

CREDIT RISK ANALYSIS OF NEPALESE COMMERCIAL BANKS

(With reference to Kumari Bank Limited and Global IME Bank Limited)

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

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CERTIFICATION OF AUTHORITY

I hereby corroborate that I have researched and submitted the final draft of dissertation entitled “**CREDIT RISK ANALYSIS OF NEPALESE COMMERCIAL BANKS(With reference to Kumari Bank Limited and Global IME Bank Limited)**”. The work of this dissertation has not been submitted previously for the purpose of conferral of any degrees nor has it been proposed and presented as part of requirements for any other academic purpose.

The assistance and cooperation that I have received during this research work has been acknowledged. In addition, I declare that all information sources and literature used are cited in the reference section of the dissertation.

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(With reference to Kumari Bank Limited and Global IME Bank Limited)

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ABBREVIATIONS

BFI	:	Bank and Financial Institutions
CAR	:	Capital Adequacy Ratio
CRR	:	Cash Reserve Ratio
DEA	:	Data Envelopment Analysis
FX	:	Foreign Exchange
GCC	:	Gulf Cooperation Council
IR	:	Interest Rate
NRB	:	Nepal Rastra Bank
NPL	:	Non-performing Loan
ROA	:	Return on Assets
ROE	:	Return on Equity
TA	:	Total Assets
TL	:	Total Liability

ABSTRACT

Banks are the backbone of the country's economic development. They are providing a foundation to develop country through economic ways. Now twenty eight commercial banks (during study period) are in operation in all over the country and two banks viz Kumari Bank Ltd and Global IME Bank Ltd have been considered for the purpose of research. The data, which were used in this dissertation, are secondary nature. They were obtained from concerned banks annual report, literature, publication, balance sheet, profit and loss account, previous thesis report, different web site, related books and booklets, journal and articles and NEPSE. For the analysis and interpretation of data, various related financial and statistical tools, which are used in this study are correlation, regression and profitability ratio. Similarly, statistical tools, which are used in this study are, mean, coefficient of correlation etc.

To fulfill the objective of the study all secondary data are compiled, processed and tabulated in the second last chapter. To make the analysis easier and understandable bar diagram are also used. This study also bounded by many limitations, such as secondary data, unreliability of time and resources are the constraints of the study.

In this study the focus is given to the quantitative data and qualitative factors are not studied. Therefore the study may not be generalized in all cases and accuracy depends upon the data collected and provided by the concerned organization.

CHAPTER I

INTRODUCTION

1.1 Background of the Study

Investment is the sacrifice of certain present value of uncertain future rewards. People invest their saving in different types of assets. Assets are classified in two different categories, which are Real Assets and Financial Assets. Investment in real assets refers to the investment of fund in real goods such as land and building, vehicles and computer etc. Investment in financial securities means putting the money in the piece of paper such as shares, debentures, bonds and treasury bills etc. The term 'Portfolio' simply means collection of investment. For an investor through the stock exchange the portfolio will be collection of shareholding in different companies. For a property investor portfolio will be collection of buildings. To a financial manager within an industrial company portfolio will be a collection of real capital projects. It will be apparent that the actual nature of components of a portfolio depends on the population of opportunities from which the selection has been made.” (Alexander & Sharp, 2003)

Portfolio investment refers to an investment that combines several assets. It is a collection of securities. The portfolio theory is concerned with the selection of optimal portfolio that provides risk for any specified rate of return. Portfolio theory has been developed for financial assets. Thus, making investment form selected optimal portfolio i.e. the portfolio that provides the highest rate of return with least possible amount of risk is the real investment portfolio.

Portfolio management is concerned with efficient management of portfolio investment in financial assets, including shares and debentures of companies. The management may be by professionals, by others or by individuals themselves. A portfolio is a combination of investment assets. The portfolio is the holding of securities and investment in financial assets i.e. bond, stock. Individual securities have risk-return characteristics of their own. Portfolios may or may not take on the aggregate characteristics of their individual part. Portfolio analysis thus takes the ingredients of effects of combining securities and considers the blending or

interactive effects of combining securities. Portfolio management is the art of handling a pool of funds so that it not only preserves its original worth but also over time appreciates in value and yields and adequate returns consistent with the level of risk assumed. In finance, a portfolio is a collection of investment held by an institution or a private individual. In building up an investment portfolio a financial institution will conduct its own investment analysis whilst a private individual may make use of the service of a merchant bank which offers portfolio management. Holding a portfolio is a part of an investment and risk limiting strategy called diversification.

In short, portfolio management is the process of selecting a bundle of securities or the selection of the investment sectors (real sector also) that provide the investing organization a maximum yield for a given level of risk. Portfolio management can be also taken as risk and return management. It aims to determine an appropriate asset mix which attains an optimal level of risk and return. Risk and return arise simultaneously out of any financial assets on which investors invest their funds. To maximize return without considering risk is almost impossible. Risk and return are needed not only at the time of initial investment but also for the whole investment processes where major decisions should be made.

Financial markets facilitate the flow of funds from surplus to deficit units. Those financial markets that facilitate the flow of short-term funds, that is, less than one year are known as money markets. While those that facilitate the flow of long-term funds are known as capital markets. There are two types of securities. Securities having a life less than one year are called money market securities and securities having long life, generally of more than one year are called capital market securities.

Risk is the likelihood of losses resulting from events such as change in market price and other variables. Risk refers to the chance of loss or the chance of an alternative outcome from an investment. It is the chance of a loss due to uncertainty. Risk is the fact of the life, which are products of uncertainty and magnitudes depend upon the degree of variability in certain cash flows. Risk is an indication of the change of investment value. Our normal life and business are always concerned with uncertain risk of loss. It is also the variability between the

actual return and expected. Greater the variability higher the risk and lower the variability of a set of observation. The sigma square (δ^2) measure the total risk.

Return is income received from an investment, which is mainly two types one, is cash flow (revenue) receipts and other is income earned by appreciation of investment. These aforesaid terms should be quantified and examined thoroughly to help investors achieve their investment goal. Risk and return, portfolio selection, portfolio performance evaluation, efficient and frontier set, capital assets pricing model etc. are the most important dimensions of investment and without these aspects we cannot assume investment (Fisher & Jordan, 2000).

Most of Nepalese investors invest in single security. Though, some of the investors invest in two or more security, it is found that they don't make any analysis of portfolio before creation of such securities to invest. They invest their funds in different securities on the basis of expectation and assumptions of individual security rather than on the basis of effect of portfolio. So, it is necessary to make them well acquainted with these tools along with their practical implications on investment decision and evaluation.

Generally, investors are risk-averse meaning that given the choice they choose less risky assets for the same level of return. Investor always seeks higher return for more risk as risk premium. So, primary problem in investment is to identify the security which has low and high return. Risk can be reduced by the creation of the portfolio. Right portfolio can diversification and eliminate the unsystematic risk, which is associated with change, in return on the market as a whole cannot be avoided. These risk and return, are obviously an important concept in investment and should be addressed. Commercial banking sectors have been fast growing situation at the current time. For investment in this sector should be analyzed carefully in terms of risk, return and portfolio creation. Reported profits, dividend is not enough base for rational investment and it is suggested not to quit from this sectors, risk and return should be performed between the firms of this industry to combine securities and to form portfolio. Securities of losing company may prove to be useful to construct portfolio combining with the stock of profit making company (Bajracharya & Bhattarai, 2005).

1.1.1 Profile of Sample Banks

Global IME Bank Ltd. (GIBL)

Global IME Bank Ltd. (GIBL) emerged after successful merger of Global Bank Ltd (an “A” class commercial bank), IME Financial Institution (a “C” class finance company) and Lord Buddha Finance Ltd. (a “C” class finance company) in year 2012. Two more “B” class development banks (Social Development Bank and Gulmi Bikas Bank) merged with Global IME Bank Ltd in year 2013. Later, in the year 2014, Global IME Bank made another merger with Commerz and Trust Bank Nepal Ltd. (an “A” class commercial bank). During 2015-16, Global IME Bank Limited acquired Pacific Development Bank Limited (a "B" Class Development Bank) and Reliable Development Bank Limited (a "B" Class Development Bank). During 2019-20, Global IME Bank Limited acquired Hathway Finance Limited (a “C” class finance company) and merged with Janata Bank Nepal Limited (an “A” class commercial bank).

Global Bank Limited (GBL) was established in 2007 as an ‘A’ class commercial bank in Nepal which provided entire commercial banking services. The bank was established with the largest capital base at the time with paid up capital of NPR 1.0 billion. The paid up capital of the bank has since been increased to NPR 23.79 billion. The bank's shares are publicly traded as an 'A' category company in the Nepal Stock Exchange.

It is in line with the aim of the bank to be “The Bank for All” by giving necessary impetus to the economy through world class banking service.

For the day to day operations, the bank has been using the world renowned FINACLE software that provides real time access to customer database across all branches and corporate locations of the bank. This state of the art customer database has also been linked to a Management Information System that provides easy reach to all possible database information for balanced and informed decision making. A disaster recovery system (DRS) of the Bank has also been established in the Western Region of Nepal (200 kms west of Kathmandu).

The bank has been able to achieve excellent diversification of its assets. A well balanced distribution of exposure in areas of national interest has been possible through long term

forecasting and timely strategic planning. The bank has diversified interests in hydro power, manufacturing, textiles, services industry, aviation, exports, trading and microfinance projects, just to mention a few.

Kumari Bank Limited,

Kumari Bank Limited, came into existence as the fifteenth commercial bank of Nepal, starting its banking operations from Chaitra 21, 2057 B.S (April 03, 2001) with an objective of providing competitive modern banking services in the Nepalese financial market. The Bank has paid up capital of NPR 13.87 billion.

Kumari Bank Limited provides a wide-range of modern banking services through 246 points of representation located in various urban, semi-urban and rural parts of the country, with 196 branches, 14 extension counters and 38 Branchless Banking Units.

The Bank has pioneered in providing modern banking services like Internet Banking and Mobile Banking. With the implementation of Core Banking Software, FINACLE (version 10), the Bank is confident that it will provide a robust, ultra-modern banking platform for all customers throughout the country.

The Bank has been offering both Domestic and International Visa Debit and Credit Card, accessible in all VISA linked ATMs in Nepal and India. It serves through 177 ATMs and - POS terminals across the country. Along with this, the Bank offers latest digital banking services such as Mobile, Internet, and Viber Banking and QR payments. The Bank is recognized as an innovative and fast-growing institution that always strives towards customer satisfaction. It has transparent business practices, professional management, corporate governance, and Total Quality Management as the organizational mission.

The Bank acquired Kasthamandap Development Bank Ltd., Paschimanchal Finance Co. Ltd., Mahakali Bikash Bank Ltd. and Kankrebihar Bikash Bank Ltd. on Asadh 2074; with an objective to fulfill the directive forwarded by Nepal Rastra Bank to attain the paid-up capital of NPR 8 billion. Further to that, the Bank acquired Deva Bikas Bank Limited and joint operation was started from Asadh 28, 2077. Post this acquisition, the Bank's branch-network reached 203 branches, 138 ATMs, Bank's loan investment to NPR 112 billion and deposit-base to NPR 124 billion.

The Bank focuses on meeting dynamic needs of its customers via modern technology-driven banking products/services, thereby solidifying its reputation as an organisation committed towards enhancing stakeholders' experience.

1.2 Statement of the Problem

In comparison to the development and growth of capital market the investors attitude and knowledge does not seem to have changed significantly. They do not have sufficient knowledge about risk and return. There are no separate institutions to provide required information to make rational decision and on the other hand lacks of proper policy discourage the investors. Government policy is less encouraging proper investment situations. Some plans and policies are not implemented. There are no strong commitment towards increasing public investment in policy makers and government. Investors are the bases for any company they are the sources of revenue as a customer for the stockbrokers and financial institutions and ultimately they are the backbone of economic development of the nation. However, any above body has no any effective program to develop investor's knowledge. People feel more risk in stock investment than its real risk that may due to lack of proper knowledge about the stocks he/she is trading in due to the false presentation of stock prices in the secondary market. To build their confidence unbiased analysis and information about it is necessary. Unavailability of a simple and clear way or technique to analyze risk and return of individual stock and portfolio is therefore being a major weakness to increase stock investment and stock market efficiency as well (Bhalla, 2001).

In context of Nepal, investors are facing the problem of institutions to provide adequate information about the investment options. Investor should not get enough informational related to risk return as well as portfolio analysis of investing sectors. After the emergence of NEPSE in 1993 A.D. these type of problem somehow solved but the problem to another the Nepalese people is they feel more risk in stock investment than as its real risk. It keeps them in dilemma, whether they should invest in stock not and this all conditions makes them to not utilize their funds as a result investors have no much more alternatives for investment. So, everyone is making investment on security market. Only few companies are listed in NEPSE, which still limits the opportunities of investment. This trend has made the market unbalanced and unfair. If any bank or financial institution issues share their becomes huge

demand rather than supply but if any manufacturing and processing issues shares very little investors make investment (Bhatarai, 2008).

Therefore, portfolio analysis between various types of investment made by listed company is important issues, which helps to minimize risk by diversifying total risk to different sectors. But portfolio management activities of Nepalese listed companies as well as financial institutions to invest their funds in a good sector, which affects the investment portfolios. Nowadays financial institutions have to face competition with other financial institutions to grab the investment opportunity. Based on the above discussion on the research problems, this study will deal with the following issues.

- Whether the sample banks are able to maintain their investment portfolio or not?
- Whether the sample banks are able to maintain their return properly or not?
- What is the relation of common stock price of sample banks with the banking industry index?
- Whether the sample banks are able to maintain their risk and return indicator or not?

1.3 Objectives of the Study

The major objective of this study is to identify the present situation of investment portfolio of sample commercial banks (KBL and GBIL) of Nepal. The specific objectives of the study are as follows.

- To examine the investment portfolio of sample selected Banks.
- To examine the risk and return on investment of sample selected Banks.
- To examine the common stock's price of sample selected banks under CAPM method.
- To assess the financial situation as well as financial performance of sample selected banks.

1.4 Rationale of the Study

This study will be helpful to investors regarding the risk return statistics association with investment. Analysis of comparative study among various companies will be benefited for them to know about the position of financial performance. Risk return analysis and portfolio theory will create awareness to utilize their scarce resources with optimization. The customers financing agencies and stock traders are interested in the performance of the company and they can identify as to which bank they should invest. This study will be

helpful to know an idea about the optimum portfolio creation for Nepalese investors and financial institution.

In Nepalese context, there will lacks wider invest opportunities, which provides good rate of return. That's result huge amount of unutilized saving funds with public. Nowadays, the capital market is also growing very slowly, the market is not efficient. There are very few magazines and articles related to capital market and very few studies are made on the topics risk and return. However, in Nepalese investors one is investing on the capital market without any good knowledge and information. Therefore, investment on the capital market is just like 'shooting in dark'. The study will give more information about the condition of companies and it will help to contribute to increase the analytical power of the investors in capital market. This study also helps to financial institutions definitely contribute and play vital role for domestic resource mobilization, economic development and maintain economic confidence of various segments and extends credit to people.

1.5 Limitations of the Study

This study is conducted for the partial fulfillment of degree of M.B.S. So there may find many deficiencies due to various limitations. Some of the limitations are as follows.

- This study is based on secondary data taken from annual report of sample banks, the calculation and conclusion of the study will fully depend on the accuracy and reliability of data collected from various sources and concerns organization.
- Among the 27 commercial banks, only three commercial banks (KBL and GBIL) are taken as sample for this study.
- The whole study is based on data of six years period i.e. the fiscal year from 2015/16 to 2019/20 A.D.
- Those factors, which are related with investment portfolio analysis, are only considered in this study.
- Only limited financial and statistical tools are used for analysis.

CHAPTER II

REVIEW OF LITERATURES

Credit risk plays an important role on banks' profitability since a large chunk of banks' revenue accrues from loans from which interest is derived. However, credit risk may be a serious threat to the performance of banks. Therefore various researchers have examined the impact of credit risk on banks in varying dimensions.

2.1 Conceptual Review

2.1.1 Concept about credit risk theories

Credit Management

The word investment sounds very good and attractive that is why every individual in the world is interested in it. There is always a return if there is investment. This may be favorable as well as unfavorable to the investor's stand point. Investment brings forth vision of profit, risk, speculation and wealth. For the uninformed, investing may result in disaster. In general sense; investment means to pay out money to get more. But in the broadest sense, investment means the sacrifice of current money for future money. Two different attributes are generally involved time and risk. The sacrifice takes place in the present and is certain. The reward comes later, if at all, and the magnitude is generally uncertain (Gitman & Joehnk, 1990).

Investment is any vehicle into which funds can be placed with the expectation that will preserve or increase in value and generated positive returns (Reilly & Frank 1997).

Investment is the current commitment of funds for a period of time to derive a future flow of funds that will compensate the investing unit for the time funds are committed, for the expected rate of inflation and also for uncertainty involved in the future flow of the funds (Sharpe, Alexander & Bailey 2000).

Concept of Credit Risk

Credit risk plays an important role on banks' profitability since a large chunk of banks' revenue accrues from loans from which interest is derived. However, credit risk may be a serious threat to the performance of banks. Therefore various researchers have examined the impact of credit risk on banks in varying dimensions. The major studies related to the issue of credit risk and bank performance have reviewed as follows: Ahmed, Takeda and Shawn

(1998) have found that loan loss provision has a significant positive influence on non-performing loans. Therefore, an increase in loan loss provision indicates an increase in credit risk and deterioration in the quality of loans consequently affecting bank performance adversely.

Kargi (2011) argues that credit risk management maximizes banks' risk adjusted rate of return by maintaining credit risk exposure within acceptable limit in order to provide framework for understanding the impact of credit risk management on banks' profitability. Furthermore, bank's profitability is inversely influenced by the level of loans and advances, non-performing loans and deposits thereby exposing them to great risk of illiquidity and distress. Golden and Walker (1993) explained that contingencies are important for bankers in order to reduce incidence of bad loans. Bankers are supposed to look at everything that can happen thereafter deciding the likelihood of having bad loans, since the major concern of a lender is to get back both the principal and the interest. Banks manage problem loans through loan workouts. Loan workouts can take a number of forms: simple renewal or extension of the loan terms; extension of additional credit; formal restructuring of the loan terms with or without concessions; or, in some cases, foreclosure on underlying collateral. Banks should choose the alternative that will optimize the recovery and minimize the risk of troubled loans. Thus, credit risk is assessed through analyzing the financial performance of commercial banks in an attempt to mitigate impacts arising from credit defaults. The financial health of the commercial banks depends on the possession of good credit risk management dynamics. Commercial banks may have a keen awareness of the need to identify, measure, monitor and control credit risk as well as to determine that they hold adequate capital against these risks and that they are adequately compensated for risks incurred (Bhattarai, 2016).

Recently, many studies have focused on examining the effect of credit risk on bank profitability and found contradictory results in global context. Hosna et al. (2009) found a positive relationship between credit risk and profitability on commercial banks in Sweden. Similarly, Afriyie and Akotey (2012), Boahene et al. (2012) confirmed a significant positive impact of non-performing loan on profitability of commercial banks in Ghana. In contrast, Kolapo et al. (2012) found a negative relationship between credit risk and the bank profitability in Nigerian commercial banks. In the same way, Kishori and Sheeba (2017) showed a significant, negative impact of credit risk on profitability of commercial banks in

India. Kaaya and Pastory (2013) examined the negative impact of credit risk on profitability in Tanzanian commercial banks. Whereas, Kithinji (2010) confirmed that the bulk of the profits of commercial banks are not influenced by the amount of credit and nonperforming loans whereas, other variables other than credit and non-performing loans impact on profits.

Although, credit risk is the most influencing factor on bank profitability, empirical evidences have confirmed that there are so many other factors that affect banks' profitability. Haslem (1968) identified that bank management, time, location, and size influence on banks' profitability. Berger (1995) found a strong positive relationship between capitaladequacy ratio and profitability of US banks. However, the study further considered the relationship should be negative under certain situations. Collins and Preston (1969) showed a positive association between firm size and profitability and it stems from implementing greater differentiation and specialization strategies and should therefore lead to higher efficiency. Contrarily, Redmond and Bohnsack (2007) examined the negative significant relationship between profitability and the volume of assets. In the same way, Kosimodou et al. (2005) concluded that, small banks showed higher performance in comparison to large ones. Regarding the liquidity, Khan and Ali (2016) examined a significant positive relationship of liquidity with profitability of the commercial banks. On the other hand, Abdullah and Jahan (2014) revealed that there is no significant relationship between liquidity and profitability.

Antwi and Apau (2015) confirmed that gross domestic product (GDP) and annual rate of inflation are significant drivers of profitability in Ghana. Raza et al. (2013) revealed a negative relationship between interest spread and bank profitability in Pakistani commercial banks. However, Musah et al. (2018) confirmed that there is a positive and statistically significant association between interest rate spread and bank profitability. Therefore, it is very important to identify how far the credit risk and other bank specific determinants affect profitability of the commercial banks in Nepal. This paper aims to examine the impact of credit risk, bank specific variables and macroeconomic variables on profitability in the Nepali commercial banks. The overall study is based on 195 observations from the sample of 15 commercial banks operated in Nepal for 13 years from 2002/03 to 2014/15. One way fixed effect model of panel data analysis is used as a major tool of analysis to identify the impact of credit risk on the profitability of commercial banks in Nepal. Return on Equity (ROE) has been regressed individually and jointly with the different explanatory variables. The study reveals that credit

risk (the ratio between non-performing loan to total loan) has the significant negative impact on profitability of commercial banks in Nepal. Moreover, solvency ratio, interest spread rate and inflation have the insignificant negative impact on profitability. On the other hand, capital adequacy ratio, total assets, and GDP growth have the significant positive impact on profitability. The remaining sections of the study are; section two summarizes the findings of major studies relating to profitability in commercial banks. Section three describes the overall research methodology used in the study. Similarly, section four deals with the results derived from the analysis. Finally, section five presents conclusions of the study.

2.2 Review of Related Studies

Ahmed, Takeda and Shawn (1998) have found that loan loss provision has a significant positive influence on non-performing loans. Therefore, an increase in loan loss provision indicates an increase in credit risk and deterioration in the quality of loans consequently affecting bank performance adversely.

Mekasha (2001) has investigated credit risk management and its impact performance on Ethiopian Commercial Banks. The researcher used 10 years panel data from the selected commercial banks for the study to examine the relationship between ROA and loan provision, non-performing loans and total assets. The study revealed that there is a significant relationship between bank performance and credit risk management.

Ahmad and Ariff (2007) have examined the key determinants of credit risk of commercial banks on emerging economy banking systems compared with the developed economies. The authors found that regulation is important for banking systems that offer multi-products and services; management quality is critical in the cases of loan-dominant banks in emerging economies. An increase in loan loss provision is also considered to be a significant determinant of potential credit risk. The authors further asserted that credit risk in emerging economy banks is higher than that in developed economies.

Ben-Naceur and Omran (2008) in an attempt to examine the influence of bank regulations, concentration, financial and institutional development on commercial banks' margin and profitability in Middle East and North Africa (MENA) countries from 1989-2005 have found that bank capitalization and credit risk have positive and significant impact on banks net interest margin, cost efficiency and profitability.

Felix and Claudine (2008) have investigated the relationship between bank performance and credit risk management. It could be inferred from their findings that return on equity (ROE) and return on assets (ROA) both measuring profitability were inversely related to the ratio of non-performing loan to total loan of financial institutions thereby leading to a decline in profitability.

Kithinji (2010) has assessed the effect of credit risk management on the profitability of commercial banks in Kenya. Data on the amount of credit, level of non-performing loans and profits were collected for the period 2004 to 2008. The findings revealed that the bulk of the profits of commercial banks are not influenced by the amount of credit and non-performing loans, therefore suggesting that other variables other than credit and non-performing loans impact on profits.

Al-Khouri (2011) has examined the impact of bank's specific risk characteristics, and the overall banking environment on the performance of 43 commercial banks operating in 6 of the Gulf Cooperation Council (GCC) countries over the period 1998-2008. Using fixed effect regression analysis, results showed that credit risk, liquidity risk and capital risk are the major factors that affect bank performance when profitability is measured by return on assets while the only risk that affects profitability when measured by return on equity is liquidity risk.

Kargi (2011) has evaluated the impact of credit risk on the profitability of Nigerian banks. Financial ratios as measures of bank performance and credit risk were collected from the annual reports and accounts of sampled banks from 2004-2008 and analyzed using descriptive, correlation and regression techniques. The findings revealed that credit risk management has a significant impact on the profitability of Nigerian banks. It concluded that banks' profitability is inversely influenced by the levels of loans and advances, non-performing loans and deposits thereby exposing them to great risk of illiquidity and distress.

Chen and Pan (2012) have examined the credit risk efficiency of 34 Taiwanese commercial banks over the period 2005-2008. Their study used financial ratio to assess the credit risk and was analyzed using Data Envelopment Analysis (DEA). The credit risk parameters were credit risk technical efficiency (CR-TE), credit risk allocative efficiency (CR-AE), and credit risk cost efficiency (CR-CE). The results indicated that only one bank is efficient in all types of

efficiencies over the evaluated periods. Overall, the DEA results show relatively low average efficiency levels in CR-TE, CR-AE and CR-CE in 2008.

Epure and Lafuente (2012) have assessed bank performance in the presence of risk for Costa-Rican banking industry during 1998-2007. The results showed that performance improvements follow regulatory changes and that risk explains differences in banks and non-performing loans negatively affect efficiency and return on assets while the capital adequacy ratio has a positive impact on the net interest margin.

Kutum(2017) has analyzed the impact between credit risk and the profitability of five banks on the Palestine Exchange. Profitability was measured by return on equity and return on assets while credit risk was measured by net charge-offs to total loans and advances, non-performing loans to total loans and advances and pre-provision profit to total loans and advances. Other variables like bank size, leverage and net income growth were included to account for their effects. The study found a weak but positive relationship between credit risk as measured by non-performing loans to total loans and advances and profitability as measured by return on assets. The study also found that bank size was positively related to profitability.

Saeed and Zahidn (2016) have analyzed the impact of credit risk on profitability of five big UK commercial banks. For measuring profitability, two dependent variables ROA and ROE were considered whereas two variables for credit risks were: net charge off (or impairments), and nonperforming loans. Multiple statistical analyses were conducted on bank data from 2007 to 2015 to cover the period of financial crisis. It was found that credit risk indicators had a positive association with profitability of the banks. This means that even after the deep effects of credit crisis in 2008, the banks in the UK are taking credit risks, and getting benefits from interest rates, fee, and commissions etc. The results also reveal that the bank size, leverage, and growth were also positively interlinked with each other, and the banks achieved profitability after the financial crisis and learned how to tackle the credit risk over the years.

This research conducted by Luqman (2014) found the effect of credit risk on commercial banks performance in Nigeria. The study is motivated by the damaging effect of classified assets on bank capitalization and would be of utmost relevance as it addresses how credit risk affects banks' profitability using a robust sample and the findings would serve as the basis to provide policy measures to the various stakeholders on how to tackle the credit risk in order to

enhance the quality of banks' assets and reduce bank risk. Secondary data source was explored in presenting the facts of the situation. The secondary data are obtained from annual reports, relevant literatures and statistical Bulletin publication. The result shows that the ratio of loan and advances to total deposit negatively relate to profitability though not significant at 5% and that the ratio Non-performing loan to loan & Advances negatively relate to profitability at 5% level of significant. This study shows that there is a significant relationship between bank performance (in terms of profitability) and credit risk management (in terms of loan performance). Loans and advances and non-performing loans are major variables in determining asset quality of a bank. Some of the recommendations made in this study are; management need to be cautious in setting up a credit policy that will not negatively affects profitability and also they need to know how credit policy affects the operation of their banks to ensure judicious utilization of deposits and maximization of profit. Improper credit risk management reduce the bank profitability, affects the quality of its assets and increase loan losses and non-performing loan which may eventually lead to financial distress. CBN for policy purposes should regularly assess the lending attitudes of financial institutions. One direct way is to assess the degree of credit crunch by isolating the impact of supply side of loan from the demand side taking into account the opinion of the firms about banks' lending attitude. Finally, strengthening the securities market will have a positive impact on the overall development of the banking sector by increasing competitiveness in the financial sector.

Veizi, Mano and Kociu (2016) considered Credit risk as the biggest risk affects bank's financial performance. The main indicator that shows the quality of the loan portfolio is non performing loans ratio (NPLR) which is dramatically increased in recent years. Quality of the loan portfolio in the Albanian banking system has been good until 2007 but it began to deteriorate from 2008 onwards. The accelerated growth in the level of non-performing loans in the Albanian banking system remains a major problem for economy in the coming years. Main purpose of the paper is to provide stakeholders correct information in relation to the quantitative relationship that exists between the indicator of credit risk management (NPLR) and profitability indicators ROA (return on assets) and ROE (return on equity) for commercial banks in Albania. On the basis of empirical findings we conclude that despite that in both cases ROA, ROE, the regression coefficients are different from zero and they show for a negative impact of NPLR on the banking profitability represented by ROA and ROE, the lack

of sufficient level of significance, does not allow us to express that the model ensures sustainability of this hypothesis.

Anner and Obeng (2017) Effective credit risk management is very important to the health of banks because it has the possibility of either ruining or ensuring the sustenance and growth of the bank. This study assessed the impact of credit risk management on the profitability of 6 selected commercial banks listed on the Ghana stock exchange. Secondary data was gathered from the annual reports of the six selected banks and Ghana banking survey for the years under consideration. The study adopted the Random Effect Model within the panel estimation technique framework. The study used return on equity (ROE) to measure profitability of bank, non-performing loans, loan loss provisions ratio, loan to asset ratio and capital adequacy ratio as credit risk. The findings showed that indeed credit risk management have significant relationship with the profitability of banks. While capital adequacy ratio had positive relationship with a bank's profitability; non-performing loans, loan loss provisions ratio and loan to asset ratio shows statistically significant negative relationship with the profitability of a bank. The study recommends that banks should assess and manage credit risk indicators vigorously in order reduce their exposure to these risks.

The main purpose of the research by Li and Zou (2014) is to investigate if there is a relationship between credit risk management and profitability of commercial banks in Europe. We also aim to investigate if the relationship is stable or fluctuating. In the research model, ROE and ROA are defined as proxies of profitability while NPLR and CAR are defined as proxies of credit risk management. The research collects data from the largest 47 commercial banks in Europe from 2007 to 2012 and formulates four hypotheses which are related to the research question. A series of statistical tests are performed in order to test if the relationship exists. Other statistical tests are performed to investigate if the relationship is stable or not. The findings reveal that credit risk management does have positive effects on profitability of commercial banks. Between the two proxies of credit risk management, NPLR has a significant effect on the both ROE and ROA while CAR has an insignificant effect on both ROE and ROA. However, from 2007 to 2012, the relationships between all the proxies are not stable but fluctuating. This research aims at examining the effect of credit risk management on financial performance of the Jordanian commercial banks during the period (2005-2013), thirteen commercial banks have been chosen to express on the whole Jordanian commercial

banks. Two mathematical models have been designed to measure this relationship, the research revealed that the credit risk management effects on financial performance of the Jordanian commercial banks as measured by ROA and ROE.

Alshatti (2015) concludes that the credit risk management indicators considered in this research have a significant effect on financial performance of the Jordanian commercial banks. Based on findings, the researcher recommends banks to improve their credit risk management to achieve more profits, in that banks should take into consideration, the indicators of Non-performing loans/Gross loans, Provision for facilities loss/Net facilities and the leverage ratio that were found significant in determining credit risk management. Also, banks should establish adequate credit risk management policies by imposing strict credit estimation before granting loans to customers, and banks in designing an effective credit risk management system, need to establish a suitable credit risk environment; operating under a sound credit granting process, maintaining an appropriate credit administration that involves monitoring, processing as well as enough controls over credit risk, and banks need to put and devise strategies that will not only limit the banks exposition to credit risk but will develop performance and competitiveness of the banks.

Ekinci (2014) concludes strong connection between bank performance and economic growth. Therefore, understanding on the effects of credit and market risk on bank performance could contribute to the better functioning of the banking system. This study investigates the effects of credit and market risk, i.e., interest rate and foreign exchange (FX) rate risk, on the bank performance for the Turkish banking sector in a time-varying framework employing the generalized autoregressive conditional heteroscedasticity approach for the 18.01.2002-30.10.2015 period by using weekly data. The results suggest two main findings: (i) Credit risk and FX rate have a positive and significant effect, but interest rate has insignificant effect on banking sector profitability, (ii) credit and market risk have a positive and significant effect on conditional bank stock return volatility.

Kodithuwakku (2015) The adoption of credit risk management is becoming a crucial factor for every commercial bank around the world. The objective of this study is to identify the impact of credit risk management on the performance of the commercial banks in Sri Lanka. This study is primarily based on both primary and secondary data. Primary data were collected

from eight commercial banks from 24 commercial banks in Sri Lanka. The sample was selected from the population based on the superior financial performance for the period under review and the availability of the consistent data over the set period. The primary data was collected mainly through an interview. The relevant authorities were interviewed personally in order to have their views on the problems and solutions. The secondary data were obtained from various sources such as Annual Reports of the selected commercial banks, relevant articles, books and magazines etc. The panel data of a five year period from 2009 to 2013 from the selected banks were used to examine the relationship between credit risk and performances. The Return on Assets (ROA) is used as performance indicator and Loan provision to Total (LP/TL), Loan Provision to Non-Performing Loans (LP/NPL), Loan Provision to Total Assets (LP/TA) and Non-Performing Loans/ Total Loans (NPL/TL) were used as indicators of credit risk. Further, a regression model was used to establish the relationship between amounts of loan as well as non-performing loans and profitability during the period of study by using E-views software. The result shows that non-performing loans and provisions have an adverse impact on the profitability. Therefore, the study recommended the banks to implement an effective tools and techniques to reduce the credit risk management.

Ndoka and Islami (2016) studied a relationship between Credit risk management and profitability of commercial banks in Albania. The main indicators used in this study are Return on Equity, Return on Assets, Non-performing Loans Ratio and Capital Adequacy Ratio. The research collects data from the 16 banks operating in the Albanian banking system from 2005 to 2015. Statistical test are performed in order to test the relationship between the four indicators and the profitability of commercial banks in Albania. This study provides a contribution within the identification of credit risk factors that affect more the profitability of the Albania Banks and the finding of a scientific solution in order to manage the credit risk in a more efficient way.

Sheeba (2017) aimed at investigating the impact of Credit risk on the profitability of the bank. Through extensive literature review, various factors that influence Credit risk are identified as Capital adequacy ratio (CAR), Nonperforming Asset ratio (NPA), Loan to Deposit Ratio (LDR), Cost per Loan Ratio (CLR), Provision Coverage Ratio (PCR), Leverage Ratio (LR), and Nonperforming Asset to Asset Ratio (NPAAR). Return on Equity (ROE) is identified as

the indicator of profitability. The secondary data is collected from the Annual reports of the State Bank of India for twenty years (1997-2016). The data is analyzed using multiple regression. The result showed that NPAAR alone have significant negative impact on ROE and other indicators of credit risk do not have significant impact on ROE. But overall credit risk has significant impact on profitability of State Bank of India. State bank of India faces credit risk due to inefficient Credit risk management. So it is advised to improve Credit risk management practices in State Bank of India. State Bank of India can minimize the Credit risk by reducing the Nonperforming assets by framing strict loan policies.

Ariffin and Tafri (2014) aims empirically study of the impact of financial risks on Islamic banks' profitability. The data for this study is obtained from the annual reports of Islamic banks' worldwide derived from the Bank scope database for the period between 2004 and 2011. The methodology employed is the Generalized Least Square (GLS) panel data analysis. The dataset used in this study involves 65 full-fledge Islamic banks across the globe. Results show that credit risk and interaction between credit risk and rate of interest risk have significant negative impact on the return on assets (ROA) which is the proxy for Islamic banks' profitability. However, the other financial risks, namely liquidity risk and rate of interest risk, are found to be insignificant in affecting the profitability of the banks.

Kishori and Sheeba.J(2017) aims at investigating various factors that influence Credit risk and also aimed at investigating the impact of Credit risk on the profitability of the bank. Through extensive literature review, various factors that influence Credit risk are identified as Capital adequacy ratio (CAR), Nonperforming Asset ratio (NPA), Loan to Deposit Ratio (LDR), Cost per Loan Ratio (CLR), Provision Coverage Ratio (PCR), Leverage Ratio (LR), and Problem Asset Ratio (PAR), Substandard Asset Ratio (SAR), Doubtful Asset Ratio (DAR), Loss Asset Ratio (LAR). Return on Capital (ROC) is identified as the indicator of profitability. The secondary data is collected from the Annual reports of the State Bank of India for twenty years (1996-1997 to 2015-2016). The data is analysed using multiple regression. The result showed that PAR and LR have significant, negative impact on ROC and other variables do not have significant impact on ROC. But overall credit risk has significant impact on profitability of State Bank. State bank of India faces credit risk due to inefficient Credit risk management. So it is advised to improve Credit risk management practices in State Bank of India. State Bank

of India can minimize the Credit risk by reducing the Nonperforming assets and managing the leverage properly.

Fredrick (2012) has analyzed the impact of credit risk management on the financial performance of commercial banks in Kenya. The study has used CAMEL model as a proxy for credit risk management. The author found that the strong impact of CAMEL (credit risk components) on the financial performance of commercial banks.

Paudel (2012) has examined the impact of credit risk management on the financial performance of commercial banks in Nepal using the financial report of 31 banks for eleven years (2001-2011). The methods of data analysis in the study were descriptive, correlation and multiple regressions. The financial performance indicator used in the study was return on assets (ROA). The predictors of the banks' financial performance used in the study were: default rate, cost per loan assets and capital adequacy ratio. The author asserts that all these parameters have an inverse impact on banks' financial performance. However, among the risk management indicators, default rate (NPLR) is the single most influencing predictor of bank financial performance in Nepal whereas cost per loan assets is not significant predictors of bank performance. The author concludes that credit risk management is crucial on the bank performance since it have a significant relationship with bank performance.

Abiola and Olausi (2014) have investigated the impact of credit risk management on the performance of commercial banks in Nigeria. Financial reports of seven commercial banking firms were used to analyze for seven years (2005–2011). Panel regression model was employed for the estimation of the model. In the model, return on equity (ROE) and return on assets (ROA) were used as the performance indicators while non-performing loans (NPL) and capital adequacy ratio (CAR) as credit risk management indicators. The study revealed that credit risk management has a significant impact on the profitability of commercial banks" in Nigeria.

Kurawa and Garba (2014) have assessed the effect of credit risk management (CRM) on the profitability of Nigerian banks with a view to discovering the extent to which default rate (DR), cost per loan assets (CLA), and capital adequacy ratio (CAR) influence banks' profitability (ROA). The secondary data from the annual reports and accounts of quoted banks during the period of 2002 to 2011 were used for analysis. The results of the random-effect

generalized least square (GLS) regression techniques reveal that default rate (DR) ratio and cost per loan assets (CLA) ratio have indicated significant positive relationship with the dependent variable, ROA. In respect of the control variable such as LOAN has positive relationship with ROA whereas AGE has negative association with ROA. The authors conclude that credit risk management components have significant positive effect on the profitability of Nigerian banks.

Alshatti (2015) has examined the effect of credit risk management on financial performance of the Jordanian commercial banks during the period 2005-2013 using capital adequacy ratio, credit interest/credit facilities ratio, provision for facilities loss/ net facilities ratio, leverage ratio and non-performing loans/gross loans ratio as independent variables. The dependent variables represent the profitability measured by ROA and ROE. The author concludes that all the credit risk management indicators used in the study have significant effect on the financial performance of the Jordanian commercial banks.

Kodithuwakku (2015) has analyzed the impact of credit risk management on the performance of the commercial banks in Sri Lanka by using both primary and secondary data. The return on assets (ROA) is used as performance indicator and loan provision to total loan (LP/TL), loan provision to non-performing loans (LP/NPL), loan provision to total assets (LP/TA) and non-performing loans/ total loans (NPL/TL) were used as indicators of credit risk. The result shows that non-performing loans and provisions have an adverse impact on the profitability.

Ugoani (2015) has examined the relationship of poor credit risk management and bank failures in Nigeria using survey research design. The results from the Chi-square statistics revealed that weak corporate governance accelerates bank failures and the credit risk management function is to the greatest extent the most diverse and complex activity in banking business. The author concludes that poor credit risk management influences bank failures.

Bhattarai (2016) examined the effect of credit risk on performance of Nepalese commercial banks. The descriptive and causal comparative research designs have been adopted for the study. The pooled data of 14 commercial banks for the period 2010 to 2015 have been analyzed using regression model. The regression results revealed that 'non-performing loan ratio' has negative effect on bank performance whereas 'cost per loan assets' has positive effect on bank performance. In addition to credit risk indicators, bank size has positive effect on

bank performance. Capital adequacy ratio and cash reserve are not considered as the influencing variables on bank performance. This study concludes that there is significant relationship between bank performance and credit risk indicators.

Zou&Li (2014), investigated what influence credit risk management has on the profitability of European banks and results of Multivariate regression analysis shows that deterioration in credit risk management affects the performance and the ratio of Non Performing Loans largely affect the profitability as denoted by Return on Equity and Return on Asset while Capital Adequacy Ratio has negligible consequence on both ROE and ROA.

Achou and Tenguh (2008)analyzed the 5 years (2001-2005) financial data of Qatar Central Bank. The results of regression model exposed that credit risk management and bank performance have significant relationship. Moreover, findings revealed that the ratio of NPLs/TL has significant negative association with profitability which was measured by return on assets (ROA) and return on equity (ROE).

Musyoki and Kadubo (2012) studied the impact of credit risk management on the financial performance of banks. The sample was consists of 10 banks and the data was collected for the period of 2000-2006. The parameters used for credit risk management were default rate, bad debts cost and cost per loan asset while the profitability was measured by ROA. Descriptive, correlation and regression results showed that all above mentioned parameters have statistically significant and negative impact on financial performance of banks. Further results showed that the default rate (NPLs/TL) is the major predictor of bank's financial performance.

Boahene (2012) measured the relationship between credit risk and profitability of Ghanaian banks. NPLs rate, net charge off rate and a pre provision profit as a percentage of net total loans and advances used as explanatory variables of credit risk while three variables such as bank size, bank growth and bank debt capital were used as control variables. The results of fixed affect model revealed that non-performing loans rate, net charge off rate and the pre provision profit as a percentage of net total loans and advances have a positively significant association with bank profitability. These results showed that the Ghanaian banks earned a high profitability in spite of the higher credit riskiness.

Tuladhar (2017) investigated the impact of credit risk management on the profitability of Nepalese commercial banks. Data from 28 commercial banks for the period 2011 to 2015 have been collected and analyzed using pooled regression analysis and panel data analysis. The findings indicate that credit risk management has significant impact on the profitability of Nepalese commercial banks. Results show that coverage ratio, capital adequacy ratio, and bank size have a positive impact on bank performance. On the other hand, leverage ratio, non-performing loan ratio and female board member are found to have a negative impact on bank performance. However, liquidity ratio, asset quality, and cash reserve ratio turned out to be not significant variables in determining bank's performance.

Alshatt (2015) examined the effect of credit risk management on financial performance of the Jordanian commercial banks during the period (2005-2013), thirteen commercial banks have been chosen to express on the whole Jordanian commercial banks. Two mathematical models have been designed to measure this relationship, the research revealed that the credit risk management effects on financial performance of the Jordanian commercial banks as measured by ROA and ROE. The research further concludes that the credit risk management indicators considered in this research have a significant effect on financial performance of the Jordanian commercial banks.

Taiwo, Ucheaga, Achugamonu, Adetiloye, Okoye and Agwu (2017) investigation into the quantitative effect of credit risk management on the performance of Nigeria's Deposit Money Banks (DMBs) and Bank lending growth over the period of 17 years (1998- 2014). Secondary data for empirical analysis was obtained from CBN Statistical bulletin 2014 and World Bank (WDI) 2015. The study employed multiple linear regression model to analyze the time series data. The result showed that sound credit management strategies can boost investors and savers confidence in banks and lead to a growth in funds for loans and advances which leads to increased bank profitability. The findings revealed that credit risk management has an insignificant impact on the growth of total loans and advances by Nigerian Deposit money banks.

Kodithuwakku (2015) identified the impact of credit risk management on the performance of the commercial banks in Sri Lanka. This study is primarily based on both primary and secondary data. Primary data were collected from eight (08) commercial banks from 24

commercial banks in Sri Lanka. The sample was selected from the population based on the superior financial performance for the period under review and the availability of the consistent data over the set period. The primary data was collected mainly through an interview. The panel data of a five year period from 2009 to 2013 from the selected banks were used to examine the relationship between credit risk and performances. The Return on Assets is used as performance indicator and Loan provision to Total (LP/TL), Loan Provision to Non-Performing Loans, Loan Provision to Total Assets (LP/TA) and Non-Performing Loans/ Total Loans (NPL/TL) were used as indicators of credit risk. Further, a regression model was used to establish the relationship between amounts of loan as well as non-performing loans and profitability during the period of study by using E-views software. The result shows that non-performing loans and provisions have an adverse impact on the profitability.

Githaiga (2015) analyze the effects of credit risk management practices on the performance of Financial Banking Institutions. The study attempted to establish if there exists any relationship between the credit risk management determinants by use of CAMEL indicators and financial performance of commercial banks in Kenya. The study reviewed several literatures in line with the area of study. This review enabled the researcher to demonstrate and familiarize with the area of study. The review also helped identify gaps in previous studies. This study sought to review the effect of credit risk management on the financial performance of commercial banks. The study used multiple regression analysis in the analysis of data and the findings have been presented in the form of tables and regression equations. The study found out that there is a strong impact between the CAMEL components on the financial performance of commercial banks. The study also established that capital adequacy management efficiency and liquidity had a strong relationship with financial performance (ROA).The study also established that credit risk had a weak and negative relationship with financial performance (ROA).This study concludes that CAMEL model can be used as a proxy for credit risk management when measuring the financial performance.

Alice and Shukla (2016) studied sought to determine the effect of credit management on the financial performance of commercial banks in Rwanda. The study adopted a descriptive survey design. The target population of study consisted of 57 employees of Equity bank in credit department. Entire population was used as the sample giving a sample size of size of 57

employees. Purposive sampling technique was used in sampling where the entire population was included in the study. Primary data was collected using questionnaires which were administered to the respondents by the researcher. Descriptive and inferential statistics were used to analyze data. The study found that client appraisal, credit risk control and collection policy had effect on financial performance of Equity bank.

Magnifique (2013) study was to establish the effect of credit risk management and Financial Performance of commercial banks in Rwanda. The study had four specific objectives of establishing how credit risk identification, credit risk analysis and assessment, credit scoring mechanism and risk monitoring affect financial performance of commercial banks in Rwanda. The study adopted a descriptive research design which assisted to examine the effect between regulation and financial performance of commercial banks. The sample size as well as the population of the study was eleven commercial banks. The response rate was a 100% which comprised 11 commercial banks. Data was gathered using a data a questionnaire and analysed using SPSS 17. The overall finding and conclusion of the study was that all the measures of credit risk management used in this study are highly significant predictors of financial performance of commercial banks in Rwanda except risk monitoring. The credit risk identification was found to be significant in explaining profitability of commercial banks in Rwanda. The credit risk scoring and credit analysis and assessment also found to be significant to explain the financial performance.

Onkoba (2014) Commercial Banks earn profits principally by obtaining funds at relatively low interest rates and then lending the funds or investing in securities at higher interest rates. They adopt different credit risk management policies majorly determined by ownership of the banks (privately owned, foreign owned, government influenced and locally owned) credit policies of banks, credit scoring systems, banks regulatory environment and management styles of the banks. The very nature of banking business is so sensitive because more than 85% of their liability is from depositors (Saunders's and Cornett, 2005). It's from these deposits that banks use to generate credit to their borrowers .This credit creation process exposes banks to high default risk which might lead to financial distress including bankruptcy. The objective of the study was to establish the effect of credit risk management on the financial performance of commercial Banks in Kenya. A descriptive study was undertaken in order to ascertain and be able to describe the characteristics of the variables of interest in the study. The independent

variables included Loss Reserves/ Gross Loans (LLR R), Non-Performing Loans (NPL R) and CAR with ROA (Net Income/Total Assets) as the dependent variable. Secondary data from commercial banks annual reports (2008-2012) was used. Of the 43 commercial banks in Kenya, full data was attained from 30 banks and thus the study concentrated on the 30 banks. The data was then analyzed, summarized and tabulated. The study concluded that there is a significant relationship between the bank performance (ROA) and credit risk management (Loan Loss Reserve and loan performance). Better credit risk management results in improved bank performance. Thus bank managers need to practice prudent credit risk management, safeguard the assets of the bank and protect the shareholders' interests. They also need diversify their loan portfolio as a way of mitigating credit risk.

Mutava (2016), focused to establish the effect of credit risk management on Financial Performance of commercial banks in Mombasa County. The study had three specific objectives of establishing the effect of liquidity risk management, determine the effect of market risk management and determine the effect of default risk management on credit risk management. Credit risk management is vital. The study thus utilized descriptive survey research design. Questionnaires were used to collect data. The banks that contributed to the study were 44 banks and were selected through simple random sampling. The sample size of the study was 50 credit managers of Commercial Banks. The list was obtained from 2014 central Bank of Kenya. Sampling involves a assortment of a number of individuals or objects from a population such that the selected group contained elements representatives of characteristics found in the entire group. Mugenda and Mugenda, (2003) recommends a representative sample of 10%-30% for descriptive survey research. The study found that there is a correlation between liquidity risk management, default risk management and market risk management with performance of the banks. It however found that the banks do not involve experts and consultants in market risk management thus recommendations were made for the banks to revise their credit risk management policies, open up and share information with other players on market risk thus involve consultants more in their market risk management and to be more proactive than reactive in risk management.

The most of the related empirical studies reported that bank performance is affected by capital adequacy ratio, non-performing loan and cost per loan assets. Moreover, bank performance may be affected the cash reserve ratio and bank size.

Table 2.1: Literature Matrix

Study	Major Findings
Ahmed, Takeda and Shawn (1998)	an increase in loan loss provision indicates an increase in credit risk and deterioration in the quality of loans consequently affecting bank performance adversely.
Mekasha (2001)	The study revealed that there is a significant relationship between bank performance and credit risk management.
Ahmad and Ariff (2007)	An increase in loan loss provision is also considered to be a significant determinant of potential credit risk. The authors further asserted that credit risk in emerging economy banks is higher than that in developed economies.
Ben-Naceur and Omran (2008)	have found that bank capitalization and credit risk have positive and significant impact on banks net interest margin, cost efficiency and profitability.
Felix and Claudine (2008)	It could be inferred from their findings that return on equity (ROE) and return on assets (ROA) both measuring profitability were inversely related to the ratio of non-performing loan to total loan of financial institutions thereby leading to a decline in profitability.
Kithinji (2010)	The findings revealed that the bulk of the profits of commercial banks are not influenced by the amount of credit and non-performing loans, therefore suggesting that other variables other than credit and non-performing loans impact on profits.
Al-Khoury	results showed that credit risk, liquidity risk and capital risk are the major

(2011)	factors that affect bank performance when profitability is measured by return on assets while the only risk that affects profitability when measured by return on equity is liquidity risk.
Kargi (2011)	The findings revealed that credit risk management has a significant impact on the profitability of Nigerian banks. It concluded that banks' profitability is inversely influenced by the levels of loans and advances, non-performing loans and deposits thereby exposing them to great risk of illiquidity and distress.
Chen and Pan (2012)	The results indicated that only one bank is efficient in all types of efficiencies over the evaluated periods. Overall, the DEA results show relatively low average efficiency levels in CR-TE, CR-AE and CR-CE in 2008.
Epure and Lafuente (2012)	The results showed that performance improvements follow regulatory changes and that risk explains differences in banks and non-performing loans negatively affect efficiency and return on assets while the capital adequacy ratio has a positive impact on the net interest margin.
Kutum(2017)	The study found a weak but positive relationship between credit risk as measured by non-performing loans to total loans and advances and profitability as measured by return on assets. The study also found that bank size was positively related to profitability.
Clearly et al. (2007)	Their study found when firms are classified on the basis of size, age or bond rating, relationship between cash flow and investment may be positive or negative.
Anner and Obeng (2017)	The findings showed that indeed credit risk management have significant relationship with the profitability of banks. While capital adequacy ratio had positive relationship with a bank's profitability; non-performing

	loans, loan loss provisions ratio and loan to asset ratio shows statistically significant negative relationship with the profitability of a bank.
Ndoka and Islami (2016)	This study provides a contribution within the identification of credit risk factors that affect more the profitability of the Albania Banks and the finding of a scientific solution in order to manage the credit risk in a more efficient way.
Fredrick (2012)	The author found that the strong impact of CAMEL (credit risk components) on the financial performance of commercial banks.
Azam (2011)	Study found positive and significant relationship between firm size and investment and negative relationship between age and investment.

2.3 Research gaps

Most of the Nepalese commercial banks are found to approve the loans that are not well examined. This may lead to increase the loan defaults and non-performing loans. Thus, the existing procedures for credit risk management are not adequate to compete with the existing financial and economic challenges in Nepal. There is need to investigate whether this investment in credit risk management is viable to the banks. This study therefore seeks to investigate the impact of credit risk indicators on a bank's financial performance in Nepal. This study addresses how credit risk affects banks' financial performance using a robust sample and the findings would serve as the basis to provide policy measures useful to the various authorities on how to tackle the effect of credit risk in order to enhance the quality of banks' risky assets.

This study provides empirical evidence in confirming the validity of the theories to assist the bank's management in determining the best credit risk strategies that enhance bank performance. Moreover, the fact that the banking industry in Nepal is still growing and it should ensure that effective strategies are put in place to minimize risk and maximize loan performance at any particular point while in operation. Thus, this study aims to analyze the

effect of credit risk on bank performance of commercial banks listed in the Nepalese Stock Exchange. The findings of this study may enable bank executives understand how credit risk affect the bank performance and they may then adopt the appropriate credit risk strategies.

This study also fills a gap in adding literatures regarding the credit risk and profitability in Nepal.

CHAPTER III

RESEARCH METHODOLOGY

Research methodology is the systematic way of solving research problem. Research methodology refers to the overall research process, which a researcher conducts during his/her study, if all the procedures from theoretical foundation to the collection and analysis of data. As most of the data are quantitative, the research is based on the scientific models. It is composed of both parts of technical aspect and logical aspect. On the basis of historical data, research is systematic and organizational effort to investigate a specific problem that needs a solution. This process of investigation involves a series of well thought out activities of gathering, recording and analyzing and interpreting the data with the purpose of finding answer to the problem. Hence, the entire process by which we attempt to solve the problem is called research (Kothari; 1999: 39).

3.1 Research Design

To achieve the objective of this study, descriptive and analytical research design has been used. A descriptive study is one in which information is collected without changing; the environment (i.e., nothing is manipulated). A descriptive research design refers to the process of describing what current conditions or attitudes exist at the moment and the analytical surveys describe and explain why certain situations exist. Research design is a plan, structure and strategy of investigations conceived so as to obtain answer to research questions and to control variance. It is the arrangement of conditions for collection and analysis of data in a manner aiming at combining relevance to the research purpose with economy in procedure (Wolff and Pant, 2004).

3.2 Population & Sample of the Study

The term population of data denotes for the data of each organization which is within the boundary of specific organization. The population data for this study comprises all listed companies, which are currently operating in Nepal. A represented part of population selected from it to investigating its properties is called sample. Where as, sample data are the data of those organizations, which has, been selected from that whole population for study. The

sample consists of three selected company. Judgmental sampling method is to be used while selecting sample organizations for this study period 2015/16 to 2019/20 A.D. The selected sample companies for the analysis are as follows.

- Kumari Bank Limited
- Global IME Bank Limited

3.3 Nature & Sources of Data

This type of data is not original in character. The study is mainly based on secondary data. Data are collected from concern sample banks ,NEPSE, SEBON and various libraries. Furthermore, several data and information were gathered from periodicals, economic journals and the other published and unpublished reports.

3.4 Method of Data Collection

It indicates the sources of data and how they collected. In this study, data were collected through published sources. They were collected from the correspondent offices and their respective websites. The annual reports of sample banks for the period of six years are obtained from the main branch of selected banks. The data regarding the profile of sample banks and other related documents were collected from internet websites. Unpublished master's thesis, books, research papers, articles, journals have been collected mainly form Centre Library of Tribhuvan University and newspapers are from concerned authorities.

3.5 Data Analysis Tools

A host of analytical tools can be applied to perform risk and return analysis of a firm. Following the nature of the study, a set of appropriate tools, particularly financial and statistical may be used for effective and significant analysis to meet the research objective.

3.5.1 Market Price of Stock (P)

In this study, market price is one of the major data. In this study we have taken closing price of the stock as market price because it is difficult to get all the required data accurately. The closing price is used as market price of stock that has a specific time of one year.

3.5.2 Dividend (D)

Dividend is relevant during the computation of rate of return. This is a reward to the shareholders for their investment. If a company declares only the cash dividend, there are no problems to take the dividend amount. But, if the company declares stock dividend (Bonus Share), it is difficult to obtain the amount that really shareholders has gained. In this case, they get extra numbers of shares as dividend and simultaneously price the stock declines as a result of increased number of stocks. To get a real amount of dividend there are no any model. So the models have been developed considering practical as well as theoretical aspect.

$$\text{Divided per share (DPS)} = \frac{\text{Total Amount of Dividend Paid}}{\text{No.of Common Stock Outstanding}}$$

If company declares only cash dividend, there is no problem while taking the exact amount of dividend that is relevant. But if the company declares stock dividend (bonus share), it is difficult to obtain the amount that really shareholders have gained. In this case, they get extra numbers of shares as dividend and simultaneously price of stock declines as a result of increased number of stocks.

3.5.3 Return on Common Stock (R)

Return is the income received on as investment plus any change in market price, usually expressed as a percent of the beginning market price of the investment. The single period rate of return can be calculated by using the following formula.

$$\text{Return on Share and Debenture (Rs)} = \frac{P_1 - P_0 + D_1}{P_0} \times 100$$

Where,

P_1 = Ending Value of Share

P_0 = Beginning Value of Share

D_1 = Dividend per Share

3.5.4 Expected Rate of Return E(R_j)

Expected rate of return E(R_j) is the arithmetic mean of the past years return. It can be calculated using the following formula,

$$E(R_j) = \sum P_j \times R_j$$

Where,

P_j = probability distribution of stock j

R_j = Rate of return of stock j

In another way, when historical data (time series data) are given, it can be calculated as,

$$E(R_j) = \frac{\sum R_j}{N}$$

Where,

$E(R_j)$ = Expected rate of return on stock j

N = Number of years that the return is taken

Σ = Sign of summation

3.5.5 Standard Deviation (S.D) of the Stock Return

Standard deviation measure the dispersion from the mean. In other words, it is the statistical measure of the variability of the distribution of return around its mean. It is the square root of the variance and measures the risk on the stock investment.

$$\text{Standard deviation } (\sigma) = \sqrt{\frac{\sum (R_A - \bar{R}_A)^2}{n-1}}$$

Where,

R_A = Rate of return of individual asset

\bar{R}_A = Expected Return of Asset 'A'

σ = Standard deviation or risk

n = no. of years

3.5.6 Coefficient of Variation (C.V)

It is applicable to calculate the risk per unit of the expected return. "It is the ratio of standard of returns to the mean of that distribution. It is the measure of reliable risk". (Van Horne and Wachowicz, 1995: 94). The CV is a measure of relative dispersion that is useful in comparing the risk of assets with differing expected return. The higher the coefficient of variation the greater the risk, which is expressed as follows.

$$CV_j = \frac{\sigma_j}{R_j} \times 100$$

Where,

CV_j = Coefficient of variation of stock j.

- σ_j = Standard deviation of return on stock j.
- \bar{R}_j = Average rate of return of stock j.

3.5.7 Correlation Coefficient

Correlation coefficient defines the degree of relationship between two assets whether they are going in same direction or opposite direction. It always ranges from +1 to -1. It can be calculated by using following formula.

$$\text{Correlation between Assets A \& B } (r_{AB}) = \frac{COV_{AB}}{\delta_A \delta_B}$$

Where,

δ_A = Risk on Asset 'A'

δ_B = Risk on Asset 'B'

COV_{AB} = Covariance between Assets 'A' and Assets 'B'

- If $r_{AB} = +1$, Correlation between two assets is perfectly positive in this condition a single unit of risk cannot be minimized.
- If $r_{AB} = -1$, Correlation between two assets is perfectly Negative in this condition all the risk can be minimized.
- If $r_{AB} = 0$, There is no correlation between two assets in this condition a little bit of risk can be minimized.

3.5.8 Covariance

It defines the combined risk or accumulated risk between two assets. Covariance and correlation are closely related, covariance between two assets can be calculated by using following formula.

Covariance between Assets 'A' and Assets 'B'

$$(COV_{AB}) = \frac{\sum[(R_A - \bar{R}_A)(R_B - \bar{R}_B)]}{n-1}$$

Where,

R_A = Rate of return of individual asset 'A'

\bar{R}_A = Expected Return of Asset 'A'

R_B = Rate of return of individual asset 'B'

\bar{R}_B = Expected Return of Asset 'B'

3.5.9 Beta coefficient (β)

The beta coefficient is an idea of systematic risk. It may be used for ranking the systematic risk of different assets. It is an index of the degree of movement of an assets return in response to a change in the market return. An asset's historical returns are used in finding the asset's beta coefficient. Beta coefficient shows the market sensitivity of stock. Higher the beta greater the sensitivity and reaction to the market movement. Beta coefficient of a particular stock will be less than equal or more than 1, but the beta of market beta serves. As a benchmark or measuring scale for the evaluation of risk of individual stock. Beta coefficient can be expressed as follows.

$$\text{Beta coefficient } (\beta_j) = \frac{\text{cov}(r_i r_m)}{\sigma_m^2}$$

Where,

$\text{cov}(r_i r_m)$ = Covariance of the return on assets j, and market portfolio.

σ_m^2 = Variance of the return on the market portfolio.

R_m = required rate of return on the market portfolio of securities.

3.5.10 Portfolio Return

The return on portfolio is simply the weighted average of the expected returns of the individual assets in the portfolio. The weights are the proportions of the investor's wealth in each asset.

$$\text{Portfolio return } (R_P) = W_A \bar{R}_A + W_B \bar{R}_B + \dots + W_N \bar{R}_N$$

Where,

R_P = Return on Portfolio

W_A = Weight or Proportion of Asset 'A'

W_B = Weight or Proportion of Asset 'B'

\bar{R}_A = Expected Return of Asset 'A'

\bar{R}_B = Expected Return of Asset 'B'

3.5.11 Portfolio Risk

The portfolio risk is a function of the proportions invested in the components, the riskiness of the components and the correlation of returns on the component securities. It is measured by

either variance or standard deviation. Lower the standard deviation and variance lower the riskiness and vice versa. It can be computed by using the following formula.

For two assets case;

$$\delta_P = \sqrt{W_A^2 \delta_A^2 + W_B^2 \delta_B^2 + 2COV_{AB} W_A W_B}$$

Where,

δ_P = Portfolio Risk

W_A = Weight or Proportion of Asset 'A'

W_B = Weight or Proportion of Asset 'B'

δ_A = Risk on Asset 'A'

δ_B = Risk on Asset 'B'

COV_{AB} = Covariance between Assets 'A' and Assets 'B'

$$COV_{AB} = \frac{\sum[(R_A - \bar{R}_A)(R_B - \bar{R}_B)]}{n-1}$$

For three assets case;

$$\delta_P = \sqrt{W_A^2 \delta_A^2 + W_B^2 \delta_B^2 + W_C^2 \delta_C^2 + 2COV_{AB} W_A W_B + 2COV_{BC} W_B W_C + 2COV_{AC} W_A W_C}$$

Where,

δ_P = Portfolio Risk

W_A = Weight or Proportion of Asset 'A'

W_B = Weight or Proportion of Asset 'B'

W_C = Weight or Proportion of Asset 'C'

δ_A = Risk on Asset 'A'

δ_B = Risk on Asset 'B'

δ_C = Risk on Asset 'C'

COV_{AB} = Covariance between Assets 'A' and Asset 'B'

COV_{AC} = Covariance between Assets 'A' and Asset 'C'

COV_{BC} = Covariance between Assets 'B' and Asset 'C'

3.6 Conceptual Framework

According to discussion on literature reviews about the concept of service quality and its dimensions and the affection of service quality in sustainable competitive advantage and the subject of sustaining competitive advantage, the theoretical framework is presented in figure 3.1.

Independent Variable

Dependent Variable

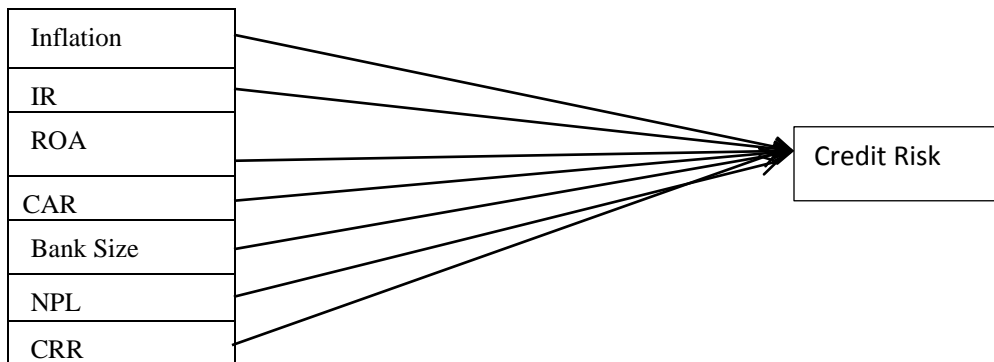


Figure 3.1 Conceptual Framework

3.7 Operational Definition

Inflation

In economics, inflation refers to a general progressive increase in prices of goods and services in an economy. When the general price level rises, each unit of currency buys fewer goods and services; consequently, inflation corresponds to a reduction in the purchasing power of money.

Inflation rate

Inflation is the rate of increase in prices over a given period of time. Inflation is typically a broad measure, such as the overall increase in prices or the increase in the cost of living in a country.

Return on Assets

The return on assets ratio, often called the return on total assets, is a profitability ratio that measures the net income produced by total assets during a period by comparing net income to the average total assets. In other words, the return on assets ratio or ROA measures how efficiently a company can manage its assets to produce profits during a period.

Nonperforming loan

A nonperforming loan (NPL) is a loan in which the borrower is default and hasn't made any scheduled payments of principal or interest for some time. In banking, commercial loans are considered nonperforming if the borrower is 90 days past due. ... However, there is no standard or definition of NPLs.

Bank size

Bank size is measured as the natural logarithm of the value of total assets in US dollars. Capital ratio is measured using Tier 1 ratio, which is the ratio of tier-1 capital to total risk-weighted assets

Cash Reserve Ratio

The Cash Reserve Ratio in India is decided by RBI's Monetary Policy Committee in the periodic Monetary and Credit Policy. The Reserve Bank of India takes stock of the CRR in every monetary policy review, which, at present, is conducted every six weeks. CRR is one of the major weapons in the RBI's arsenal that allows it to maintain a desired level of inflation, control the money supply, and also liquidity in the economy. The lower the CRR, the higher liquidity with the banks, which in turn goes into investment and lending and vice-versa. Higher CRR can also negatively impact the economy as lesser availability of loanable funds, in turn, slows down investment. It thereby reduces the supply of money in the economy.

Capital Adequacy Ratio

Capital Adequacy Ratio is also known as Capital to Risk Assets Ratio, is the ratio of a bank's capital to its risk. National regulators track a bank's CAR to ensure that it can absorb a reasonable amount of loss and complies with statutory Capital requirements. It is a measure of a bank's capital.

CHAPTER V

SUMMARY AND CONCLUSION

5.1 Summary

The study mainly aims at finding the impact of credit risk on profitability of Nepalese commercial banks for which bank specific and macroeconomic variables are taken as explanatory variable to explain the impact on return on assets which is dependent variable. Bank specific variables include bank size, capital adequacy ratio, cash reserve ratio, and non performing loan whereas macroeconomic variables are inflation and interest rate. This study advocated three models to explain the determinants of return on assets of Nepalese commercial bank. In the first model, a regression for the return on assets is run against a set of bank- specific variables such as bank size, capital adequacy ratio, cash reserve ratio while in the second model return on assets is regressed against variables reflecting macroeconomic factors like inflation and interest rate. Similarly, in the third model, both bank specific and macroeconomic variables were regressed together with return on assets.

On the basis of results obtained from regression model, it is found that bank specific variables like bank size, capital adequacy ratio, have significant impact on return on assets whereas cash reserve ratio has an insignificant impact with return on assets. In terms of macroeconomic variable inflation has insignificant impact with net interest margin whereas interest rate has significant impact on return on assets of Nepalese commercial banks. Credit risk management is crucial on the bank performance since it have a significant relationship with bank performance.

5.2 Conclusion

This study focuses on examining the impact of credit risk on profitability and conclusively answered the objectives of the study. On the basis of finding, it can be concluded that credit risk and macroeconomic variable has an imperatively significant role in determining profitability of Nepalese commercial banks.

The result indicated that, when bank variables were regressed with return on assets, it was found that capital adequacy, bank size and non performing loan have impact on return on assets whereas cash reserve ratio have no impact on return on assets. And when

macroeconomic variables were regressed with return on assets, inflation was found to have no impact with return on assets whereas interest rate was found to have impact with return on assets and is one of the major determinants of profitability of Nepalese commercial banks.

Since capital adequacy provides more strength to survive in the financial crises and increase safety for depositor in difficult macroeconomics. Nonperforming loan is a key unity to measure loan losses, it hindrance the performance of banks. Nonperforming loan decreases profitability of banks. Bank size incorporates the larger exposure to the market which helps in growth of finance.

5.3 Implications

The study indicated that a change in bank specific variables like bank size, capital adequacy ratio, and non performing loan significantly creates value to return on assets whereas cash reserve ratio has insignificant impact on return on assets. Since bank variable are to some extent controllable by bank therefore the policy recommendation is that bank should always maintain sufficient liquidity which could aid in reducing market concentration and increase competition, otherwise it deteriorate banks ability to create credit in the economy which ultimately hampers the bank performance. Similarly, bank should not pursue aggressive strategy directed towards credit policy because adoption of such increases credit risk which ultimately effects banks capacity of collecting deposit and creating credit in the economy.

This study will benefit to policy makers of the related sectors. Understanding the present situations of credit risk in Nepal, the data, test and result will help them to change or modify and improve regarding these sectors according to the demand of the country. Moreover, it will also support to policy makers for making and correcting rules and regulation against credit default which may can prevent from being loss for the banks. It is useful for understanding the impact that how credit risk and profitability is responsible for deterioration performance.

The study has also added up to the existing literatures and also has opened up the avenue for further studies to investigate the purported links between credit risk and macroeconomic variable with return on assets. Further studies can be conducted by taking other bank variables like money power, bank reserve and macroeconomic variable as gross domestic product. This study used econometric tools like correlation and regression test. It is possible to elaborate study by including maximum likelihood estimators of co-integrating vectors, impulse

responses for models, GMM estimations. The findings will also be useful to academia by assisting lecturers, students, instructors and other future researchers to approach the subject matter with deeper understanding as well as serving as a source of reference. This study can provide bases for other study.

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APPENDICES

APPENDIX 1: LIST OF ALL COMMERCIAL BANKS IN NEPAL

Name of Commercial Bank	Year of establishment A.D.	Head Office
1. Nepal Bank Limited	1957	Kathmandu
2. Kumari Bank Limited	1966	Kathmandu
3. Nabil Bank Limited	1984	Kathmandu
4. Nepal Investment Bank Limited	1986	Kathmandu
5. Standard Chartered Bank Limited(Previously Nepal Grindlays Bank Limited)	1987	Kathmandu
6. Himalayan Bank Limited	1993	Kathmandu
7. Nepal SBI Bank Limited	1993	Kathmandu
8. Nepal Bangladesh Bank Limited	1993	Kathmandu
9. Everest Bank Limited	1994	Kathmandu
10. Bank of Kathmandu Limited	1995	Kathmandu
11. Nepal Credit and Commerce Bank Limited(Previously Nepal Bank of Ceylon Limited)	1996	Bhairawa
12. Machhapuchre Bank Limited	2000	Pokhara
13. Kumari Bank Limited	2001	Kathmandu
14. Laxmi Bank Limited	2002	Birgunj
15. Siddharth Bank Limited	2002	Kathmandu
16. Global IME Bank Limited	2013	Birgunj
17. Citizens Bank International Limited	2007	Kathmandu

18. Prime Commercial Bank Limited	2007	Kathmandu
19. NIC Asia Nepal Limited	2013	Kathmandu
20. NMB Bank Limited	2009	Kathmandu
21. Prabhu Bank Limited	2009	Kathmandu
22. Mega Bank Limited	2009	Kathmandu
23. Sunrise bank limited	2009	Kathmandu
24. Civil Bank limited	2010	Kathmandu
25. Century commercial bank limited	2011	Kathmandu
26. Sanima Bank limited	2011	Kathmandu
27. Global IME Bank	2024 B.S.	Kathmandu

APPENDIX 2: DATA OF COMMERCIAL BANKS

Inflation	IRR	ROA	CAR	Bank size	NPL	CRR
9.58	4.53	1.78	6.72	76.04	3.58	5.5
9.95	3.98	0.1	8.41	75.58	3.58	5.5
8.51	2.28	0.10	7.95	74.41	3.58	5.5
8.92	1.82	0.28	7.51	73.45	3.7	5
8.43	0.97	0.36	7.51	72.28	3.7	5
7.52	0.8	0.61	7.15	71.30	3.7	5
6.77	0.7	0.61	10	72.80	3.9	5
7.06	0.61	0.74	10	72.52	3.9	5
7.05	0.97	0.78	10.2	72.95	3.9	5
7.51	1.09	1.02	10.3	73.36	3.5	5
8.74	0.83	1.09	13.6	72.82	3.5	5
9.95	1.34	1.11	13.5	71.77	3.5	5
11.48	1.15	1.49	14.2	70.55	2.6	5
11.9	0.18	0.15	13.5	70.39	2.6	5
11.2	0.15	0.28	13.2	71.92	2.6	5
10.5	0.31	0.37	13.2	73.64	2.9	6
10.5	0.6	0.49	10.9	74.28	2.9	6
10.4	0.74	0.52	10.5	74.20	2.9	6
9.82	1.52	0.74	11	76.36	3.2	6
10.1	1.93	0.82	11	77.09	3.2	6
10.2	4.02	0.87	11	76.66	3.1	6
9.5	3.49	1.15	11.3	77.29	3	6
8.7	4.46	1.24	11.3	77.70	3	6
8.2	2.67	1.27	11.3	77.04	3	6
7.8	0.19	1.66	12.3	73.35	2.6	6
7.9	0.25	0.12	12.3	73.25	2.7	6
8	0.14	0.19	12.3	73.13	2.7	6
8.4	0.07	0.33	12	72.95	2.8	5
10	0.03	0.42	11.5	72.77	2.8	5
10.3	0.08	0.48	11.6	72.24	2.8	5
9.70	0.47	0.71	11.30	74.27	3.10	5
8.80	0.23	0.76	11.60	74.56	3.10	5
8.90	0.08	0.79	11.30	74.07	3.00	5
9.40	0.06	1.07	11.50	75.03	3.00	5
9.70	0.04	1.12	11.50	75.68	3.00	5
9.50	0.13	1.19	11.60	75.71	3.00	5
8.10	0.02	1.44	12.03	74.03	2.92	5
7.50	0.10	1.10	12.03	74.71	2.90	5

7.60	0.07	1.05	11.36	76.24	2.79	5
7.50	0.93	1.27	11.40	76.34	3.02	6.00
7.20	0.52	1.27	11.41	76.73	3.00	6.00
7.00	0.13	1.25	11.41	77.02	2.94	6.00
6.80	0.16	0.96	11.30	78.48	2.80	6.00
7.00	0.74	1.22	11.30	79.45	2.77	6.00
7.00	0.59	1.00	11.66	79.11	2.73	6.00
6.90	0.69	1.29	11.66	79.72	2.68	6.00
7.10	0.59	1.31	11.34	77.66	2.68	6.00
7.40	0.37	1.28	11.56	75.77	2.67	6.00
7.60	0.17	1.59	11.94	74.34	2.63	6.00
6.90	0.95	0.08	11.94	74.77	2.41	6.00
7.20	2.22	0.15	11.94	74.25	2.39	6.00
8.20	1.10	0.35	11.94	74.59	2.41	6.00
10.40	0.29	0.39	11.94	74.51	2.38	6.00
11.60	0.48	0.45	11.89	73.78	2.37	6.00
12.10	0.68	0.79	11.89	75.14	2.37	6.00
11.30	0.35	0.82	11.89	74.35	2.34	6.00
10.20	0.53	0.86	11.89	77.03	2.27	6.00
9.70	1.10	1.21	11.79	77.44	2.22	6.00
10.00	1.34	1.28	11.79	78.38	2.22	6.00
11.10	0.12	1.37	12.31	79.23	2.22	6.00
10.40	0.05	1.75	12.12	78.23	1.82	6.00
8.60	1.50	0.09	12.52	78.58	1.82	6.00
7.90	1.20	0.16	12.52	79.88	1.82	6.00
6.70	0.70	0.44	12.59	79.80	1.81	6.00
4.80	0.90	0.52	12.59	81.00	1.81	6.00
3.80	1.10	0.57	12.59	81.21	1.81	6.00
3.20	1.74	0.92	12.7	82.67	1.77	6.00
3.30	2.64	0.93	12.7	82.96	1.77	6.00
2.90	0.74	0.94	12.7	83.11	1.77	6.00
3.80	0.93	1.34	13.44	84.06	1.67	6.00
3.40	0.78	1.37	13.44	84.15	1.67	6.00
2.80	1.03	1.36	13.44	83.78	1.67	6.00