ROA and ROE as indicators of bank profitability. The findings of the study show the existence of a significant positive relationship between non-performing loans and bank profitability meaning that even though there is huge loan default, non-performing loans are increasing proportionately to profitability. The authors have found the reason for ineffective credit risk management practice among the rural and community banks of Ghana and reported that banks shift the cost of loan default to other customers with higher interest on loans. Due to this practice the community banks remained profitable. This however reveals that rural and community banks in Ghana do not have sound and effective credit risk management practice because theoretically, nonperforming loan reduces the bank profitability. The authors strongly recommend for the Bank of Ghana to tighten its control mechanism of the rural banking industry to stop this practice.

Nawaz et. al. (2012), evaluated the impact of credit risk on the profitability of Nigerian banks from 2004 to 2008 using multiple regression analysis. The ratio of non-performing loan to loan & advances and ratio of loan & advances to total deposit were used as indicators of credit risk. Return on asset was used as an indicator of financial performance. The findings of this study show that bank profitability is inversely influenced by the level of loan and advances, non-performing loan and deposits thus exposing them to risk of illiquidity and distress. The authors recommend for the management to be cautious when setting up the credit policy as not to affect profitability.

Kaaya and Pastory (2013), analyzed the relationship between credit risk and bank performance of commercial banks in Tanzania using regression analysis. The credit risk indicators used by the authors include loan loss to gross loan, nonperforming loan, loan loss to net loan, and impaired loan to gross loan. As in previous studies, the bank performance indicator used is return on asset. The overall findings of this study show that credit risk indicators used in this study have a negative correlation with bank performance, meaning that an increase in credit risk tends to lower bank performance. The authors recommend that banks need to maintain a substantial amount of capital reserve to absorb credit risk in the event of failure, as well as to enhance lending criteria, portfolio grading and credit mitigation techniques to reduce chances of default.

Ogboi and Unuafe (2013), investigated the impact of credit risk management strategies and capital adequacy on banks financial performance in Nigeria from 2004 to 2009 using panel data analysis. The study considered loan loss provision, loan and advances, non-performing loan, capital adequacy ratio and liquidity as independent variables; and return on asset as the dependent variable. The result of panel data regression showed that sound credit risk management and capital adequacy impacted positively on bank's financial performance with the exception of loan and advances which was found to have a negative impact on bank profitability. Based on the result, the authors recommend Nigerian banks to establish appropriate credit risk management strategies by conducting rigorous credit appraisal before loan disbursement and drawdown. Additionally, the authors recommend Nigerian banks to pay adequate attention to enhancing Tier-One capital.

Kurawa and Garwa (2014), devoted effort to assess the effect of credit risk management on the profitability of Nigerian banks during the period 2002 to 2011 using the generalized least square regression technique as a methodology. The credit risk management indicators used in this study are default rate, cost per loan asset and capital adequacy ratio. The profitability ratio indicator like many other studies is ROA. The findings of this study show that default rate, cost per loan assets and capital adequacy ratio have a significant positive relationship with ROA. The authors recommend that it is necessary for Nigerian banks to practice scientific credit risk control, improve their efficacy in credit analysis and loan management, and minimize the high incidence of non-performing loans and their negative effect on profitability.

Li and Zou (2014), investigated the relationship between credit risk management and profitability of commercial banks in Europe from 2007 to 2012. The authors collected data from the largest47 commercial banks in Europe and analyzed them using multivariate regression analysis. The study used capital adequacy ratio and non-performing loan ratio as proxies for credit risk management, and ROA and ROE as proxies for profitability. The overall findings of this study show that credit risk management has a positive effect on the profitability of commercial banks in Europe, meaning that the better the credit risk management, the higher is the profitability of commercial bank.

Alshatti (2015), investigated the effect of credit risk indicators on banks' financial performance during the period of 2005 to 2013 using thirteen commercial banks of

Jordan. The author used secondary sources to collect data through annual reports of sample banks and carried out panel regression analysis study. The credit risk management indicators used in this study are capital adequacy ratio, credit interest/credit facilities, provision for facilities loss/net facilities, leverage ratio and level of non-performing loans. The bank financial performance indicators are ROA and ROE. The findings of this study show that there is a positive effect of nonperforming loans/gross loans on banks' financial performance and a negative effect of provision for facilities loan/net facilities ratio on banks' financial performance. However, he found that capital adequacy ratio and credit interest/credit facilities ratio have no effect on banks' financial performance. Further, the significant variables found in this study are non-performing loans/gross loans, provision for facilities loss/net facilities and the leverage ratio. The author recommends that the Jordanian banks design an effective credit risk management system, operate under a sound credit granting process, and to maintain an appropriate credit administration with monitoring, processing and control mechanism. Overall, the study recommends improving banks' credit risk management to attain higher profitability.

Ndoka and Islami (2016), studied the relationship between credit risk management and profitability of 16 commercial banks in Albania from 2005 to 2015 using a regression model. The independent variable used are non-performing loan ratio and capital adequacy ratio. Again, the dependent variables used are ROA and ROE. The overall findings of this study show that there exists a correlation between credit risk management of commercial banks in Albania and their profitability, meaning that an efficient credit risk management leads to higher profitability. Based on these findings, the authors recommend that commercial banks of Albania focus on managing credit risk especially on the control and monitor of non-performing loans.

Pradhan and Shrestha (2017)**,** examined the impact of capital adequacy and bank operating efficiency on the financial performance of Nepalese commercial banks using data from the period of 2011/12 to 2020/21. The result showed that total deposits to total asset and banks operating efficiency are the major variables determinant of financial performance of commercial banks in Nepal. Similarly, bank operating efficiency, loan ratio, total deposit to total assets, loan loss provision to total equity has a significantly positive impact on financial performance of commercial banks. Loan

loss provisions to total loan, core capital ratio, risk-weighted ratio, total capital ratio have negative impact on financial performance of Nepalese commercial banks.

In the study about the effect of capital adequacy and cost income ratio on the performance of Nepalese commercial banks by Pradhan and Parajuli (2017) found evidence for a positive relationship of bank size with ROA; by using total assets as a proxy for the size of the bank. It means, larger the banks, higher would be the ROA. Similarly, the study revealed that there is a positive relationship of debt-to-equity ratio with ROA. This means that higher the debt equity ratio, higher would be the ROA. On the other hand, the study observed that there is a negative relationship of capital adequacy, cost income ratio, equity capital to total assets ratio and liquidity ratio with ROA.

(Elshaday et al., 2018), investigated the determinants of Ethiopian commercial banks' financial performance during the period of 2007-2016. They used the correlation and random effect model. The conclusion emphasized that capital adequacy has a significant positive impact on the Ethiopian commercial banks financial performance as measured by the return on assets. In addition, non-performing loans and operational cost efficiency have a significant negative effect on banks' return on asset.

This means that higher the capital adequacy lower would-be ROA. Similarly, the study observed that higher the equity capital to total assets, lower would be the ROA. The result also showed that there is a positive relationship of capital adequacy, equity capital to total assets, bank size and debt to equity ratio with ROE. This means that higher the capital adequacy, higher would ROE. The study also indicated that higher the equity capital to assets, higher would be return on equity. Similarly, the study observed that larger the bank, higher would be the ROE. These study results were based on the secondary data of 5 commercial banks with 50 observations for the period of 2011/12 to 2020/21.

Kofarmata and Danlami (2019), used a multinomial logit model to analyse credit rationing among farmers in the rural areas of Kano State of Nigeria. The assessment found the engagement of farmers in farming activities greatly influenced credit rationing and consequent effect of farm profit. Contrary to the commercial banking sector, the study was based on agricultural credit rationing, a gap to be filled.

Mulyungi and Mulyungi (2020) studied how client appraisal influences the performance of financial institutions. A descriptive research design was applied in this assessment based on Guaranty Trust Bank Rwanda and the findings showed client appraisal and financial performance relate positively. It can be inferred from the results that client appraisal based on business finance and individuals as well as physical characteristics contained within the credit scoring models as well as credit reference bureau utilization and analysis of credit risk is crucial for establishing appropriately reliable clients to advance loans. The identification of the right strategies to ascertain the suitability of borrowers reduces the chances of loan defaults and overall loan performance.

Smarika Jain, Dr. Sangeetha R. (2021), as a result, the judgment is that management should focus more on non-performing assets under credit risk management since they have a negative impact. While the capital adequacy ratio has no substantial influence, it is recommended that they do not place too much emphasis on it. Rather, management should merely guarantee that the capital adequacy ratio maintains within 12-15 percent, over which the firms may risk financial underperformance.

1. Objective

The purpose of this research is to determine the various aspect of risk management techniques that might impact commercial banks' credit risk management. We anticipate determining if these tactics help to both the reduction of credit risk and the efficient performance in meeting client requests.

2. Research methodology

This research paper is completely descriptive in nature so for this study secondary data collection tools are used. In the secondary data collection various study material and research works which have been done on mergers and acquisitions have been studied. Key and associated data has been collected and used for this research work. For the purpose of assessment, examination data is collected from various research paper and thesis which is related to credit risk management in Indian banking industry.

3. Finding

Since significant private sector banks, the risk in public sector banks is higher than in private sector banks must continue to expand their capital base in order to confront any

scenario of solvency risk. According to the report, the top risk acknowledged by banks is strategic risk, followed by operational and empowerment risks. To improve customer service and build new delivery platforms, banks should begin using new technology. Banks should give training to employees in order to improve their capacity, as well as assess the appropriateness of credit training across the board.

Yeasin, H. (2022), Also reveals that there is a significant negative relationship between non-performing loans, capital adequacy ratio, and financial performance of commercial banks in Bangladesh. However, the relationship between loans-to-deposit ratio and financial performance of commercial banks is revealed to be positive.

From the review of the related literature, it is observed that bank performance has been measured using return on assets, return on equity and net interest margin. Also, various measures of credit risk have been used by past studies. However, the predominant measures are the capital adequacy ratio and non-performing loans ratio. Bank size, management performance, and macroeconomic variables, such as gross domestic product and inflation have also been used to explain the performance of banks. More importantly, this study incorporates an important financial performance measure economic value-added which past studies have virtually ignored.

2.4.3 Review of Nepalese studies

Poudel (2012), attempted to identify the various parameters pertinent to credit risk management as it affects banks' financial performance by using data of 31 commercial banks of Nepal from 2001 to 2011 and by applying multiple regression analysis. The parameters specified in the study were default rate, cost per loan assets and capital adequacy ratio. The findings revealed that all these factors have an inverse impact on banks' financial performance, and that default rate is the most significant predictor of bank financial performance. From the findings, the author recommends for Nepalese commercial banks to emphasize more on risk management as risk management, in general, has a significant contribution to bank performance. Further, the author recommends that in order to reduce risk on loans and achieve maximum performance, the banks need to allocate more fund to default rate management and try to maintain an optimum level of capital adequacy.

Bhattarai (2014), examined the effect of credit risk on the performance of Nepalese commercial banks using pooled data of fourteen commercial banks of Nepal for the

period of 2010 to 2015 totaling to 77 observations. The 77 observations include capital adequacy ratio, non-performing loan ratio, cost per loan assets, cash reserve ratio and bank size as an independent variable; and return on assets as a dependent variable. Regression analysis was used to assess the data. The findings of the study showed that the commercial banks under consideration has been practicing poor credit risk management. This was further evidenced by the negative effect of non-performing loan ratio on bank performance and the positive effect of cost per loan assets on bank performance. In contrast to other studies, the author found that capital adequacy ratio and cash reserve have no influence on bank performance. Since there is a significant relationship between credit risk and bank performance, the author suggests that the banks establish proper credit risk management strategies by conducting sound credit evaluation procedure before granting loans to customers.

2.6 Research gap

There are various factors that affect the lending practices. The directives of NRB change over time and commercial bank should adopt their policy with the changing time. So, up-to-date study over the change of time frame is major concern for the researcher and concerned organization as well as whole. This study covers the more 29 recent financial data, NRB circulars and guidelines than that of studies previously conducted. The study previously conducted so far do not consider the variables like Capital Adequacy, Non-performing Loan, Loan Loss Provision and Loan and Advance to Deposit in relation to performance of the banks which however are done well in this study. The research fills the variable gaps and it is further believed that such a study with recognition of these variables would contribute to policy making and devise risk mitigating mechanisms. It is major concern of shareholders to know portfolio behavior of the bank; this study puts its effort to find out factors that are related with investment of the banks. Analysis of lending efficiency shows the sufficiency of the bank. No case study has yet been conducted about credit management of NBL, ADBL, NABIL, NIBL, and SCB bank. This study tries to show how bank stands in terms of investment policy with leading commercial banks. Hence, this study fulfills prevailing research gap about the in-depth analysis of lending efficiency, investment in priority and deprived sector by the banks.

The aforesaid review represents only a preliminary survey of the relevant issue. On the basis of review, it can be concluded that still there are some unsolved research issues

on the proposed subject. The purpose of this study is to see what new contribution can be made and receive some ideas, knowledge, and suggestions in relation to the impact of credit risk exposure and management practices on the performance of commercial banks.

However, the previous studies cannot be ignored because they provide the foundation for the present study. This study is continuity in research and is ensured by linking the present study with the past research studies. It is clear that there is a scant of study based on recent data. As many researchers emphasized the effects of credit risk in own country context or with other variables. Hence, there exists research gap. The research gap will be minimized by emphasizing the effects of credit risk exposure on the profitability of commercial banks in Nepal with the profitability variables, ROA and EPS

This study tries to complete the research work as many journals, articles are followed as guidelines to make the research easier and smooth. To achieve the main objectives, various financial and statistical tools are used. Hence, this study is useful to the concerned bank as well as stakeholder.

CHAPTER III
RESEARCH METHODOLOGY

Research methodology is a way to solve the research problem systematically and to fulfill the research objectives accordingly. This study plans the following methodological aspects.

3.1 Research design

A research design is the logical and systematic planning that specifies the procedures for collecting and analyzing data and information. To attain the specified purpose of this study, descriptive research design will be considered an appropriate one. On the other hand, causal comparative research method has also been followed. Because this study is intended to describe the phenomenon related to credit risk management and its effect on the return of commercial banks operating in Nepal. Accordingly, the overall study plan will be based on the quantitative approach of research.

3.2 Population and sampling procedure

This study is based on the data of commercial banks in Nepal. Therefore, a total number of commercial banks is obviously the size of the population. As per the recent publication of Nepal Rasta Bank (NRB), there are 27 commercial banks operating in Nepal. This figure is based on the data after merger and acquisition process of the bank and financial institutions (BFIs) as per Financial Institutions Merger and Acquisition Regulation-2073. Hence, the population of the study is considered as 27 commercial banks in Nepal.

A list of five commercial banks joint operation data after merger according to the paid up capital based on the financial statement of mid-July, 2022

Table 3.1

List of Selected Banks

As of Mid Jul, 2022 (Licensed by NRB)

S.N	Name	Operating Date (A.D)	Head Office	Paid Up Capital (Rs. In crore)
1	NBL	11/15/1937	Dharmapath, Kathmandu	12.64
2	ADBL	1/21/1968	Ramshahpath, Kathmandu	18.62
3	NABIL	7/12/1984	BeenaMarga, Kathmandu	18.49
4	NIBL	3/9/1986	Durbarmarga, Kathmandu	18.3
5	SCBL	2/28/1987	NayabaneshworKathmandu	9.42

(Source: www.nrb.org.np)

3.3 Sampling method

The sampling method is the way the sample units are selected. So, far the sampling method applied in this study is concerned; it has followed the non-probability sampling method. Accordingly, purposive sampling design has been used for the study. Specifically, the study will follow the judgmental sample technique.

3.4 Nature and sources of data collection

To fulfill the research objectives, most of the data will be collected from the secondary sources. The required data, as demanded by the study, will be collected through the published annual reports of the sample banks. On the other hand, some supporting information has been collected from the website of Nepal Rasta Bank and other official websites. The negligible information has been acquired from the primary sources.

3.5 Data collection procedure

The data will be sourced from the annual reports of the banks in the sample. The data included time series and cross-sectional data, i.e. pooled data set and estimated the effect of credit risk on the return of commercial bank using pooled data regression. The

10 years data of sample bank will be considered as the sample years to analyze the data.

3.6 Instrument of data collection

The study is quantitative in nature and analysis all the way through will be based on the historical data. Therefore, tools of the study are selected accordingly as demanded by the purpose of the study and data nature. For the analysis of data different financial ratios will be analyzed means of descriptive statistic (arithmetic mean, standard deviation coefficient of variation) as well as inferential statistics (correlation coefficients between to variables).

3.7 Methods of analysis

3.7.1 Models

Basically, the variables under study are profitability and the Credit Performance (CP). As a proxy of profitability, Return on Assets (ROA) and Earning per Share (EPS) will be considered. These are considered as dependent variables. On the other hand, as independent variables, Credit Deposit Ratio (CDR), Non-Performing Loan (NPL), and Capital Adequacy Ratio (CAR) are considered. These are the variables representing the credit performance. The study is oriented toward analyzing the effect of these independent variables on the profitability. Therefore, the basic relationship functions are expressed as follows:

$$EPS = F(CP) \quad ROA = F(CP)$$

The regression equation to be estimated has therefore been specified as,

$$Y = \beta 0 + \beta\, Xit + \varepsilon it$$

Where Y is the dependent variable; β0 is constant; β is the coefficient of explanatory variables; Xit is the vector of explanatory variables, and εit is the error term. Adapting this basic model, following models are estimated.

$$EPSit = \beta 0 + \beta 1 CDRit + \beta 2 NPLit + \beta 3 CARit + \varepsilon it$$

$$ROAit = \beta 0 + \beta 1 CDRit + \beta 2 NPLit + \beta 3 CARit + \varepsilon it$$

Where,

EPSit represents earning per share of bank i in year t;

ROAit represents Return on assets of bank i in year t;

CDRit represents credit deposit ratio of bank i in year t;

NPL it represents non-performing loan of bank i in year t;

CARit represents capital adequacy ratio of bank i in year t;

β0 is the Intercept (constant); β1, β2, and β3 represent the corresponding slope which addresses the impact coefficients.

3.8 Research framework

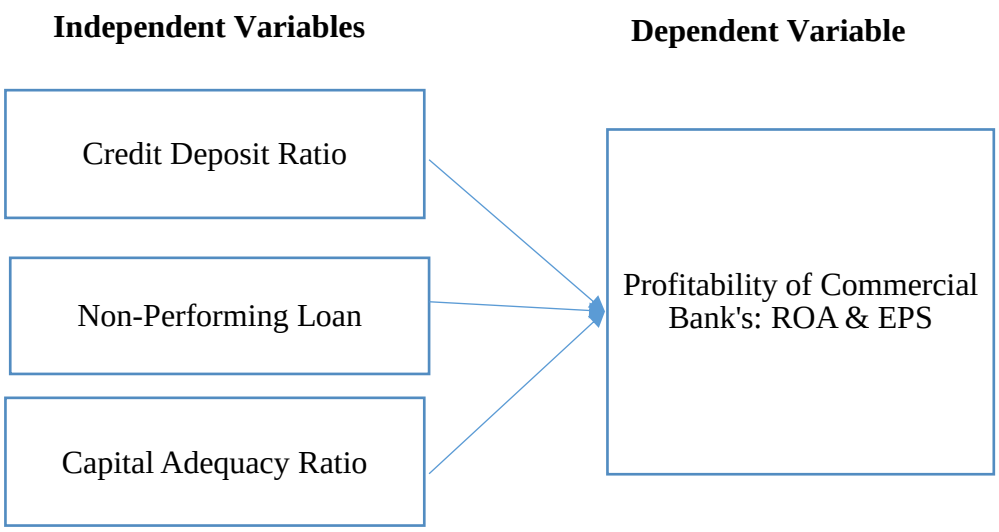
A research framework provides an underlying structure or model to support our collective research efforts. Up until now, we've referenced, referred to and occasionally approached research as more of an amalgamated set of activities. But as we know, research comes in many different shapes and sizes, is variable in scope, and can be used to answer all manner of questions across all aspects of business, product and delivery.

From the broad fundamentals that have the potential to inform company strategy and shape portfolio decisions, through to the specific and narrow that guide our day-to-day development efforts. There is a flavor of research for every situation and a framework helps us recognize these different scenarios and tailor our approach and methods accordingly.

Based on the aforesaid models and variables, this study will be based on the following schematic diagrams:

Figure 3.1

Schematic diagram of the theoretical framework



The schematic diagram as presented in Figure 3.1 is based on the preliminary survey of literature on the subject.

3.9 Definitions of variables

Dependent Variables the important aspect of the study is to analyze an impact of credit risk on the return or profitability. Therefore, dependent variables are the proxies of profitability. Among the different aspects of profitability, as proxies of profitability, Earnings per share and returns on asset will be considered as well as they can be measure by tools such as financial & Statistical tools.

A. Financial tools:

Financial tools are different ways to evaluate and interpret a company's financial statements for various purposes like planning, investment, and performance. Some of the most used financial tools based on their usage and requirements are common size statements (vertical analysis), comparative financial statements (comparison of financial statements), ratio analysis (quantitative analysis), cash flow analysis, and trend analysis.

i. Earnings per share (EPS): Earning per share (EPS) is the portion of a company`s profit that is allocated to each outstanding share of common stock, serving as an indicator of the company`s financial health. In other words, earning per share is the portion of company`s net income that would be earned per share if all the profits were paid out to its shareholders. The financial model of the bank's EPS can be expressed as under:

$$\text{EPS} = \frac{\text{Net income} - \text{Dividend on preferrd stock}}{\text{Average outstandig common shares}}$$

ii. Return on assets (ROA): Return on assets (ROA) is an indicator of how profitable a company is relative to its total assets. ROA gives a manager, investor, or analyst an idea as to how efficient a company's management is at using its assets to generate earnings. Thus, ROA is primarily an indicator of managerial efficiency. The financial model of the bank's NPM can be expressed as under:

$$\text{ROA} = \frac{\text{After tax net income}}{\text{Total assets}}$$

iii. Credit deposit ratio (CDR): It is also known as the loan-to-deposit ratio. It is used to assess a bank's credit risk as well as liquidity by comparing a bank's total loans to its total deposits for the same period. The financial model of the bank's NPM can be expressed as under:

$$\text{CDR} = \frac{\text{Total loan and advances}}{\text{Total Deposits}}$$

iv. Non-performing loan (NPL): A nonperforming loan (NPL) is a sum of borrowed money upon which the debtor has not made the scheduled payments for a period of time of usually at least 90 days for commercial banking loans and 180 days for consumer loans. Nonpayment means there has been zero interest or principal payments made on the loan within a specified period of time (90 to 180 days depending on industry and loan type). Any definition of a nonperforming loan will depend on the loan's particular terms and agreement. The financial model of the bank's NPL can be expressed as under:

$$\text{NPL} = \frac{\text{Non performing Loan}}{\text{Total Loan}}$$

v. Capital adequacy ratio (CAR): Capital adequacy ratios are a measure of the amount of a bank's capital expressed as a percentage of its risk weighted credit exposures. In other words, it is the ratio of a bank's capital in relation to its risk weighted assets and current liabilities. The financial model of the bank's CAR can be expressed as under:

$$\text{CAR} = \frac{\text{Tire 1 capital} + \text{Tire 2 capital}}{\text{Risk weighted assets}}$$

B. Statistical tools

Statistical methods involved in carrying out a study include planning, designing, collecting data, analyzing, drawing meaningful interpretation and reporting of the research findings. The statistical analysis gives meaning to the meaningless numbers, thereby breathing life into a lifeless data. The results and inferences are precise only if proper statistical tests are used. This dissertation will try to acquaint the reader with the basic research tools that are utilized while conducting various studies. The dissertation covers a brief outline of the variables, an understanding of quantitative and qualitative variables and the measures of central tendency. An idea of the sample size estimation, power analysis, regression analysis, T-value analysis, ANOVA table analysis and the statistical errors is given. Finally, there is a summary of parametric and non-parametric tests used for data analysis.

CHAPTER IV
RESULT AND DISCUSSION

4.1 Data presentation

Data Analysis and Data Presentation have a practical implementation in every possible field. It can range from academic studies, commercial, industrial and marketing activities to professional practices. In its raw form, data can be extremely complicated to decipher and in order to extract meaningful insights from the data, data analysis is an important step towards breaking down data into understandable charts or graphs. Data analysis tools used for analyzing the raw data which must be processed further to support N number of applications.

Therefore, the processes or analyzing data usually helps in the interpretation of raw data and extract the useful content out of it. The transformed raw data assists in obtaining useful information. Once the required information is obtained from the data, the next step would be to present the data in a graphical presentation. The presentation is the key to success. Once the information is obtained the user transforms the data into a pictorial Presentation so as to be able to acquire a better response and outcome.

4.2 Organization profile

Commercial banks is an institution that provides services such as accepting deposits, providing loans, and offering basic investment products. There are 27 commercials banks in Nepal, among them five commercial banks, Nepal Bank Ltd (NBL), Agricultural Development Bank (ADBL), NABIL Bank (NABIL), Nepal Investment Bank Ltd. (NIBL) and Standard Chartered Bank Ltd (SCB) are selected for the study. This report focuses on "Impact of Credit Performance and Profitability of Commercial Banks in Nepal." including past 10 years data from FY 2011/12 to FY 2020/21.

4.3 Credit performances and profitability position of selected commercial banks

Data collected from various sources are processed and changed into the understandable presentation using financial as well as statistical tools supported by diagrams and graphs. Similarly, the process of transforming data is called analysis for the examination and interpretation of the data to draw the conclusion. For the purpose of the study ten years data from fiscal year 2011/12 to 2020/21 of five commercial bank have been taken into consideration i.e. Nepal Bank Ltd (NBL), Agricultural

Development Bank (ADBL), NABIL Bank (NABIL), Nepal Investment Bank Ltd. (NIBL) and Standard Chartered Bank Ltd (SCB)

The detailed analysis carried out by comparing five commercial bank's (NBL, ADBL, NABIL NIBL and SCB) profitability and credit performances indicators in Nepal. Among five banks, whose performance is better and degree of effects of credit performances.

4.4 Data analysis

Data analysis is a process of inspecting, cleansing, transforming, and modelling data with the goal of discovering useful information, informing conclusions, and supporting decision-making. Data analysis has multiple facets and approaches, encompassing diverse techniques under a variety of names, and is used in different business, science, and social science domains. In today's business world, data analysis plays a role in making decisions more scientific and helping businesses operate more effectively.

Data mining is a particular data analysis technique that focuses on statistical modelling and knowledge discovery for predictive rather than purely descriptive purposes, while business intelligence covers data analysis that relies heavily on aggregation, focusing mainly on business information In statistical applications, data analysis can be divided into descriptive statistics, exploratory data analysis (EDA), and confirmatory data analysis (CDA). EDA focuses on discovering new features in the data while CDA focuses on confirming or falsifying existing hypotheses. Predictive analytics focuses on the application of statistical models for predictive forecasting or classification, while text analytics applies statistical, linguistic, and structural techniques to extract and classify information from textual sources, a species of unstructured data. All of the above are varieties of data analysis.

Analysis, refers to dividing a whole into its separate components for individual examination. Data analysis, is a process for obtaining raw data, and subsequently converting it into information useful for decision-making by users. Data, is collected and analyzed to answer questions, test hypotheses, or disprove theories. The data is necessary as inputs to the analysis, which is specified based upon the requirements of those directing the analysis (or customers, who will use the finished product of the analysis). The general type of entity upon which the data will be collected is referred to as an experimental unit

a. Earnings per share (EPS)

Table 4.1

Earnings per Share (EPS)

Years	NBL	ADBL	NABIL	NIBL	SCB
2011/2012	46.36	60.57	83.23	27.60	72.60
2012/2013	198.53	71.54	91.05	46.20	65.70
2013/2014	18.08	35.19	76.12	40.70	65.47
2014/2015	7.48	78.83	57.24	30.90	57.38
2015/2016	44.59	52.79	59.27	29.30	45.96
2016/2017	38.77	31.59	59.86	29.30	35.49
2017/2018	39.98	36.64	51.84	35.70	27.33
2018/2019	26.99	42.88	50.57	26.40	30.39
2019/2020	20.68	31.45	36.16	17.00	24.81
2020/2021	23.44	29.13	33.57	22.00	16.32
Mean	46.49	47.06	59.89	30.51	44.15
SD	54.90232	17.93624	18.83862	8.565623	20.00679
CV	1.18	0.38	0.31	0.28	0.45

Source: Annual report

Table no. 4.1 presents the return on assets ratio of NBL, ADBL, NABIL NIBL and SCB. The highest EPS of NBL is 198.53 in fiscal year 2012/13 and the lowest EPS NBL is 7.48 in year 2014/15, the highest Mean is 59.89 of NABIL Bank. So, the NABIL Bank is better according to the Mean whereas Nepal Investment bank has lowest value 30.51 which is worse. The CV of NIBL is 0.28 which better than other bank and NBL has 1.18 CV which is not good. Hence, Nepal Investment Bank is better than other commercial bank according to EPS the overview of the aforesaid analysis is illustrated in the trend chart. Gives the glimpse of the trend of Earning per share (EPS) of NBL, ADBL, NABIL NIBL and SCB

b. Non-performing loan (NPL)

As depicted in Table 4.2, NBL"s non-performing loan mean is 3.69 percent which is greater than other commercial banks. The standard deviation of a non-performing loan of ADBL is more than other commercial i.e.1.986831 whereas CV of NBL is lesser than other, which indicates relative risk of NBL is better. The analysis below in table

4.2 is best described by the line graph below which gives the trend of Nonperforming Loan (NPL) of NBL, ADBL, NABIL NIBL and SCB

Table 4.2

Non-performing loan

Years	NBL	ADBL	NABIL	NIBL	SCB
2011/2012	5.58	8.98	2.33	3.32	0.78
2012/2013	5.24	5.85	2.13	1.91	0.77
2013/2014	5.12	5.46	2.23	1.77	0.48
2014/2015	3.98	5.35	1.82	1.25	0.34
2015/2016	3.11	4.36	1.14	0.68	0.32
2016/2017	3.32	4.60	0.80	0.83	0.19
2017/2018	3.37	3.50	0.55	1.36	0.18
2018/2019	2.64	3.29	0.74	2.78	0.15
2019/2020	2.47	2.84	0.98	2.91	0.44
2020/2021	2.05	1.88	0.84	2.46	0.96
Mean	3.69	4.61	1.36	1.93	0.46
SD	1.245425	1.986831	0.692775	0.911751	0.284935
CV	0.34	0.43	0.51	0.47	0.62

Source: Annual report

c. Capital adequacy ratio (CAR)

Table 4.3 indicates that the mean value of ADBL„s capital adequacy ratio is 18.20.As per NRB requirements, CAR must be ten percent as ADBL,NABIL, NIBL and SCB has maintained more than ten percent on average whereas NBL has just 9.22 which is less than ten percent. The absolute risk of CAR of NBL is 7.8567 percent. Similarly, the C.V of capital adequacy of NABIL is slightly less than C.V of other banks. Hence, the CAR of NBL is riskier. The analysis above in table 4.3 is best described by trend graph below which gives the trend of Capital Adequacy Ratio (CAR).

Table 4.3
Capital Adequacy Ratio (CAR)

Years	NBL	ADBL	NABIL	NIBL	SCB
2011/12	(5.82)	19.00	11.01	11.10	13.93
2012/13	(0.59)	16.34	11.59	11.49	12.54
2013/14	4.55	14.93	11.18	11.27	12.27
2014/15	7.49	17.16	11.57	11.90	13.10
2015/16	10.20	17.18	11.73	14.92	16.38
2016/17	14.47	20.491	12.90	13.02	21.08
2017/18	11.27	20.33	13.00	12.66	22.99
2018/19	16.80	20.37	12.50	13.26	19.69
2019/20	17.01	19.29	13.07	13.54	18.51
2020/21	16.80	16.94	12.77	14.71	17.17
Mean	9.22	18.20	12.13	12.79	16.77
SD	7.856786	1.938495	0.795959	1.363207	3.783118
CV	0.85	0.11	0.07	0.11	0.23

Source: Annual report

d. Cash reserve ratio (CRR)

As depicted by Table 4.4 cash reserve ratio of ADBL,,s capital adequacy ratio is 30.91. It seems that ADBL is stronger than other commercial bank. The absolute risk of CRR of NBL is 7.8057 percent. Similarly, the C.V of capital adequacy of ADBL is slightly less than C.V of other banks. Hence, the CAR of NBL is riskier. The overview of analysis is illustrated in the trend chart. Gives the trend of cash reserve ratio (CRR) of NBL, ADBL, NIBL and SCB.

Table 4.4
Cash Reserve Ratio (CRR)

Years	NBL	ADBL	NABIL	NIBL	SCB
2011/12	25.09	36.65	8.60	13.60	22.40
2012/13	22.53	32.27	9.32	16.00	16.43
2013/14	9.60	30.43	11.32	19.20	21.18
2014/15	11.55	28.74	14.15	12.00	24.03
2015/16	17.46	23.33	6.77	7.20	7.98
2016/17	18.81	31.18	10.02	10.50	19.71
2017/18	9.05	29.15	10.05	8.20	18.91
2018/19	4.06	27.20	4.78	5.50	7.52
2019/20	4.52	33.98	12.20	8.70	14.49
2020/21	4.19	36.21	3.66	4.40	7.53
Mean	12.69	30.91	9.09	10.53	16.02
SD	7.805737	4.10477	3.262096	4.707217	6.367792
CV	0.62	0.13	0.36	0.45	0.40

Source: Annual report

e. Return on Assets (ROA)

As depicted by Table 4.5 Return on assets of mean ADBL„s Return on Assets is 2.42. It seems that ADBL is stronger than other commercial bank. The absolute risk of ROA of NBL is 0.888217 percent. Similarly, the C.V of return on Assets of NIBL is slightly less than C.V of other banks. Hence, the ROA of NBL is riskier. The overview of analysis is illustrated in the trend chart. Gives the trend of Return on Assets (ROA) of NBL, ADBL, NABIL, NIBL and SCB

Table 4.5

Return on Assets (ROA)

Years	NBL	ADBL	NABIL	NIBL	SCB
2011/2012	0.30	2.90	2.80	1.60	2.80
2012/2013	1.07	2.97	3.25	2.60	2.67
2013/2014	0.92	1.76	2.65	2.30	2.51
2014/2015	0.55	3.12	2.06	1.90	1.99
2015/2016	2.79	2.32	2.32	2.00	1.98
2016/2017	2.78	2.15	2.69	2.10	1.84
2017/2018	2.41	2.71	2.61	2.13	2.61
2018/2019	1.51	2.77	2.11	1.79	2.61
2019/2020	1.22	1.86	1.58	1.19	1.71
2020/2021	1.33	1.59	1.71	1.56	1.22
Mean	1.49	2.42	2.38	1.92	2.19
SD	0.888217	0.552796	0.518862	0.404394	0.520197
CV	0.60	0.23	0.22	0.21	0.24

Source: Annual report

f. Credit deposit ratio (CDR)

As depicted by Table 4.6 Credit deposit ratio of mean ADBL's Credit deposit ratio is 94.98. It seems that ADBL is stronger than other commercial bank. The absolute risk of CDR of NBL is 9.73532 percent. Similarly, the C.V of credit deposit ratio of NIBL is slightly less than C.V of other banks. Hence, the CDR of NBL is riskier. The overview of analysis is illustrated in the trend chart and gives the trend of credit deposit ratio (CDR) of NBL, ADBL, NABIL, NIBL and SCB.

Table 4.6

Credit Deposit Ratio (CDR)

Years	NBL	ADBL	NABIL	NIBL	SCBL
2011/2012	52.98	104.06	77.91	71.80	55.13
2012/2013	60.10	100.81	74.90	74.80	58.63
2013/2014	59.45	94.80	74.55	71.90	56.87
2014/2015	68.45	93.77	64.43	72.80	48.92
2015/2016	71.05	95.46	70.49	76.80	56.88
2016/2017	79.17	92.90	65.38	77.60	62.20
2017/2018	75.68	95.64	82.66	74.70	66.45
2018/2019	78.14	93.62	81.96	71.97	70.11
2019/2020	72.25	85.84	79.72	72.93	56.75
2020/2021	82.76	92.93	89.84	75.12	71.27
Mean	70.00	94.98	76.18	74.04	60.32
SD	9.73532	4.85931	7.95049	2.08493	7.09531
CV	0.14	0.05	0.10	0.03	0.12

Source: Annual report

g. Descriptive statistics of study variables

Table 4.7 reports that there is bank performance indicator earning per share (EPS) and return on assets and three independent variables. They are non-performing loan (NPL), capital adequacy ratio (CAR), credit deposit ratio (CDR) and

Table 4.7

Data and Descriptive Statistics of Study Variable –Selected Banks (n=50)

Variables	No of Observation	Mean	Standard Deviation	Kurtosis	Skewness	Minimum	Maximum
ROA	50	2.0784	0.0949	-0.123863	-0.534255	0.3	3.25
EPS	50	45.6194	4.1330	14.60057	3.0841387	7.48	198.53
CDR	50	66.3956	3.8480	-0.204649	-1.004384	12.27	104.06
NPL	50	2.4086	0.26971	1.431254	1.1187796	0.15	8.98
CAR	50	13.8196	0.7199	4.395945	-1.442827	-5.82	22.99

Source: Annual report

The result shows that the average value of the bank performance (EPS) is 45.62 during the period of 2012-2022, that means on average per share of sample commercial banks in Nepal earns 45.62. The standard deviation of return on assets is 0.095, whereas earning per share is 45.62 which show the lack of substantial variation.

Recognizing the role of the nature and shape of data distribution in further statistical analysis, the skewness and kurtosis of EPS have been measured as a part of descriptive statistics. Skewness reflects the asymmetry of distribution. As a result shows, the coefficient of skewness regarding EPS data of sample commercial banks (14.60) seems the distribution is highly skewed. The general consensus of statistics states that coefficient of skewness if less than -1 or greater than +1, the distribution is highly skewed. The value of kurtosis is positive and kurtosis value is 14.60 called leptokurtic. Compared to a normal distribution, its central peak is higher and sharper and its tails are longer and flatter.

On the other hand, kurtosis is the degree of peak of a distribution. A distribution with a negative kurtosis value indicates that the distribution has shorter and thinner tails and lower and broad central peak than the normal distribution. The non-performing loan ratio among the sample commercial banks in Nepal is varied from 0.15 to 8.97 percent with the mean and standard deviation 2.40 percent and 0.26 percent respectively which indicates volatility among the banks‟ ability in credit risk management.

The coefficient of skewness regarding NPL data of sample commercial bank (1.43) seems the distribution is approximately symmetrical. The general consensus of statistics states that coefficient of skewness between -0.5 to 0.5 considers as approximately symmetric. On the other hand, a distribution with negative kurtosis value indicates that the distribution has shorter and thinner tails and lower and broad central peak than a normal distribution. Hence, non-performing loan of sample banks indicates such situation.

The minimum capital adequacy ratio is 12.27.% that is higher than regulatory requirement of 10% which is the evidence of the compliance of sample banks regarding Nepal Rastra Bank‟s Directives 2015 and Basel II requirements. The coefficient of skewness regarding CAR data of sample commercial banks (-1.004) seems the distribution is highly skewed. The general consensus of statistics states that coefficient of skewness if less than -1 or greater than +1, the distribution is normal skewed. The

value of kurtosis is negative and kurtosis value is -0.204 called normal. Compared to a beta distribution, it indicate that the distribution has lighter tails than the normal distribution.

Table 4.7 shows that minimum observation of credit deposit ratio is 12.27% According to data above in Table 4.7, the distribution of CDR is normal skewed (-0.2046.) and the distribution has negative kurtosis -1.0043, so compared to a beta distribution, its indicates that the distribution has lighter tails than the normal distribution.

The result shows that the average value of the bank performance (ROA) is 2.0784 during the period of 2011/12-2020/21, the standard deviation of return on assets is 0.094, whereas return on assets is 2.00784 which show the lack of substantial variation.

h. Relationship between profitability and credit risk indicators

In an effort to analyze the nature of correlation between dependent and independent variables, Pearson correlation analysis has been computed. Correlation indicates the relationship between the variables.

Table 4.8

Pearson Correlation Coefficients-Sample Banks (n=50)

Variables	ROA	EPS	CDR	NPL	CAR
ROA	1				
EPS	.297	1			
CDR	0.093	-0.025	1		
NPL	-0.080	0.201	.565	1	
CAR	.418	-.382	0.025	-0.208	1

Results are drawn using Excel-2013 version

The correlation matrix that is shown in Table 4.8 indicates that non-performing loan is negatively associated with profitability and the magnitude of association is weak with the correlation coefficient of -0.080. However, capital adequacy ratio as well as credit deposit ratio is negatively correlated with profitability but their magnitude of profitability seems weak. Since, the correlation coefficient among independent variables is less than 0.8, meaning that the multicollinearity problem may not arise and the selected independent variables are suitable to be used in the regression model.

i. Effect of credit risk on the profitability of commercial banks

For analyzing the effect of credit risk on the profitability of commercial banks of Nepal, regression analysis has been computed. Regression analysis is analysis using specified and associated data for two or more variables such that one variable can be estimated from the other variable.

Table 4.9

Regression Results of Effects of Credit Performance

Variable	Dependent variable EPS			
	Coefficients	Standard Error	t Stat	P-value
Constant	1.205717	0.338711	3.559727	0.000875
CDR	0.002918	0.004047	0.720929	0.474602
NPL	-0.02212	0.059018	-0.37487	0.709477
CAR	0.052986	0.01825	2.903329	0.005654

R^2 = 0.1838; Adjusted R^2 = 0.1306; F-stat = 3.4522; F-sig = 0.0239

Results are drawn using Excel- 2013 version

Table 4.9 presents the regression results of the effect of credit risk on bank performance. The value of R^2 and adjusted R^2 are 0.1838 and 0.1306 respectively. The overall explanatory power of the regression model is fair with R^2 of 0.1838. This indicates that 18.38% of the variation in bank performance can be explained by the variation in the explanatory variables. The p-value for F-statistics in the model represents model is fairly fitted well statistically since p-value of F-statistics is less 0.01. The results from Table 2.8 indicate that the coefficient of non-performing loan (a measure of default rate) is negative but statistically significant. The finding of this study supports the hypothesis that non-performing loan has an insignificant effect on bank performance. Moreover, the result indicates that increase in non-performing loan ratio reduces the profitability (earning per share) of Nepalese commercial banks.

The coefficient of capital adequacy ratio is positive and statistically significant. So, the finding of the study support the hypothesis that capital adequacy ratio has a significant effect on bank performance.

Credit deposit ratio in the estimated regression model assumes that changes in credit deposit ratio

(CDR) have an impact on banks‟ profitability. Contrary to prior expectation, the result indicates that the coefficient of credit deposit ratio is positive and statistically insignificant. The result of this study reveals that credit deposit ratio doesn't significantly affect the performance of commercial banks in Nepal.

The coefficient of capital adequacy ratio is significant meaning that it can explain the variation of a dependent variable (EPS). Likely, the coefficient of capital adequacy ratio is also significant which indicates that capital adequacy ratio has a positive effect on bank performance in Nepalese context.

Table 4.10

Regression Results of Effects of Credit Performance

Variable	Dependent variable ROA			
	Coefficients	Standard Error	t Stat	P-value
Constant	1.2057	0.3387	3.5597	0.0009
CDR	0.0029	0.0040	0.7209	0.4746
NPL	-0.0221	0.0590	-0.3749	0.7095
CAR	0.0530	0.0183	2.9033	0.0057

R^2 = 0.1838; Adjusted R^2 = 0.1305; F-stat= 3.4522; F-sig=0.0239

Results are drawn using Excel-2013 version

Table 4.10 presents the regression results of the effect of credit risk on bank performance. The value of R^2 and adjusted R^2 are 0.1838 and 0.1305 respectively. The overall explanatory power of the regression model is fair with R^2 of 0.1838. This indicates that 18.38% of the variation in bank performance can be explained by the variation in the explanatory variables. The p-value for F-statistics in the model represents model is fairly fitted well statistically since p-value of F-statistics is less 0.01. The results from Table 4.10 indicate that the coefficient of non-performing loan (a measure of default rate) is negative but statistically significant. The finding of this study supports the hypothesis that non-performing loan has an insignificant effect on bank performance. Moreover, the result indicates that increase in non-performing loan ratio reduces the profitability (earning per share) of Nepalese commercial banks.

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The coefficient of capital adequacy ratio is significant meaning that it can explain the variation of a dependent variable (ROA). Likely, the coefficient of capital adequacy ratio is also significant which indicates that capital adequacy ratio has a positive effect on bank performance in Nepalese context.

4.5 Major findings

This study is carried out to identify the effects of credit risk on bank performance in Nepalese context. The data of both independent and dependent variables over ten years are obtained from selected bank annual reports and they are used in this study using Excel Spreadsheet
Software. Major findings while analyzing the data are pointed out be

1. The higher mean of EPS among five sample banks is of NABIL Bank Ltd. (NABIL) i.e. 59.89.
2. Among five sample banks have maintained more than minimum Capital Adequacy Ratio (CAR), Credit Deposit Ratio (CDR), and Return on Assets (ROA) as specified in NRB Directive i.e. 18.20, 94.98, 2.42 percent of Agricultural Bank Ltd (ADBL).
3. The Pearson’s Correlation Coefficient result indicates the bank performance (EPS) is positively correlated with non-performing loan ratio (NPLR) and return on assets (ROA), whereas the bank performance (EPS) is negatively correlated with capital adequacy ratio and credit deposit ratio (CAR & CDR). Likely, there is a negative relationship between non-performance loan and credit adequacy ratio.
4. The regression model revealed that Capital Adequacy Ratio (CAR) has a positive and statistically significant impact on bank performance. As the regression model,

the coefficient of credit deposit ratio & non-performance loan is statistically insignificant impact on bank performance (EPS)

5. The regression model revealed that Capital Adequacy Ratio (CAR) has a positive but statistically significant impact on bank performance. As the regression model, the coefficient of credit deposit ratio & non-performance loan is statistically insignificant impact on bank performance (ROA)

4.6 Discussion

The main objective of this study is to analyze the effect of credit performance on the profitability of commercial banks. Based on previous studies and the finding of this study, this section discussed the general result obtained via Regression Model as shown in the above table. Referring the literature, the result of each explanatory variable including their impact on the level of ROA was discussed.

To explain the research findings, multiple regression results of WCM were as follows: The regression model has a statistically significant value at the 5% level, the correlation coefficient (R) was 0.1838, and the determination coefficient was 0.1305, which describes the ability of IVs (WCM and CMP) to influence the dependent variable (FP). The results also showed that the test value (F) was 3.4522. On the other hand, the results showed that the regression model in ANOVA test was significant (0.00) at the significance level of $\alpha \leq 0.05$,

CHAPTER V

SUMMARY AND CONCLUSION

5.1 Summary

In chapter 1, the significance of the study and the purpose of the research were presented and discussed. As specified earlier, the primary aim of the study is to examine the impact of credit performance on the profitability of commercial banks in Nepal. The various studies on the topic reviewed in the context of developed and developing countries were presented in chapter 2. Based on the review, appropriate variables were selected to be included in the analysis. Each of the variables were then defined and the rationale of choosing them were put forward. The calculation formula and the expected sign were also discussed. However, two independent variables which have not been used in previous studies were added in the finale models. As dependent variables indicating profitability of commercial banks, ROA and EPS were selected as these were the most popular variables in the literature. Explanatory variables include: CAR, CDR and NPL representing credit risk management. For this study, a pooled regression analysis and a panel data analysis were applied for all 27 commercial banks of Nepal for the period 2011/12 to 2020/21.

The primary research question of "What is the relationship between credit performance and profitability of Nepalese commercial banks from 2011/12 to 2020/21 is addressed using the results from the various statistical analysis. Overall, the results imply that there exists a relationship between credit performance and profitability of commercial banks of Nepal. Specifically, the study identified factors that influence the financial performance of Nepalese commercial banks.

The main purpose of this study is to investigate the impact of credit risk on the performance of Nepalese commercial banks. The data of five commercial banks with 50 observations for the period of 2011/12 to 2020/21 have been used for the analysis. The regression model revealed that Non-performing loan (NPL) has a negative and statistically insignificant and Credit deposit ratio has a positive effect but insignificant on profitability of commercial banks. Impact on bank performance. Capital Adequacy ratio have a positive and statistically significant impact on bank performance.

The finding of this study indicates that the sampled commercial banks have good credit risk management practices. This is evidenced by the significant result of Capital

Adequacy Ratio. It indicates that capital adequacy ratio could be regarded as the influencing variable for bank performance. As the coefficient of capital adequacy ratio is positive and statistically significant, the study accept that Nepalese commercial banks with higher capital adequacy ratio can advance more loans and absorbs credit can record better performance.

Moreover, the negative coefficient of Non-performing loan ratio confirms the negative effect on bank performance. NPL ratio, in particular, indicates how banks manage their credit risk because it defines the proportion of loan losses amount in relation to total loan amount in relation to the total loan amount. All these evidences support that Nepalese commercial banks have poor credit risk management.

This study has found the significant relationship between bank performance and credit risk indicators. Hence, Nepalese commercial banks have poor credit risk management.

5.2 Conclusion

The analysis of bank profitability revealed that ADBL has the highest average ROA and NBL has the lowest average ROA among other five sample commercial banks in Nepal. Coefficient of variation (C.V.) of NIBL is lower than other five commercial banks. This means that profitability position is more consistent in NIBL. So, NIBL is better in profitability position in terms of low variation.

The study concluded that there is a positive relationship between average capital adequacy ratio (CAR), return on assets (ROA) and company size and profitability, and there is a negative relationship between non-performing loan (NPL) and earnings per share commercial banks. The study found that to support a bank's performance, the bank may need to lengthen client credit terms, prolong the cash transfer cycle, and require a longer payment period when making judgments on financial performance of commercial banks.

5.3 Implications

The study "Effects of credit performance on the profitability of Commercial Banks in Nepal" was based on the secondary data derived from respective banks (NBL, ADBL, NABIL, NIBL and SCB) annual report from FY 2011/12 to 2020/21. The secondary data collected includes the proxy of profitability (EPS) and proxies of credit risk i.e. non-performing loan ratio, capital adequacy ratio, credit deposit ration and return on

assets. From the study, it could be taken into consideration that there are effects of credit risk on the bank's performance.

Based on the analysis, interpretation and conclusions, some recommendations are made here. This study was undertaken with five commercial banks only. A further study should be undertaken to further explore the effects of credit risks by employing more samples and carrying out detail analysis of banks. The study could be more interesting to include more indicators to test the relationship. Meanwhile, it can help researchers to enhance the accuracy of the research model with the most suitable variables.
For banking industry's development, diversified types of banks have built to satisfy the demand of innovation of financial market. This study focus on commercial banks while credit risk also affects development banks performance. Not only credit risk, liquidity risk, market risk, operational risk can also be taken into consideration.

Banks need to place and devise strategies that will not only limit the bank's exposition to credit risk but will develop performance and competitiveness of the banks, and banks should establish a proper credit risk management strategies by conducting sound credit evaluation before granting loans to customers. Based on findings from the data analysis part, the study offers action implications that to improve credit risk management and to have an effective role in achieving profitability. Nepalese commercial bank should take into consideration, the indicators of credit risk i.e. non-performing loan ratio, credit deposit ratio and capital adequacy ratio that were found to have a statistically significant impact on bank performance.

5.4 Contributions

Upon the completion of this research study, the research gap of examining the relationship between credit performance and profitability of Nepalese commercial banks taking into account all the commercial banks of Nepal and introducing 2 new variables that are hypothesized to be affecting bank profitability is fulfilled. It is hoped that the findings presented are useful for academicians and the banking industry. Further, the findings and conclusions of this research also contribute as a source of valuable information to bank management, investors, stakeholders, regulatory bodies, financial analysts, economists or any other stakeholders that are making any relevant decisions.

5.5 Areas for further research

A suggestion for further research could be performing research on the relationship between financial profitability and financial performance of Nepalese banks focusing on other risk management such as liquidity risk, market risk, or operational risk. Another area of research could be the inclusion of development banks, finance companies, and cooperatives which are successfully operating in the Nepalese market.

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APPENDIX I

List of Banks and Financial Institutions

As of Mid Jul, 2022 (Licensed by NRB)

Class: "A" (Commercial Banks)

S.No	Name	Operation Date	Head Office
1	Nepal Bank Ltd.	11/15/1937	Dharmapath,Kathmandu
2	Agriculture Development Bank Ltd.	1/21/1968	Ramshahpath,Kathmandu
3	Nabil Bank Ltd.	7/12/1984	Beena Marg,Kathmandu
4	Nepal Investment Bank Ltd.	3/9/1986	Durbarmarg,Kathmandu
5	Standard Chartered Bank Nepal Ltd.	2/28/1987	Nayabaneshwor, Kathmandu
6	Himalayan Bank Ltd.	1/18/1993	Kamaladi, Kathmandu
7	Nepal SBI Bank Ltd.	7/7/1993	Kesharmahal, Kathmandu
8	Nepal Bangaladesh Bank Ltd.	6/6/1994	Kamaladi, Kathmandu
9	Everest Bank Ltd.	10/18/1994	Lazimpat , Kathmandu
10	Kumari Bank Ltd.	4/3/2001	Durbarmarg, Kathmandu
11	Laxmi Bank Ltd.	4/3/2002	Hattisar, Kathmandu
12	Citizens Bank International Ltd.	4/20/2007	Narayanhitipath, Kathmandu
13	Prime Commercial Bank Ltd.	9/24/2007	Kamalpokhari, Kathmandu
14	Sunrise Bank Ltd.	10/12/2007	Gairidhara, Kathmandu
15	Century Commercial Bank Ltd.	3/10/2011	Putalisadak , Kathmandu
16	Sanima Bank Ltd.	2/15/2012	Nagpokhari, Kathmandu
17	Machhapuchhre Bank Ltd.	7/9/2012	Lazimpat , Kathmandu
18	NIC Asia Bank Ltd.	6/30/2013	Thapathali, Kathmandu
19	Global IME Bank Ltd.	9/4/2019	Kamaladi, Kathmandu
20	NMB Bank Ltd.	9/28/2019	Babarmahal, Kathmandu
21	Prabhu Bank Ltd.	2/12/2016	Babarmahal, Kathmandu
22	Siddhartha Bank Ltd.	7/21/2016	Hattisar, Kathmandu
23	Bank of Kathmandu Ltd.	7/14/2016	Kamalpokhari,Kathmandu
24	Civil Bank Ltd.	10/17/2016	Kamaladi, Kathmandu
25	Nepal Credit and Commerce Bank Ltd.	1/1/2017	Bagbazar, Kathmandu
26	Rastriya Banijya Bank Ltd.	5/2/2018	Singhadurbar plaza,Kathmandu
27	Mega Bank Nepal Ltd.	5/13/2018	Kamaladi, Kathmandu

(Source: www.nrb.com.np)

Appendices II

1. Nepal Bank Limited

S.N	Year(AD)	EPS	(CDR)	(CAR)	(NPL)	ROA
1	2011/12	46.36	52.98	(5.82)	5.58	0.30
2	2012/13	198.53	60.10	(0.59)	5.24	1.07
3	2013/14	18.08	59.45	4.55	5.12	0.92
4	2014/15	7.48	68.45	7.49	3.98	0.55
5	2015/16	44.59	71.05	10.20	3.11	2.79
6	2016/17	38.77	79.17	14.47	3.32	2.78
7	2017/18	39.98	75.68	11.27	3.37	2.41
8	2018/19	26.99	78.14	16.80	2.64	1.51
9	2019/20	20.68	72.25	17.01	2.47	1.22
10	2020/21	23.44	82.76	16.80	2.05	1.33

(Source: www.nbl.com.np)

2. Agricultural Development Bank Limited

S.N	Year(AD)	EPS	CDR	CAR	NPL	ROA
1	2011/12	60.57	104.06	19.00	8.98	2.90
2	2012/13	71.54	100.81	16.34	5.85	2.97
3	2013/14	35.19	94.80	14.93	5.46	1.76
4	2014/15	78.83	93.77	17.16	5.35	3.12
5	2015/16	52.79	95.46	17.18	4.36	2.32
6	2016/17	31.59	92.90	20.41	4.60	2.15
7	2017/18	36.64	95.64	20.33	3.50	2.71
8	2018/19	42.88	93.62	20.37	3.29	2.77
9	2019/20	31.45	85.84	19.29	2.84	1.86
10	2020/21	29.13	92.93	16.94	1.88	1.59

(Source: www.adbl.com.np)

3. NABIL Bank Limited

S.N	Year(AD)	EPS	CDR	CAR	NPL	ROA
1	2011/12	83.23	77.91	11.01	2.33	2.80
2	2012/13	91.05	74.9	11.59	2.13	3.25
3	2013/14	76.12	74.55	11.18	2.23	2.65
4	2014/15	57.24	64.43	11.57	1.82	2.06
5	2015/16	59.27	70.49	11.73	1.14	2.32
6	2016/17	59.86	65.38	12.9	0.8	2.69
7	2017/18	51.84	82.66	13	0.55	2.61
8	2018/19	50.57	81.96	12.5	0.74	2.11
9	2019/20	36.16	79.72	13.07	0.98	1.58
10	2020/21	33.57	89.84	12.77	0.84	1.71

(Source: www.nabil.com.np)

4. Nepal Investment Bank Limited

S.N	Year(AD)	EPS	CDR	CAR	NPL	ROA
1	2011/12	27.6	71.8	11.1	3.32	1.6
2	2012/13	46.2	74.8	11.49	1.91	2.6
3	2013/14	40.7	71.9	11.27	1.77	2.3
4	2014/15	30.9	72.8	11.9	1.25	1.9
5	2015/16	29.3	76.8	14.92	0.68	2
6	2016/17	29.3	77.6	13.02	0.83	2.1
7	2017/18	35.7	74.7	12.66	1.36	2.13
8	2018/19	26.4	71.97	13.26	2.78	1.79
9	2019/20	17	72.93	13.54	2.91	1.19
10	2020/21	22	75.12	14.71	2.46	1.56

(Source: www.nibl.com.np)

5. Standard Charted Bank Limited

S.N	Year(AD)	EPS	CDR	CAR	NPL	ROA
1	2011/12	72.6	55.13	13.93	0.78	2.80
2	2012/13	65.7	58.63	12.54	0.77	2.67
3	2013/14	65.47	56.87	12.27	0.48	2.51
4	2014/15	57.38	48.92	13.1	0.34	1.99
5	2015/16	45.96	56.88	16.38	0.32	1.98
6	2016/17	35.49	62.2	21.08	0.19	1.84
7	2017/18	27.33	66.45	22.99	0.18	2.61
8	2018/19	30.39	70.11	19.69	0.15	2.61
9	2019/20	24.81	56.75	18.51	0.44	1.71
10	2020/21	16.32	71.27	17.17	0.96	1.22

(Source: www.scb.com.np)

Appendices II

1. Regression result of ROA

Regression Statistics	
Multiple R	0.4287
R Square	0.1838
Adjusted R Square	0.1305
Standard Error	0.6261
Observations	50

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	3	4.05969721	1.353232403	3.45220488	0.023983
Residual	46	18.0315748	0.391990756		
Total	49	22.091272			

	Coefficients	*Standard Error*	*t Stat*	*P-value*
Constant	1.205717391	0.33871061	3.559727277	0.00087547
CDR	0.002917696	0.00404714	0.720928553	0.47460161
NPL	-0.02212416	0.05901763	-0.37487378	0.70947718
CAR	0.052986243	0.01825017	2.903329071	0.00565355

2. Regression result of EPS

Regression Statistics	
Multiple R	0.428683196
R Square	0.183769283
Adjusted R Square	0.130536845
Standard Error	0.626091652
Observations	50

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	3	4.05969721	1.353232403	3.45220488	0.023983
Residual	46	18.0315748	0.391990756		
Total	49	22.091272			

	Coefficients	*Standard Error*	*t Stat*	*P-value*
Intercept	1.205717391	0.33871061	3.559727277	0.00087547
CDR	0.002917696	0.00404714	0.720928553	0.47460161
NPL	-0.02212416	0.05901763	-0.37487378	0.70947718
CAR	0.052986243	0.01825017	2.903329071	0.00565355

Independent variables: Non-Performing Loan, Capital Adequacy Ratio and Credit Deposit Ration.

Dependent variable: Earning per Share and Return on Assets

IMPACT OF CREDIT PERFORMANCE ON THE PROFITABILITY OF COMMERCIAL BANKS IN NEPAL

A Proposal of Dissertation Submitted to the Office of the Dean, Faculty of Management in partial fulfillment of the requirements for the Master's Degree

By:

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Exam Roll No.: 7103/18

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March, 2022

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1.1 Background of the study

Modern banking is an essential industry that operates within the periphery of national as well as the international financial system. Financial systems allow funds to be allocated, invested, or moved between economic sectors. The health of national as well as global economy largely depends on a highly regulated financial system. Bank as a vital section of such system. Rose (2002) mentioned that it is one of the most heavily regulated businesses in the world therefore, many authors use to argue that no institution has shaped the economic development of the world more than the bank.

A commercial bank is financial institution which performs the functions of accepting deposits from the general public and giving loan for investment with the aim of earning profit. They generally trade and commerce with short term loans.

Depending on the definition, the world's oldest bank is either Banca Monte Deipaschi di Siena or Berenberg bank. Banca Monte Deipaschi di Siena was founded in its present from in 1624 but traces its history to a mount of piety founded in 1472. The Berenberg Company was founded in 1590. And has operated continuously ever since with the same family as owners or co-owners. Berenberg bank is the world's oldest merchant bank or investment bank. The world's oldest central bank is the Sveriges Riks bank which was founded in 1668. The commercial bank was founded in 1924 by local businessmen in Oglethorpe country with the mission of serving the financial needs of the citizens and businesses of the area. Much has changed since 1924.

The primary function of commercial bank is the credit management. But management of credit is not an easy job. There are tremendous risks associated with credit. Such risk is very popular in the name of "credit risk" in the banking industry. Gieseche (2004) stated that credit risk is a situation of unexpected changes in the credit quality of counterparty in a financial agreement. It is a risk of financial loss if a borrower or counterparty fails to honor commitments under an agreement and any such failure has an adverse effect on the financial performance of the bank. A credit risk is the risk of default on a debt that may go up from a borrower refuse to make necessary payments. The risk is that of the bank and includes lost principal and interest, disruption to cash flows, and increased collection costs.

As mentioned in Investopedia.com, credit risk is the probable risk of loss resulting from a borrower's failure to repay a loan or meet contractual obligations. Traditionally, it refers to the risk that a lender may not receive the owed principal and interest, which

results in an interruption of cash flows and increased costs for collection. Although it is impossible to know exactly who will default on obligations, properly assessing and managing credit risk can lessen the severity of loss.

As mentioned in the publication of Basel Committee on Banking Supervision (2000), the goal of credit risk management is to maximize a bank's risk-adjusted rate of return by maintaining credit risk exposure within acceptable parameters. Banks need to manage the credit risk inherent in the entire portfolio as well as the risk in individual credits or transactions. Banks should also consider the relationships between there sustainability, credit risk, and other risks. According to Basel Committee on Banking Supervision (2000), "Granting credit involves accepting risks as well as producing profits. Banks should assess the risk/reward relationship in any credit as well as the overall profitability of the account relationship."

1.2 Statement of the problem

Various investigators have studied the impact of credit risk on banks return in changing dimensions with the sample from different country context. It is apparent that there are different measures of credit risk as well as banks return or profitability. Accordingly, the use of variables in the available works addressing credit risk and banks' profitability is also not consistent. As a result, there is a scant of unanimity in findings. Therefore, this study is oriented toward solving the problem by answering what the impact of credit risk exposure on the rate of return of sunrise bank limited, based on the contemporary data.

Some researcher found credit risk to impact positively on bank's performance, others found a negative relationship and other's highlighted other factors instead of credit risks which impact on bank performance. As concluded by Kithinji (2010), the bulk of the profits of commercial banks are not influenced by the credit risk suggesting that additional variables other than the credit risk related variables impact on profits. Commercial banks that are keen on making high profits should concentrate on other factors other than focusing more on credit risk. On the other hand, based on the data from 2012 to 2021 of the selected sample commercial banks of Nepal, Bhattarai (2016) concluded that there is a significant relationship between bank performance and credit risk indicators. These are some of the examples of contrasting results that are available in the academia. Furthermore, there is no evidence of study by taking contemporary

data of Nepalese commercial banks. Accordingly, such a situation is actually the main reason of motivation for this study and source of the identification of the problem.

The above-mention argument shows that there are some gaps in the literature. Hence, this study focuses to fill a gap, examining the impact of credit risk and their impact on the return of sunrise bank limited in Nepal. In this regard, following will be the specific research questions.

i. What is the position of credit risk exposure in the commercial banks operating in Nepal?
ii. What is the existing status of profitability among the commercial bank of Nepal?
iii. Does credit performance really matter to the commercial banks profitability?

1.3 Objectives of the study

The main objective of this study will be to investigate the impact of credit risk on the return of commercial bank limited in Nepal. Accordingly, the specific objectives will be as follows:

1. To assess the credit risk exposure of the commercial banks operating in Nepal.
2. To analyze the impact of the profitability of the commercial banks in Nepal.
3. To examine the credit performance & profitability of commercial banks in Nepal.

1.4 Hypothesis

Accordingly, this study will be oriented toward testing the hypothesis as mentioned below:

iv. The profitability of the banks depends upon the extent to which it grants loan and advances to customers. Higher the ratio of loan and advance, higher will be the bank's profitability. Based on it, this study develops the following hypothesis:

H1: Credit deposit ratio has a significant and positive effect on profitability of commercial banks.

v. Profitability of the bank depends on the performance of the loan that has been granted to the customers. Higher the ratio of non-performing loan lower will be the bank's profitability and vice-versa. Based on it, this study develops the following hypothesis:

H2: Non-performing loan ratio has a significant and negative effect on profitability of commercial banks.

vi. Minimum capital adequacy ratios are critical to ensure bank have enough cushion to absorb a reasonable amount of losses before they become insolvent and consequently lose depositors' funds. Therefore, higher the ratio of capital adequacy, higher will be the bank's profitability and vice-versa. Based on it, this study develops the following hypothesis:

H3: Capital adequacy ratio has a significant and positive effect on profitability of commercial banks.

1.5 Significance of the study

The significance of our research is the reason for conducting the study. The significance should answer the need for conducting the said research. It is very important part of our research as it justifies the significance and novelty of the study. Investigating the impact of credit risk management on the return of sunrise bank limi,,ted operating in Nepal is the main purpose of this study. It is expected that this study will make a good contribution to the existing literature in the academia. Accordingly, it will help to extend the current literature. In addition, this study is about the subject of financial matters and related with the applied field of the banking industry. Therefore, the significance of the study can be expressed by the following points.

1 Students are one of the important sections of the society. It is expected that this study report gives good insight to them, specifically to the students of business management and economics.

2 Investors are good actors in the field of overall economy. They are much concerned with the risk and return of organizations. Therefore, this study can provide reliable information to them

3 There is a greater role of professionals in the banking industry. This study is closely associated with the part of their professional activities. Hence, this report can be expected as one of the bases for their decision making.

1.6 Limitation of the study

This report is for the partial fulfillment of master degree of business studies. The efforts have been made to present and analyze the fact clearly and truly and within a specific boundary. But the reliability of tools, lack of research experience, time limit and lack of data are the primary limitation of this report.

1.7 Brief review of the literature

The idea of "literature" usually conjures up images of dusty books that you are required to read for English, American, or World literature classes. The "literature" in a literature review, however, refers to all the previous research and scholarship on a particular topic, no matter what discipline you are studying; the "review" is your explanation of what the literature says. A literature review is the synthesis of the available literature regarding your research topic. This synthesis merges the conclusions of many different sources to explain the overall understanding of the topic, thus laying a foundation for both the research question and primary research. Although a literature review will cite sources and should discuss the credibility of the sources included, it is more than an annotated bibliography. Literature review needs to review all the significant sources on a topic, regardless of whether or not they support the claims you will eventually be working toward.

A literature review functions as a tool to:

i. Provide a background to your work by summarizing the previously published work on topic.
ii. Classify the research into different categories and demonstrate how the research in a particular area has changed over time by indicating historical background if applicable (early research findings in an area) as well as explaining recent developments in an area.
iii. Clarify areas of controversy and agreement between experts in the area as well as identify dominant views
iv. Evaluate the previous research and identify gaps (i.e. unexplored or under-researched areas)
v. Help justify your research by indicating how it is different from other works in the same area.

1.7.1 Review of related studies

There are plenty of studies available about the effect of different variables on the financial performance of commercial banks.

Alshatti (2015), investigated the effect of credit risk indicators on banks' financial performance during the period of 2005 to 2013 using thirteen commercial banks of Jordan. The author used secondary sources to collect data through annual reports of sample banks and carried out panel regression analysis study. The credit risk

management indicators used in this study are capital adequacy ratio, credit interest/credit facilities, provision for facilities loss/net facilities, leverage ratio and level of non-performing loans. The bank financial performance indicators are ROA and ROE. The findings of this study show that there is a positive effect of nonperforming loans/gross loans on banks' financial performance and a negative effect of provision for facilities loan/net facilities ratio on banks' financial performance. However, he found that capital adequacy ratio and credit interest/credit facilities ratio have no effect on banks' financial performance. Further, the significant variables found in this study are non-performing loans/gross loans, provision for facilities loss/net facilities and the leverage ratio. The author recommends that the Jordanian banks design an effective credit risk management system, operate under a sound credit granting process, and to maintain an appropriate credit administration with monitoring, processing and control mechanism. Overall, the study recommends improving banks' credit risk management to attain higher profitability.

Ndoka and Islami (2016), studied the relationship between credit risk management and profitability of 16 commercial banks in Albania from 2005 to 2015 using a regression model. The independent variable used are non-performing loan ratio and capital adequacy ratio. Again, the dependent variables used are ROA and ROE. The overall findings of this study show that there exists a correlation between credit risk management of commercial banks in Albania and their profitability, meaning that an efficient credit risk management leads to higher profitability. Based on these findings, the authors recommend that commercial banks of Albania focus on managing credit risk especially on the control and monitor of non-performing loans.

Pradhan and Shrestha (2017)**,** examined the impact of capital adequacy and bank operating efficiency on the financial performance of Nepalese commercial banks using data from the period of 2011/12to 2020/21. The result showed that total deposits to total asset and banks operating efficiency are the major variables determinant of financial performance of commercial banks in Nepal. Similarly, bank operating efficiency, loan ratio, total deposit to total assets, loan loss provision to total equity has a significantly positive impact on financial performance of commercial banks. Loan loss provisions to total loan, core capital ratio, risk-weighted ratio, total capital ratio have negative impact on financial performance of Nepalese commercial banks.

In the study about the effect of capital adequacy and cost income ratio on the performance of Nepalese commercial banks by Pradhan and Parajuli (2017) found evidence for a positive relationship of bank size with ROA; by using total assets as a proxy for the size of the bank. It means, larger the banks, higher would be the ROA. Similarly, the study revealed that there is a positive relationship of debt-to-equity ratio with ROA. This means that higher the debt equity ratio, higher would be the ROA. On the other hand, the study observed that there is a negative relationship of capital adequacy, cost income ratio, equity capital to total assets ratio and liquidity ratio with ROA.

Elshaday et al. (2018), investigated the determinants of Ethiopian commercial banks' financial performance during the period of 2007-2016. They used the correlation and random effect model. The conclusion emphasized that capital adequacy has a significant positive impact on the Ethiopian commercial banks financial performance as measured by the return on assets. In addition, non-performing loans and operational cost efficiency have a significant negative effect on banks' return on asset.

This means that higher the capital adequacy lower would-be ROA. Similarly, the study observed that higher the equity capital to total assets, lower would be the ROA. The result also showed that there is a positive relationship of capital adequacy, equity capital to total assets, bank size and debt to equity ratio with ROE. This means that higher the capital adequacy, higher would ROE. The study also indicated that higher the equity capital to assets, higher would be return on equity. Similarly, the study observed that larger the bank, higher would be the ROE. These study results were based on the secondary data of 5 commercial banks with 50 observations for the period of 2011/12 to 2020/21.

Kofarmata and Danlami (2019), used a multinomial logit model to analyse credit rationing among farmers in the rural areas of Kano State of Nigeria. The assessment found the engagement of farmers in farming activities greatly influenced credit rationing and consequent effect of farm profit. Contrary to the commercial banking sector, the study was based on agricultural credit rationing, a gap to be filled.

Mulyungi and Mulyungi (2020), studied how client appraisal influences the performance of financial institutions. A descriptive research design was applied in this assessment based on Guaranty Trust Bank Rwanda and the findings showed client

appraisal and financial performance relate positively. It can be inferred from the results that client appraisal based on business finance and individuals as well as physical characteristics contained within the credit scoring models as well as credit reference bureau utilization and analysis of credit risk is crucial for establishing appropriately reliable clients to advance loans. The identification of the right strategies to ascertain the suitability of borrowers reduces the chances of loan defaults and overall loan performance.

Smarika Jain, Dr. Sangeetha R. (2021), as a result, the judgment is that management should focus more on non-performing assets under credit risk management since they have a negative impact. While the capital adequacy ratio has no substantial influence, it is recommended that they do not place too much emphasis on it. Rather, management should merely guarantee that the capital adequacy ratio maintains within 12-15 percent, over which the firms may risk financial underperformance.

Yeasin, H. (2022), Reveals that there is a significant negative relationship between non-performing loans, capital adequacy ratio, and financial performance of commercial banks in Bangladesh. However, the relationship between loans-to-deposit ratio and financial performance of commercial banks is revealed to be positive.

From the review of the related literature, it is observed that bank performance has been measured using return on assets, return on equity and net interest margin. Also, various measures of credit risk have been used by past studies. However, the predominant measures are the capital adequacy ratio and non-performing loans ratio. Bank size, management performance, and macroeconomic variables, such as gross domestic product and inflation have also been used to explain the performance of banks. More importantly, this study incorporates an important financial performance measure economic value-added which past studies have virtually ignored.

1.7.2 Research gap

The aforesaid review represents only a preliminary survey of the relevant issue. On the basis of review, it can be concluded that still there are some unsolved research issues on the proposed subject. The purpose of this study is to see what new contribution can be made and receive some ideas, knowledge, and suggestions in relation to the impact of credit risk exposure and management practices on the performance of commercial

banks. However, the previous studies cannot be ignored because they provide the foundation for the present study.

This study is continuity in research and is ensured by linking the present study with the past research studies. It is clear that there is a scant of study based on recent data. As many researchers emphasized the effects of credit risk in own country context or with other variables. Hence, there exists research gap. The research gap will be minimized by emphasizing the effects of credit risk exposure on the profitability of commercial banks in Nepal with the profitability variables, ROA and EPS we can find the credit performance.

1.8 Research methodology

Research methodology is a way to solve the research problem systematically and to fulfill the research objectives accordingly. This study plans the following methodological aspects.

1.8.1 Research design

A research design is the logical and systematic planning that specifies the procedures for collecting and analyzing data and information. To attain the specified purpose of this study, descriptive research design will be considered an appropriate one. On the other hand, causal comparative research method has also been followed. Because this study is intended to describe the phenomenon related to credit risk management and its effect on the return of commercial banks operating in Nepal. Accordingly, the overall study plan will be based on the quantitative approach of research.

1.8.2 Population and sampling procedure

This study is based on the data of commercial banks in Nepal. Therefore, a total number of commercial banks is obviously the size of the population. As per the recent publication of Nepal Rasta Bank (NRB), there are 27 commercial banks operating in Nepal. This figure is based on the data after merger and acquisition process of the bank and financial institutions (BFIs) as per Financial Institutions Merger and Acquisition Regulation -2073. Hence, the population of the study is considered as 27 commercial bank in Nepal.

1.8.3 Nature and sources of data collection

To fulfill the research objectives, most of the data will be collected from the secondary sources. The required data, as demanded by the study, will be collected through the

published annual reports of the sample banks. On the other hand, some supporting information has been collected from the website of Nepal Rasta Bank and other official websites. The negligible information has been acquired from the primary sources.

The data will be sourced from the annual reports of the banks in the sample. The data included time series and cross-sectional data, i.e. pooled data set and estimated the effect of credit risk on the return of commercial bank using pooled data regression. The 10 years data of sample bank will be considered as the sample years to analyze the data.

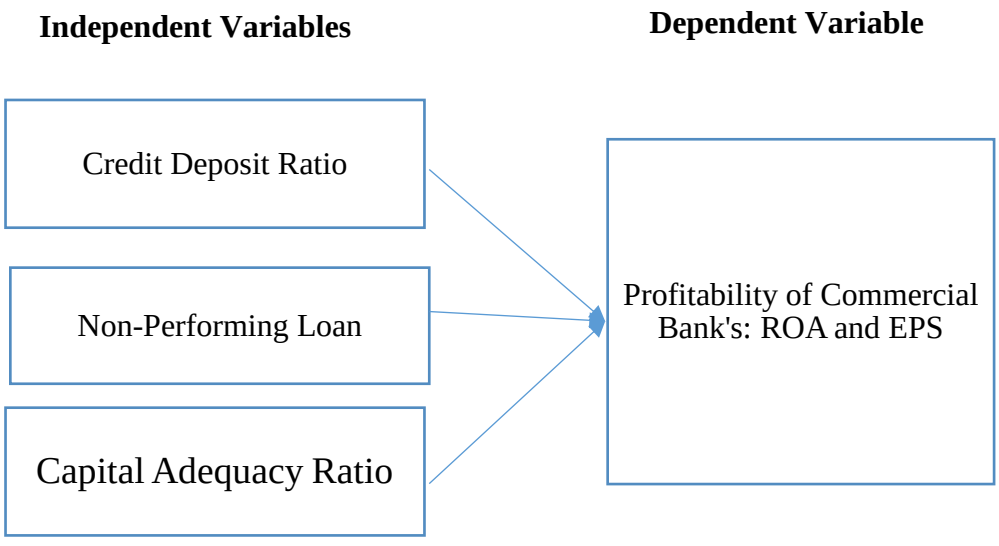
1.8.4 Research framework

The sampling method is the way the sample units are selected. So, far the sampling method applied in this study is concerned; it has followed the non-probability sampling method. Accordingly, purposive sampling design has been used for the study. Specifically, the study will follow the judgmental sample technique.

Based on the aforesaid models and variables, this study will be based on the following schematic diagrams:

Figure-1

Schematic diagram of the theoretical framework



The schematic diagram as presented in Figure-1 is based on the preliminary survey of literature on the subject.

A list of five commercial banks joint operation data after merger according to the paid up capital based on the financial statement of mid-July, 2022

Table-1

List of Selected Banks

As of Mid Jul, 2022 (Licensed by NRB)

S.N	Name	Operating Date	Head Office	Paid Up Capital (Rs. In Arab)
1	NBL	11/15/1937	Dharmapath, Kathmandu	12.64
2	ADBL	1/21/1968	Ramshahpath, Kathmandu	18.62
3	NABIL	7/12/1984	Beena Marga,Kathmandu	18.49
4	NIBL	3/9/1986	Durbarmarga, Kathmandu	18.3
5	SCBL	2/28/1987	New Baneshwo Kathmandu	9.42

(Source: www.nrb.org.np)

1.8.4 Variable and definition

Dependent Variables the important aspect of the study is to analyze an impact of credit risk on the return or profitability. Therefore, dependent variables are the proxies of profitability. Among the different aspects of profitability, as proxies of profitability, Earning per share and Return on asset will be considered as well as they can be measure by tools such as financial & Statistical tools.

C. Financial tools:

Financial tools are different ways to evaluate and interpret a company's financial statements for various purposes like planning, investment, and performance. Some of the most used financial tools based on their usage and requirements are common size statements (vertical analysis), comparative financial statements (comparison of financial statements), ratio analysis (quantitative analysis), cash flow analysis, and trend analysis.

i. **Earnings per share (EPS)**: Earning per share (EPS) is the portion of a company`s profit that is allocated to each outstanding share of common stock, serving as an indicator of the company`s financial health. In other words, earning per share is the portion of company`s net income that would be earned per share if all the profits

were paid out to its shareholders. The financial model of the bank's EPS can be expressed as:

$$EPS = \frac{Net\ income - Dividend\ on\ preferrd\ stock}{Average\ outstandig\ common\ shares}$$

ii. **Return on assets (ROA)**: Return on assets (ROA) is an indicator of how profitable a company is relative to its total assets. ROA gives a manager, investor, or analyst an idea as to how efficient a company's management is at using its assets to generate earnings. Thus, ROA is primarily an indicator of managerial efficiency. The financial model of the bank's NPM can be expressed as under:

$$ROA = \frac{After\ tax\ net\ income}{Total\ assets}$$

iii. **Credit deposit ratio (CDR)**: It is also known as the loan-to-deposit ratio. It is used to assess a bank's credit risk as well as liquidity by comparing a bank's total loans to its total deposits for the same period. The financial model of the bank's NPM can be expressed as under:

$$CDR = \frac{Total\ loan\ and\ advances}{Total\ Deposits}$$

iv. **Non-performing loan (NPL)**: A nonperforming loan (NPL) is a sum of borrowed money upon which the debtor has not made the scheduled payments for a period of time of usually at least 90 days for commercial banking loans and 180 days for consumer loans. Nonpayment means there has been zero interest or principal payments made on the loan within a specified period of time (90 to 180 days depending on industry and loan type). Any definition of a nonperforming loan will depend on the loan's particular terms and agreement. The financial model of the bank's NPM can be expressed as under:

$$NPL = \frac{Non\ performing\ Loan}{Total\ Loan}$$

v. **Capital adequacy ratio (CAR)**: Capital adequacy ratios are a measure of the amount of a bank's capital expressed as a percentage of its risk weighted credit exposures. In other words, it is the **ratio** of a bank's capital in relation to its risk weighted assets and current liabilities. The financial model of the bank's CAR can be expressed as under:

$$CAR = \frac{Tire\ 1\ capital + Tire\ 2\ capital}{Risk\ weighted\ assets}$$

D. Statistical tools

Statistical methods involved in carrying out a study include planning, designing, collecting data, analyzing, drawing meaningful interpretation and reporting of the research findings. The statistical analysis gives meaning to the meaningless numbers, thereby breathing life into a lifeless data. The results and inferences are precise only if proper statistical tests are used. This dissertation will try to acquaint the reader with the basic research tools that are utilized while conducting various studies. The dissertation covers a brief outline of the variables, an understanding of quantitative and qualitative variables and the measures of central tendency. An idea of the sample size estimation, power analysis and the statistical errors is given. Minimum capital adequacy ratios are critical to ensure bank have enough cushion to absorb a reasonable amount of losses before they become insolvent and consequently lose depositors' funds. Therefore, higher the ratio of capital adequacy, higher will be the bank's profitability and vice-versa.

6.5 Methods of data analysis

The study is quantitative in nature and analysis all the way through will be based on the historical data. Therefore, tools of the study are selected accordingly as demanded by the purpose of the study and data nature. For the analysis of data different financial ratios will be analyzed means of descriptive statistic (arithmetic mean, standard deviation coefficient of variation) as well as inferential statistics (correlation coefficients between to variables).

Models

Basically, the variables under study are profitability and the Credit Performance (CP). As a proxy of profitability, Return on Assets (ROA) and Earning per Share (EPS) will be considered. These are considered as dependent variables. On the other hand, as independent variables, Credit Deposit Ratio (CDR), Non-Performing Loan (NPL), and Capital Adequacy Ratio (CAR) are considered. These are the variables representing the credit performance. The study is oriented toward analyzing the effect of these independent variables on the profitability. Therefore, the basic relationship functions are expressed as follows:

EPS = F(CP)

ROA = F(CP)

The regression equation to be estimated has therefore been specified as,

$Y = \beta 0 + \beta\ Xit + \varepsilon it$

Where Y is the dependent variable; β0 is constant; β is the coefficient of explanatory variables; Xit is the vector of explanatory variables, and εit is the error term. Adapting this basic model, following models are estimated.

$EPS\ it = \beta 0 + \beta 1CDRit + \beta 2NPLit + \beta 3CARit + \varepsilon it$

$ROA\ it = \beta 0 + \beta 1CDRit + \beta 2NPLit + \beta 3CARit + \varepsilon it$

Where,

EPS it represents earning per share of bank i in year t;

ROA it represents Return on assets of bank i in year t;

CDR it represents credit deposit ratio of bank i in year t;

NPL it represents non-performing loan of bank i in year t;

CAR it represents capital adequacy ratio of bank i in year t;

β0 is the Intercept (constant); β1, β2, and β3 represent the corresponding slope which addresses the impact coefficients.

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