



Impact of credit and market risk on bank performance

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Abstract

This study is about impact of credit and market risk on bank performance where dependent variables are ROA and ROE and independent variables are CRE, NPLR and MRE. The findings of the study over the study period of 2069/70 to 2078/79 with sample selected 10 commercial banks based on 100 observations as using convenience sampling techniques. The descriptive and analytical research design has been used to collected secondary sources of data which is analyzed form descriptive statistics, Pearson correlation coefficient and multiple regression analysis. The regression analysis with dependent variables on ROA has negative affects on CRE. It was also found that NPLR has negative influences on ROA. Moreover, the results indicate that MRE has a positive effect on ROA. The study found that all the independent variable is significant impact on ROA. The regression analysis with dependent variables on ROE has negative affects on CRE and NPLR but MRE has positive. The study further revealed that CRE on ROE which shows that independent variable is significant impact on ROE. Moreover, it revealed NPLR and MRE has insignificant impact on ROE. There is a negative significant relationship between ROA with CRE and NPLR but positive relationship of MRE. Moreover, there is a negative significant relationship between ROE with CRE and NPLR but MRE has positive relationship.

Keywords: Credit risk exposure, non-performing loan, market risk exposure, return on assets and return on equity

Introduction

Credit risk is by far the most significant risk faced by banks. The success of the business depends on accurate measurement and efficient management of the risk to a greater extent than any other risk. Credit risk refers to the risk that a borrower may not repay a loan and that the lender may lose the principal of the loan or the interest associated with it. Credit risk arises because borrowers expect to use future cash flows to pay current debts; it's almost never possible to ensure that borrowers will definitely have the funds to repay their debts. Interest payments from the borrower or issuer of a debt obligation are a lender's or investor's reward for assuming credit risk. Through effective management of credit risk exposure banks not only support the viability and profitability of their own business but also contribute to systemic stability and to an efficient allocation of capital in the economy (Psillaki *et al*, 2010) [16]. Credit risk management is the practice of mitigating losses by understanding the adequacy of a bank's capital and loan loss reserves at any given time-a process that has been a challenge for financial institution.

Market risk refers to the potential for financial losses that arise due to fluctuations in the prices of financial instruments, such as stocks, bonds, commodities, and currencies. It is the risk that the value of an investment or a portfolio will decrease due to changes in market conditions, including factors like interest rates, economic indicators, geopolitical events, and overall market sentiment (Bodnar & Marston, 1996) [4]. Market risk is a fundamental aspect of investing and is often categorized into different types, including systematic risk (affecting the entire market) and unsystematic risk (specific to individual assets or industries). Market risk, also known as systematic risk or non-diversifiable risk, refers to the potential for financial losses that result from fluctuations in the overall market or

economy. It encompasses the risk of a decline in the value of investments due to factors such as changes in interest rates, exchange rates, commodity prices, economic indicators, political events, and general market sentiment. Market risk affects a wide range of financial instruments and assets, including stocks, bonds, derivatives, and currencies (Ngugi, 2001) [15].

The intricate relationship between credit and market risk and its impact on bank performance has been a subject of significant academic inquiry and practical importance in the realm of financial risk management. In an era characterized by heightened market volatility and evolving credit dynamics, understanding how these risks interplay and influence the overall performance of banks is imperative for both researchers and industry practitioners. This literature review aims to explore and synthesize key insights from scholarly works that delve into the complex interactions between credit and market risk, shedding light on their implications for the stability, profitability, and resilience of financial institutions (Smith, 2018).

Problem Statement

Credit and market risk are significant factors that affect the performance of commercial banks. Credit risk refers to the potential for loss due to a borrower's failure to repay a loan or meet their obligations. Market risk, on the other hand, refers to the potential for loss due to changes in market conditions or factors, such as interest rates, exchange rates, or commodity prices. These risks can have a profound impact on the financial stability and profitability of commercial banks in Nepal.

Credit risk management is indeed a very difficult and complex task in the financial industry because of the unpredictable nature of the macroeconomic factors coupled with the various microeconomic variables which are

peculiar to the banking industry or specific to a particular bank. Unfortunately, banks in Ghana have found themselves in such an unpredictable macroeconomic environment for a very long time. While there are several strategies of addressing the problem of instability and efficiency, the research attempts to investigate the factors that influence the determination of the banks' credit risk (Garr, 2013)^[7].

Managing market risk is a critical challenge for financial institutions, requiring effective strategies to quantify, monitor, and mitigate potential losses arising from adverse fluctuations in market prices. As global financial markets become increasingly interconnected and complex, the need for accurate risk assessment and management has grown substantially. This problem statement seeks to address the methodologies and tools required to identify, measure, and manage market risk, ensuring the stability and resilience of financial institutions in dynamic market environments (Doe, 2020)^[6]. The research questions of this study are follows;

- What are the positions of credit risk exposure, non-performing loan ratio, market risk exposure, return on assets and return on equity?
- Is there any relationship between credit risk exposure, non-performing loan and market risk exposure between ROA and ROE?
- Do credit risk exposure, non-performing loan and market risk exposure effect on ROA and ROE?

Objectives of the study

The main objective of the study is to examine the credit and market risk on bank performance of commercial banks in Nepal. To accomplish the main objective, specific objective of the study are:

- To analyze the position of credit risk exposure, non-performing loan and market risk exposure and bank performance.
- To measure the relationship between credit risk exposure, non-performing loan and market risk exposure between ROA and ROE.
- To examine the effect of credit risk exposure, non-performing loan and market risk exposure on ROA and ROE.

Hypothesis

A hypothesis is a proposed explanation for a phenomenon. The objective of setting hypothesis is to test the significant differences regarding the parameters of the population on the basis of sample drawn from population. In this study indicator bank performance are taken as dependent variables and indicator of profitability are taken as dependent variables and indicator of credit risk exposure, non-performing loan ratio and market risk exposure are taken as independent variables.

H₁: There is significant relationship between credit risk exposure and bank performance.

H₂: There is significant relationship between non-performing loan and bank performance.

H₃: There is significant relationship between market risk exposure and bank performance.

H₄: There is significant effect of credit risk exposure on bank performance.

H₅: There is significant effect of non-performing loan on bank performance.

H₆: There is significant effect of market risk exposure on bank performance.

Rationale of the study

Credit risk and market risk are two significant factors that can impact a bank's performance. Understanding their rationale and how they affect a bank's operations is crucial for managing risk and ensuring financial stability. Credit risk and market risk are inherent in banking operations, and their rationale is closely tied to a bank's financial performance, stability, and regulatory compliance. Effective risk management is essential for banks to optimize their profitability, maintain a good reputation, and ensure long-term viability in the financial industry.

This study will further assist bank management in finding out some of the external factors which can influence their profits and operations both in a positive and negative way. This will assist commercial banks in adapting to the ever changing dynamics of the new business and also the ever changing needs of customers and providers of different customers. A successful completion of this study research work will be of help by adding to the existing body of knowledge and also serve as a reference material to other researchers.

Empirical review

Malhotra *et al.* (2009)^[14] examined the influence of credit risk on profitability of 8 commercial banks in India for the period of 2003 to 2014. The data was analyzed using descriptive statistics and panel data regression. The ratio of non-performing loan to loan & advances and ratio of loan & advances to total deposit were used as indicators of credit risk. Return on asset was used as an indicator of financial performance. The findings of this study show that bank profitability is inversely influenced by the level of loan and advances, non-performing loan and deposits thus exposing them to risk of illiquidity and distress. The authors recommend for the management to be cautious when setting up the credit policy as not to affect profitability.

Boahene *et al.* (2012) examined the effect of credit risk and profitability of selected banks in Ghana. A panel data from six selected commercial banks covering the five-year period (2005-2009) was analyzed within the fixed effects framework. For the analysis of data regression analysis (both fixed and random effect models) was used in bringing to bear the linkage between credit risk and profitability of some selected banks. From the results credit risk (non-performing loan rate, net charge-off rate, and the pre-provision profit as a percentage of net total loans and advances) has a positive and significant relationship with bank profitability. This implies that, banks in Ghana experience high profitability irrespective of the huge risk exposure. The results can be attributed to the prohibitive lending/interest rates, fees and commission (non-interest income) charged. Also, found support for previous empirical works which depicted that bank size, bank growth and bank debt capital influence bank profitability positively and significantly.

Li & Zou (2014)^[12] examined the impact of credit risk management on profitability of commercial banks in Europe from 2007 to 2012. The authors collected data from the largest 47 commercial banks in Europe and analyzed them using multivariate regression analysis. The study used capital adequacy ratio and non-performing loan ratio as proxies for credit risk management, and ROA and ROE as proxies for profitability. They used Capital Adequacy ratio and Non-performing loan ratio as the measures of credit risk

management. The study revealed that the credit risk management does not have positive effect on profitability of commercial banks. And also they found that the relationships between all the proxies are not stable but fluctuating.

Bhattarai (2016) [3] examined the effect of credit risk on the performance of Nepalese commercial banks using pooled data of fourteen commercial banks of Nepal for the period of 2010 to 2015 totaling to 77 observations. The 77 observations include capital adequacy ratio, non-performing loan ratio, cost per loan assets, cash reserve ratio and bank size as an independent variable; and return on assets as a dependent variable. Regression analysis was used to assess the data. The findings of the study showed that the commercial bank under consideration has been practicing poor credit risk management. This was further evidenced by the negative effect of nonperforming loan ratio on bank performance and the positive effect of cost per loan assets on bank performance. In contrast to other studies, the author found that capital adequacy ratio and cash reserve have no influence on bank performance. Since there is a significant relationship between credit risk and bank performance, the author suggests that the banks establish proper credit risk management strategies by conducting sound credit evaluation procedure before granting loans to customers.

Tuladhar (2017) [9] has made an attempt to analyze the impact of credit risk management on the profitability of Nepalese commercial banks. Her main objective is to investigate the impact of credit risk management on the profitability of Nepalese commercial banks. The panel data of a five-year period from the selected banks were used to examine the relationship between credit risk and performances. Further, a regression model was used to analyze the data. She concludes 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.

Shrestha (2018) [18] investigated the impact of credit risk on the performance of Nepalese commercial banks. Among 28 commercial banks in Nepal, two commercial banks, Himalayan Bank Ltd. and Nepal Investment Bank Ltd. with 20 observations. Secondary data are collected for the study from selected banks for the period of 2006 to 2016 which have been used for the analysis. These data are analyzed using regression model. This study focused on the effect of credit risk on the bank performance in the context of Nepal's commercial banks only. It tries to minimize the

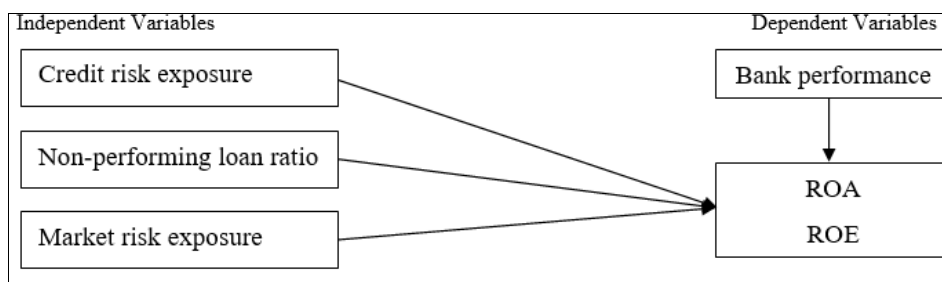
research gap by emphasizing the effects of credit risk on the financial performance of Nepalese commercial banks. Cash Reserve Ratio and Book Value per Share have a positive and statistically significant impact on bank performance. Capital Adequacy Ratio is not considered as the influencing variable on bank performance. This study concludes that there exists significant relationship between bank performance and credit risk indicators.

Chepkemoi *et al.* (2019) investigated the impact of market risk on the financial performance of non-bank financial institutions (NBFIs) listed on the Nairobi Stock Exchange (NSE) from 2012 to 2017. In this study, the degree of financial leverage (DFL) indicators was used to measure market risk. Financial leverage was found to be positively associated with NBFIs performance. Correspondingly, interest risk was found to have the most substantial influence on Kenya's NBFIs financial performance. Following interest risk, assessed annual data of seven years from 2007 to 2014 to understand the impact of interest rate fluctuations on bank profitability in Pakistan. The study found that bank profitability reduced because of deposits with other banks and interest rates. Meanwhile, advances, loans, and investment increased bank profitability. A study was also conducted focusing on the Casablanca Stock Exchange (CSE) from 2000 to 2016.

Gauchan and Upadhyaya (2020) [8] studied the evidence of credit portfolio management and its relationship with banks financial performance. Monthly financial reports of 7 joint venture commercial banks were used to analyze by comparing sector-wise portfolio management of bank's loan and its relationship with return on assets. Descriptive and fixed effect regression was used to analyze the panel data. It reveals that all the sectors have an impact on banks' financial performance except consumption & others. The study concludes that the JVBs of Nepal have managed their portfolio as per the standard parameter allocated by Nepal Rastra Bank (NRB) directives. The highest portion of loan in JVBs is invested in service sector and lowest in agriculture & mining sector. Similarly, the profitability of bank has positive relation to all the sector except consumption & other sector defining the sector-wise portfolio management provides a good framework to maintain the sustainability of bank.

Research framework and definition of variables

Some of the evaluation factors are reiterated under one or more of the other components to reinforce the interrelationship between components. The listing of evaluation factors for each component's rating is in no particular order of importance. The dependent variables of this study are bank performance and independent variables are as presented:



Note. Maharjan (2020)

a. Credit risk exposure

Credit risk exposure refers to the potential financial loss a lender or creditor may experience due to the failure of a borrower or counterparty to fulfill their contractual obligations, such as repaying a loan or meeting other credit commitments. It represents the amount of risk that a financial institution or investor is exposed to in the event of default by a borrower or deterioration in their creditworthiness. In the context of financial institutions, credit risk exposure encompasses the total value of loans, credit lines, or other forms of credit extended to borrowers. It also considers potential losses from off-balance-sheet exposures, such as guarantees, letters of credit, and derivative contracts (Darrel & Kenneth, 2003) [9].

Credit risk exposure (CRE) = $\sum_{i=1}^n (\text{Assets} \times \text{Risk weighted})$

$$\text{Non-performing Loan Ratio (NPLR)} = \frac{\text{Non-performing Loan}}{\text{Total Loan}} \times 100$$

c. Market risk exposure

Market risk exposure refers to the potential financial loss that an individual or an entity, such as a financial institution or investor, may face due to adverse movements in market variables. These variables can include interest rates, foreign exchange rates, equity prices, commodity prices, and other financial indicators that influence the value of investments, trading portfolios, and assets. Market risk exposure highlights the vulnerability of portfolios and financial positions to changes in market conditions and underscores the importance of managing the potential impact of market fluctuations (Hull, 2012) [11].

Market risk exposure (MRE) = Foreign currency risk exposure $\times 5\%$

d. Return on assets

This ratio measures the profitability achieved by the bank by investing its assets in various activities, and is calculated by dividing net income by total assets. ROA measures the performance of banks. It reflects the ability of the bank to generate profit from the bank assets. ROA measures the ability of the management to convert the assets of the bank into net earnings (Sarkar et. al, 1998) [16]. Higher liquidity may lead to lower return on assets but with less significant impact on overall profitability (Almumani, 2013) [1].

$$\text{Return on assets (ROA)} = \frac{\text{Net Profit}}{\text{Total Assets}} \times 100$$

e. Return on equity

ROE tells what percentage of profit the company makes for every monetary unit of equity invested in the company. ROE doesn't specify how much cash will be returned to the shareholders, since that depends on the company's decision about dividend payments and on how much the stock price appreciates. However, it's a good indication of whether the company is even capable of generating a return that is worth whatever risk the investment may entail (Berman, Knight and Case, 2013) [2]. ROE is usually calculated by dividing net profit by average shareholders' equity.

$$\text{Return on equity (ROA)} = \frac{\text{Net Profit}}{\text{Shareholder's Equity}} \times 100$$

b. Non-performing loan ratio

Non-performing loans ratio (NPLR) reflects the bank's credit quality and is considered as an indicator of credit risk management. NPLR, in particular, indicates how banks manage their credit risk because it defines the proportion of loan losses amount in relation to total loan amount (Hosna et al, 2009). NPLR has been used as the default rate on total loan and advances. Gizaw, Kebede and Selvaraj (2013) assert that non-performing loan ratio (NPLR) is the major indicator of commercial banks' credit risk. They finds that NPLR which measures the extent of credit default risk sustained by the banks showed a statistically significant large negative effect on profitability measured by ROA.

Research methodology

The research designs used in this study are descriptive, casual comparative and analytical. This study selected 10 commercial banks i.e. NIBL, NABIL, KBL, HBL, NBL, SBL, NICA, EBL, SCB and MBL out of total 21 commercial banks of Nepal as using convenience sampling techniques. The sample bank is selected on the basis of capital from high to low. Thus, the study is based on 100 observations. The study is based on the secondary data which are gathered for 10 commercial banks in Nepal for the period of 10 years from 2069/70 to 2078/79. The research variables are used in the study CRE, NPLR and MRE and the bank performance indicator are ROA and ROE. The main source of data includes various issues of banking and financial statistics and annual reports of the selected commercial bank from websites of concern bank.

Model specification

The main aim of this study is to analyze the impact of credit and market risk on bank performance of commercial banks in Nepal. The collected data has been analyzed using Microsoft office excel-2003 produced the result of regression analysis analyzed from different two models.

First model

In this first model, ROA is taken as dependent variable and CRE, NPLR and MRE are taken as independent variables. The first model is presented as follows:

$$\text{ROA} = \beta_0 + \beta_1 \text{CRE} + \beta_2 \text{NPLR} + \beta_3 \text{MRE} + e.$$

Second model

In this second model, ROE is dependent variable and CRE, NPLR and MRE are taken as independent variables. The second model is presented as follows:

$$\text{ROE} = \beta_0 + \beta_1 \text{CRE} + \beta_2 \text{NPLR} + \beta_3 \text{MRE} + e.$$

Where, is

ROA_{it} = Return on assets

ROE_{it} = Return on equity

CRE_{it} = Logarithm of credit risk exposure

NPLR_{it} = Non performing loan ratio

MRE_{it} = Logarithm of market risk exposure

e = Error term

Analysis and results

Descriptive statistics

Descriptive statistics refers to a branch of statistics that involves the analysis and summarization of data to provide a concise and meaningful description of its main characteristics. It aims to organize, present, and describe data in a way that allows for easier interpretation and understanding. The researcher analyzed the data from statistical tools for using dependent and independent variables has analyzed the data from minimum, maximum, mean and standard deviation which are as presented in the following table.

Table 1: Descriptive statistics of research variables

Descriptive statistics	Minimum	Maximum	Mean	SD
CRE	7.32	8.59	7.92	0.27
NPLR	0.01	5.24	1.32	1.12
MRE	4.09	6.59	5.44	0.52
ROA	0.49	3.25	1.65	0.56
ROE	3.61	42.94	16.84	6.41

Note. Microsoft Office Excel-2003

Table 1 shows the descriptive statistics of CRE, NPLR, MRE, ROA, ROE has analyzed from minimum, maximum, mean and standard deviation. The average of CRE is 7.92, NPLR is 1.32, MRE is 5.44, ROA is 1.65 and ROE is 6.41. The standard deviation is high in ROE which is more spread out and less in CRE which is disclosed.

Correlation coefficient between independent variables with ROA and ROE

The correlation coefficient is a statistical measure of the strength of the relationship between the relative movements of two variables. Pearson correlation coefficients have been computed and the results are presented in table 4.2.

Table 2: Correlation coefficient between independent variables with ROA and ROE

Correlation	ROA	ROE	CRE	NPLR	MRE
ROA	1				
ROE	0.774713	1			
CRE	-0.12898	-0.22247	1		
NPLR	-0.14108	-0.05455	-0.22131	1	
MRE	0.170792	-0.02213	0.344548	0.08292	1

Note. Microsoft Office Excel-2003

Table 2 shows that the correlation coefficient between independent variable is CRE, NPLR and MRE with ROA and ROE. The correlation coefficient between ROA with CRE is (0.12898), NPLR is (0.14108) and MRE is 0.170792. The relationship between ROA with CRE and NPLR has negligible negative relationship but MRE has negligible positive relationship. The result shows that the higher relationship with MRE and weak relationship with NPLR on ROA. Moreover, the correlation coefficient between ROE with CRE is (0.22247), NPLR is (0.05455) and MRE is (0.02213). The relationships between ROE with all independent variables are negligible negative relationship. The result shows that the higher relationship with MRE and weak relationship with CRE and NPLR on ROE.

Regression analysis

The regression analysis is carried out to determine whether the dependent variable is Influence by the given independent variables or not. In this analysis ROA and ROE are dependent variables and CRE, NPLR and MRE are independent variables. There is regression model is divided by two parts are model 1 and model 2. The equation of regression model is as follow:

1. First model

In the first model, return on assets (ROA) is taken as dependent variable and credit risk exposure (CRE), non-performing loan ratio (NPLR) and market risk exposure (MRE) are taken as independent variables. The model is presented as follows:

$$ROA = \beta_0 + \beta_1 CRE + \beta_2 NPLR + \beta_3 MRE + e.$$

a. Predictors: CRE, NPLR and MRE

b. Dependent Variable (Constant): ROA

The R-square of 0.1163 indicate that the 11.63% variation of ROA is explained by credit risk exposure, non-performing loan ratio and market risk exposure. It indicates a strong positive relationship between dependent and independent variables of (R=0.0887). In addition, the coefficient of determination indicates that about 11.63% of changes in independent variables are explained by ROA.

a. Predictors: CRE, NPLR and MRE

b. Dependent Variable (Constant): ROA

From the ANOVA statistics, the processed data had a significance level of 0% which shows that the data is ideal for making a conclusion on the population parameters as the value of significance (p-value) is less than 5% is an indication that there were significant difference between dependent and independent variables. The significance value was less than 0.05 indicating that the overall model was significant on ROA.

Table 3: Regression coefficient for ROA with independent variables

Model 1	Coefficients	Standard Error	t Stat	P-value
Intercept	4.6770	1.6343	2.8617	0.0052
CRE	-0.5757	0.2202	-2.6141	0.0104
NPLR	-0.1126	0.0498	-2.2630	0.0259
MRE	0.3075	0.1119	2.7468	0.0072

Note. Microsoft Office Excel-2003

The regression function is extracted from table 4.5 above as shown below:

$$ROA = 4.6770 - 0.5757CRE - 0.1126NPLR + 0.3075MRE + e.$$

Table 5 shows the regression coefficient has negative affects on CRE as shown by a regression coefficient of CRE is (0.5757) where p-value is 0.0104 on ROA. It also found that NPLR has negative influences on ROA shown by a regression coefficient of (0.1126) where p-value is 0.0259. Moreover, the results indicate that MRE has a positive effect on ROA as shown by regression coefficient is 0.3075 where p-value is 0.0072. The study further revealed that p-value is less than 5% are CRE, NPLR and MRE on ROA which shows that independent variable is significant impact on ROA.

2. Second model

In the second model, return on equity (ROE) is taken as dependent variable and credit risk exposure (CRE), non-performing loan ratio (NPLR) and market risk exposure (MRE) are taken as independent variables. The model is presented as follows:

$$ROE = \beta_0 + \beta_1 CRE + \beta_2 NPLR + \beta_3 MRE + e.$$

Table 4: Model summary for ROE with independent variables

Model	Multiple R	R Square	Adjusted R Square	Standard Error	Observations
2	0.2586	0.0669	0.0377	6.2924	100

a. Predictors: CRE, NPLR and MRE

b. Dependent Variable (Constant): ROE

The R-square of 0.0669 indicate that the 6.69% variation of ROE is explained by credit risk exposure, non-performing loan ratio and market risk exposure. It indicates a strong positive relationship between dependent and independent variables of (R=0.0377). In addition, the coefficient of determination indicates that about 6.69% of changes in independent variables are explained by ROE.

Table 5: Analysis of variance for ROE with independent variables

Model 2	df	SS	MS	F	Significance F
Regression	3	272.3741	90.7914	2.2930	0.0829
Residual	96	3801.1027	39.5948		
Total	99	4073.4767			

a. Predictors: CRE, NPLR and MRE

b. Dependent Variable (Constant): ROE

From the ANOVA statistics, the processed data had a significance level of 0% which shows that the data is ideal for making a conclusion on the population parameters as the value of significance (p-value) is more than 5% is an indication that there were insignificant difference between dependent and independent variables. The insignificance value was greater than 0.05 indicating that the overall model was insignificant on ROE.

Table 6: Regression coefficient for ROE with independent variables

Model 2	Coefficients	Standard Error	t Stat	P-value
Intercept	64.9499	19.3853	3.3505	0.0012
CRE	-6.6801	2.6120	-2.5575	0.0121
NPLR	-0.7086	0.5904	-1.2002	0.2330
MRE	1.0472	1.3277	0.7888	0.4322

Note. Microsoft Office Excel-2003

The regression function is extracted from table 4.13 above as shown below:

$$ROE = 64.9499 - 6.6801CRE - 0.7086NPLR + 1.0472MRE + e.$$

Table 8 shows the regression coefficient has negative affects on CRE as shown by a regression coefficient of CRE is (6.6801) where p-value is 0.0121 on ROE. It also found that NPLR has negative influences on ROE shown by a regression coefficient of (0.7086) where p-value is 0.2330. Moreover, the results indicate that MRE has a positive effect on ROE as shown by regression coefficient is 1.0472 where p-value is 0.4322. The study further revealed that p-value is less than 5% is CRE on ROE which shows that independent variable is significant impact on ROE.

Moreover, it revealed that p-value is greater than 5% is NPLR and MRE which shows that the independent variable is insignificant impact on ROE.

Discussion

The study found that the discussion of the relationship between ROA with CRE and NPLR has negligible negative relationship but MRE has negligible positive relationship. The result shows that the higher relationship with MRE and weak relationship with NPLR on ROA. The relationships between ROE with all independent variables are negligible negative relationship. The result shows that the higher relationship with MRE and weak relationship with CRE and NPLR on ROE. This result is consistency with the finding mentioned by Munangi and Sibindi (2020) and Ndzila and Nelson (2020) but inconsistency with the finding mentioned by Aduda and Obondy (2021), Shab (2019), Shrestha (2018)^[18] and Asare (2015).

The study has conducted from the first model; the regression analysis with dependent variables on ROA has negative affects on CRE. Hence, H₁ and H₄ i.e. CRE has accepted. It also found that NPLR has negative influences on ROA. Hence, H₂ and H₅ i.e. NPLR has accepted. This result is consistency with the finding mentioned by Ahmed *et al.* (1998), Bayyoud & Sayyad (2015) and Tuladhar (2017)^[9] but inconsistency with the finding mentioned by Alshtti (2020) and Ogboi and Unuafé (2013). Moreover, the results indicate that MRE has a positive effect on ROA. Hence, H₃ and H₆ i.e. MRE has accepted. This result is consistency with the finding mentioned by Okpara (2011) and Maniagi (2018) but inconsistency with the finding mentioned by Wachiaya (2011) and Koch and MacDonald (2014). The study further revealed that p-value is less than 5% are CRE, NPLR and MRE on ROA which shows that independent variable is significant impact on ROA which is accepted. This result is consistency with the finding mentioned by Ojha (2002), Kargi (2011), Khrawish (2011), Boahene *et al.* (2012), Gizaw *et al.* (2013), Isanzu (2017), Maniagi (2018), Shrestha (2018)^[18], Ndzila and Nelson (2020) but inconsistency with the finding mentioned by Malhotra *et al.* (2009), Bhattarai (2016)^[3] and Tuladhar (2017)^[9].

The study has revealed that the second model; the regression analysis with dependent variables on ROE has negative affects on CRE. Hence, H₁ and H₄ i.e. CRE has accepted. It also found that NPLR has negative influences on ROE. Hence, H₂ and H₅ i.e. NPLR has rejected. This result is consistency with the finding mentioned by Ahmed *et al.* (1998), Bayyoud & Sayyad (2015) and Tuladhar (2017)^[9] but inconsistency with the finding mentioned by Alshtti (2020) and Ogboi and Unuafé (2013). Moreover, the results indicate that MRE has a positive effect on ROE. Hence, H₃ and H₆ i.e. MRE has rejected. This result is consistency with the finding mentioned by Okpara (2011) and Maniagi (2018) but inconsistency with the finding mentioned by Wachiaya (2011) and Koch and MacDonald (2014). The study further revealed that p-value is less than 5% is CRE on ROE which shows that independent variable is significant impact on ROE which is accepted. Moreover, it revealed that p-value is greater than 5% is NPLR and MRE which shows that the independent variable is insignificant impact on ROE. This result is consistency with the finding mentioned by Tuladhar (2017)^[9] but inconsistency with finding mentioned by Pradhan and Shah (2020), Subedi (2018), Serwadda (2018) and Boahene *et al.* (2012).

Conclusion

The result shows that the higher relationship with MRE and weak relationship with NPLR on ROA. Moreover, the relationships between ROE with all independent variables are negligible negative relationship. The result shows that the higher relationship with MRE and weak relationship with CRE and NPLR on ROE. Therefore it can be concluded that bank risk exposure to credit risk and market risk and non-performing loan ratio affect the profitability of the bank, likewise bank and financial institution should consider risk exposure and non-performing loan ratio to enhance profitability.

Implication

Based on the findings from the empirical analysis, the study offers the following implications through which they can work to improve banks management practice and to have effective role in increasing profitability of banks. It also includes recommendations.

- Managers should pay more attention to improving capital adequacy since it positively enhances financial performance while reducing nonperforming loans by applying modern strategies and techniques for credit and market risk management.
- Managers should get information about credit and market risk for the bank.
- Stakeholder should find information about factor affecting investment or risk related to credit and market.
- Managers should know about the relationship between ROA and ROE with CRE, NPLR and MRE.
- Managers should know risk management technique for the credit and market risk.
- Managers should know credit and market risk management and bank profitability.
- This study also helpful for the further analysis about credit and market risk management and other risk management.

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