Journal of Management and Development Studies
Volume: 32, Issue 1, 39-52

https://doi.org/10.3126/jmds.v32i1.58694
https://www.nasc.org.np/journals/all
ISSN 2392-4896 online/ ISSN 2392-4888 print

Effects of credit risks on growth of commercial banks in Nepal

Anil Humagain
anilhuma@gmail.com

Abstract

This study aims to investigate the effects of credit risk management tools on the growth of commercial banks in Nepal. The study utilized a descriptive research design with quantitative research methods. The data were collected from System-X, for a period of 12 years from 2011 to 2022. The results of the study indicate that non-performing loans (NPLs) have a significant negative effect on bank performance and growth of total assets in Nepal. The average non-performing loans of the commercial banks during the study period was 1.5 percent. During this period, the average total assets growth of the banking sector was 19.94 percent. Credit to Deposit Ratio, Non-Performing Loan, and Inflation were statistically significant to predict the growth of commercial banks. The study also revealed that credit management practices among Nepalese commercial banks are suboptimal. This study further suggests that the regulatory authority should periodically review the credit risk management tools employed by banks in order to mitigate the credit risks.

Keywords: CD ratio, non-performing loan, inflation, assets, credit risk

1. Background of the study

The banking industry is considered to be one of the most critical sectors in any economy as it plays a crucial role in mobilizing financial resources and allocating them efficiently. Commercial banks are the primary intermediaries between savers and borrowers, and their performances are heavily influenced by the level of credit risks they undertake. Credit risk is defined as the potential loss that a bank may incur due to the failure of its borrowers to repay their loans (Nkusu, 2011). In Nepal, the banking sector has undergone significant changes in the last few years due to various economic, regulatory and technological factors. The country has witnessed a tremendous growth in the development of commercial banks, with a total of 20 commercial banks operating as of 2023 (Nepal Rastra Bank, 2023). However, these banks are facing numerous challenges, including high credit risks, which are affecting their financial performances.

Credit risk pertains to the potential financial loss arising from the failure of a borrower or counterparty to fulfil their obligations as stipulated in an agreement, which can subsequently negatively influence the financial performance of the bank. Credit risk management has emerged as a critical topic in financial research with numerous scholars exploring various aspects of risk management. While some progress has been made in understanding credit risk, there is still much to learn. The issue of banking performance has long been a priority in social science research; and credit risk is perhaps the most significant risk faced by the banks. As Coyle (2000) notes, credit risk refers to losses incurred when customers fail to repay their loans in full and on time. As Gieseche (2004) argues, banks' success depends heavily on accurate measurement and efficient management of this risk. The credit management policy plays a crucial role in the financial performance of commercial banks and emphasizes the importance of credit policies to prevent non-performing loans; and banks should maintain a significant provision to absorb credit risk while improving lending criteria, portfolio grading, and credit mitigation techniques to decrease the likelihood of default risks (Mercylynne & Omagwa, 2017). Given the significant role of commercial banks in the Nepalese economy and the growing challenges they face, investigating the effects of credit risks that are escalating in Nepalese commercial banks is a crucial research area that requires further exploration.

The importance of credit risk management has increased significantly in the last two decades due to various factors such as a rise in bankruptcies, disintermediation by high-quality borrowers, more competitive loan margins, declining real asset values, and the growth of off-balance sheet instruments with default risk exposure, including credit risk derivatives (McKinsey, n.d. cited in Bams & Ebrahimnejad, 2010). Prudent management of credit risk is essential for good financial health of financial institutions, as it is the most critical and expensive risk associated with financial institutions and can directly threaten their solvency (Chijoriga, 2011). Studies conducted in other countries have shown that credit risks have a significant impact on the financial performances of commercial banks. For instance, a study by Nabi and Siddiqui (2019) conducted in Pakistan found that credit risk had a negative effect on the profitability of banks. Similarly, a study by Ongore and Kusa (2013) conducted in Kenya found that credit risk had a significant negative effect on the financial performances of banks.

The implication of credit risks on the performance of banks has consistently captured the attention of researchers due to its crucial role within the contemporary banking system. However, limited

research has been conducted on the effects of credit risks on the performances of commercial banks in Nepal. Therefore, this study aims to fill this gap by investigating the effects of credit risks on the escalations of commercial banks in Nepal. The study was guided by the following research questions:

- What is the relationship between credit risk management tools and performance of commercial banks in Nepal?
- What is the credit risk management situation in Nepal?

To facilitate the exploration of these questions, this study first seeks to establish that the growth exhibited by the sampled banks surpasses the overall inflation level to a substantial extent. Additionally, an objective of this research involves the investigation into the potential relationship between the tools utilized for credit risk management and the growth of the banks under consideration. The structure of the remainder of this research paper is as follows: In Section 2, an extensive review of the existing literature is presented. Moving on to Section 3, the data collection process and research methodology are elaborated. Details pertaining to findings and results can be found in Section 4. Lastly, the concluding remarks are provided in Section 5.

2. Literature review

Credit risk management may be defined as the combination of coordinated tasks and activities for controlling and directing risks confronted by an organization through the incorporation of key risk management tactics and processes in relation to the organization's objectives (Nikolaidou & Vogiazas, 2014). Banks manage credit risk for two main purposes: to enhance interest income and to reduce loan losses which result from credit default (Felix & Claudine, 2008). It is expected that banks with better credit risk management strategies have lower loan losses (non-performing loans). Credit risk remains widely regarded as the major influence on a bank's performance and the major cause of bank failures, largely due to their limited capacity to absorb losses from bad loans (Al-Tamimi & Al-Mazrooei, 2007; Boffey & Robson 1995) and the risks may not be noticeable until they have already resulted in losses, making it crucial for financial institutions to adopt proactive risk management strategies (Bessis, 2011). The Stakeholder theory suggests that smaller firms are more susceptible to financial problems and thus should prioritize risk management practices. (Klimczak, 2007; Omasete, 2014). The potential conflicts of interest may exist between different stakeholders, including shareholders, management, and debt holders due to asymmetries in earning distribution. This can result in the firm taking excessive risks or not engaging in positive net value projects (Mayers & Smith, 1987). It is crucial to define the importance of aligning the interests of shareholders and managers to improve their firm's performance (Lan & Heracleous, 2010) and also to define hedging policies that can positively impact the firm's value (Smith & Stulz, 1985; Fite & Pfleiderer, 1995). The risk management does lead to lower variability of corporate value, however there is little evidence that it leads to the benefits specified by the theory (Jin & Jorion, 2006).

Daniel et al. (2020) found a significant relationship between credit management and the performance of Bank of Kigali Limited. The client appraisal, credit risk control, collection policy and terms of credit all had a positive and significant impact on the financial performance of microfinance institutions (Edwin & Omagwa, 2018). The financial performance of public sector

banks in India is dependent upon liquidity and reverse effect of inflation, capital adequacy and inversely related with banks' interest margin (Singh & Milan, 2020). The financial performance is characterized by reserves and surplus, fixed deposits and working capital (Nagarkar, 2015). The sound credit management, including client appraisal, credit risk control, and collection policy, significantly influences the financial performance of commercial banks (Olabamiji & Michael, 2018).

According to Al-Naser, (2019) there is a significant difference between public and private sector banks in Nepal in the application of risk management aspects as well as in financial soundness indicators. The financial ratios of banking sector should be improved to achieve better financial performance (Rao & Ibrahim, 2017). The profitability of commercial banks in Afghanistan is mainly determined by their internal factors, with bank-specific factors playing a significant role, while external economic factors, such as GDP growth rate, had a positive but insignificant impact on profitability (Haidary & Abbey, 2018). The management of credit risk plays a crucial role in determining a bank's profitability and overall success. Previous studies have emphasized the significance of effective credit risk management for banks (Bagale, 2023). In the context of Nepalese banks, establishing a comprehensive risk management system that adheres to the standardized processes is not only necessary to comply with regulatory requirements but is also essential for enhancing the performance of financial institutions (Bhatt et al., 2023). To safeguard their assets, banks should develop robust credit risk management strategies that involve thorough credit evaluations before granting loans to customers, as well as improve efficiency in credit analysis and loan management (Khanal & Sapkota, 2023). It is imperative for banks to design and implement strategies that minimize risk exposure while simultaneously enhancing profitability (Thapa & Bhandari, 2023).

Researches on credit risks have significantly increased over the past years with several scholars who have studied on various aspects of risk management. Despite the substantial body of literature revealing the impact of credit risks on financial performance of commercial banks, a gap still exists in research on how credit risks management helps to improve financial performance of commercial banks in Nepal (Klimczak, 2007; Omasete, 2014; Bams & Ebrahimnejad, 2010). Therefore, this study aims to fill the gap by examining the effects of credit risks on financial performance of commercial banks in Nepal through the lens of given research framework. The given paper includes five independent variables - capital adequacy ratio, credit to deposit ratio, loan loss provision ratio, non-performing loans ratio and Inflation, that are expected to have an effect on the dependent variable of total assets.

2.1. Conceptual framework

The conceptual framework depicted in Figure 1 provides a pictorial representation of the interrelationships among the independent variables and the dependent variable, this framework has been constructed by integrating perspectives from established literature. Following the given conceptual framework, this research examines and evaluates how much each independent variable affects the dependent variable "Escalation of Total Assets" during a study period.

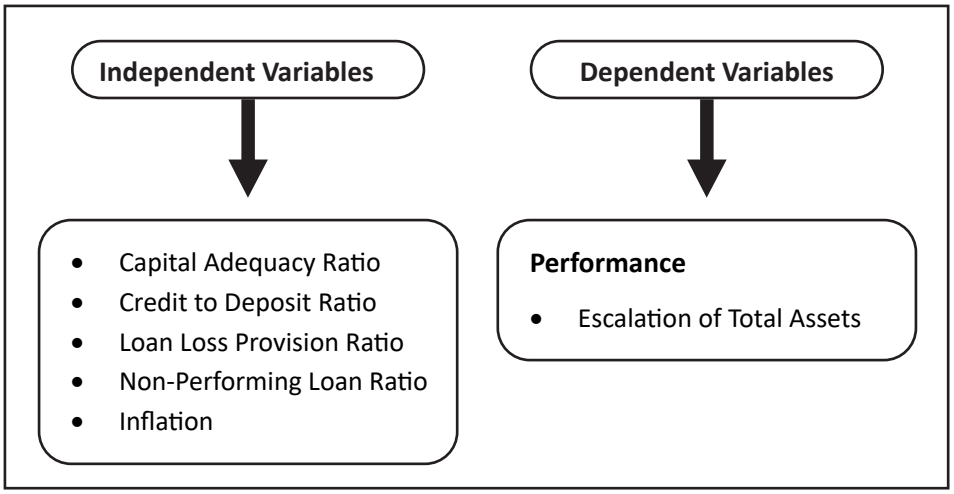

Figure 1: Conceptual framework

3. Research methods

The study utilized a descriptive research design with quantitative research methods to investigate credit risk management practices among commercial banks listed in the Nepal Stock Exchange. Ten out of 21 banks were selected as a representative sample using the random sampling method. Data were collected from System-X[1℘] for a period of 12 years from 2011 to 2022. The collected data were analysed using descriptive and inferential statistics in Python v3.11. The reliability of the data was verified by cross-checking it against the annual reports of the sampled banks.

The study model for the data analysis is as follows:

$$A_{it} = \alpha + \beta iCAR_{it} + \beta iiCDR_{it} + \beta iiiLLPR_{it} + \beta ivNPLR_{it} + \beta vInf_{t} + \varepsilon_{it}$$

Where,

A_{it}	=	Total assets in natural logarithmic terms of commercial bank i in year t
A	=	Intercept
$\beta i - \beta_v$	=	Regression Coefficients
CAR_{it}	=	Capital adequacy ratio of the commercial bank i in year t
CDR_{it}	=	Credit to deposit ratio of the commercial bank i in year t
$LLPR_{it}$	=	Loan loss provision of the commercial bank i in year t
$NPLR_{it}$	=	Non-performing loan of the commercial bank i in year t
Inf_{t}	=	Inflation Rate in year t
ε_{it}	=	Random error Term

Considering the existing literatures, the study selects variables to measure the performance of commercial banks and its determinants that the analysis would involve examining the coefficients and statistical significance of each independent variable to assess their impact on the dependent variable.

Table 1: Elaboration of variables

Variables	Elaboration	Signs of Expectation
Assets	Natural Log of Total Assets	+
RoA	It measures a bank's profitability by comparing its net income to its average total assets. It indicates how efficiently the bank generates profits from its assets.	+
RoE	It measures a bank's profitability by comparing its net income to its average total equity. It reflects the bank's ability to generate returns for its shareholders.	+
CAR	A measure of a bank's capital in relation to its risk-weighted assets. It represents the bank's ability to absorb losses and provides a measure of its financial strength and stability.	+
CDR	A measure of credit extended by a bank relative to its deposits. It indicates the bank's lending activity and liquidity position.	+
LLPR	A provision made by a bank to cover potential loan losses. It reflects the bank's assessment of the riskiness of its loan portfolio and its preparedness to absorb potential losses.	+
NPLR	A proportion of loans in a bank's portfolio that are not being repaid by borrowers as per the agreed terms. It is an indicator of asset quality and credit risk.	–
INF	Inflation is a general increase in prices level in an economy over time. It affects the purchasing power of money and can impact banks' operations and profitability.	–

Analysis and results

This study is based on secondary data of 10 commercial banks from Fiscal year 2011 to 2022. The study relied on data extracted from sample commercial banks. To analyse the general tendency and volatility of the samples of the study period, descriptive statistics of the variables has been taken into consideration.

Table 2: Descriptive statistics of variables

Variables	Mean	Median	Range	S. D.
RoA	1.79	1.76	4.31	0.72
RoE	15.52	14.62	29.92	0.521
CAR	13.39	13.10	12.80	2.11
CDR	75.52	75.12	36.60	6.63
LLPR	2.29	1.70	10.79	1.77
NPLR	1.60	1.24	17.89	1.85
INF	7.31	8.36	5.83	2.08
Assets	4.33	4.38	3.40	0.71

Source: Author's Calculations

As shown in Table 2, the mean value 1.79 percent of RoA suggests that the banking sector in Nepal has been able to generate profits from its assets. Further, the mean value of RoE is 15.52 percent and it suggests that the Banking sector has been able to generate profits for its shareholders. The mean CAR value is 13.39 percent and it suggests that the banking sector has maintained an acceptable level of capital adequacy throughout the study period. The mean CDR indicates that around 75.5 percent of total deposit has been disbursed as credit during the period. The LLPR suggests that the sector set aside a moderate proportion of its loans as provisions for possible losses. The mean value of NPLR suggests that on average a moderate portion of the company's loans was non-performing. The mean value of INF suggests that there was around 7.31 percent of inflation during the study period.

The RoA and RoE exhibit some variability but have relatively low dispersion around their mean values suggesting a relatively stable profitability and value creation for shareholders. While CAR shows some variability, the dispersion around the mean shows a reasonable level of stability in financial solvency. The LLPR and NPLR exhibit moderate variability and dispersion around their mean values, indicating some fluctuations in loan loss provisions and non-performing loan levels. The company's asset levels demonstrate some variability, but with relatively low dispersion along with an indication of a reasonable level of stability in asset holdings. However, the banking sector experienced consistent growth rates that were higher than the average inflation rate.

Table 3 depicts that the average growth rate of total assets during the period was 19.94 percent, while the average inflation rate was 7.13 percent. In each corresponding year, the growth rate exceeded the corresponding inflation rate indicating that the company consistently outperformed inflation and achieved real growth.

Table 3: Average growth rate of sampled banks during the period

Year	Growth Rate (%)	Average Inflation (%)	Growth rate > Inflation
2012	20.63	9.23	TRUE
2013	21.22	9.46	TRUE
2014	20.29	9.04	TRUE
2015	20.42	8.36	TRUE
2016	29.71	7.87	TRUE
2017	16.28	8.79	TRUE
2018	12.54	3.63	TRUE
2019	15.69	4.06	TRUE
2020	17.13	5.57	TRUE
2021	16.57	5.05	TRUE
2022	28.80	7.38	TRUE
Average	**19.94**	**7.13**	**TRUE**

Source: Author's Calculations

The trend of growth rates consistently exceeding inflation rates suggests that the sampled banks were able to maintain positive real growth and potentially increased its market share or competitiveness over the years. The computed F-Value surpasses the critical F-value, so the null hypothesis positing equal variances is deemed invalid. The result substantiates that the variances among the selected banks are uneven. Moreover, the empirical evidence shown in table 4 reflects that the banks have exhibited noteworthy performance in their endeavours to outperform the prevailing inflation rate. The data strongly supports that the commercial banks in Nepal experienced consistent growth rates higher than inflation during the given period indicating positive performance and potential success in navigating economic challenges and maintaining competitiveness.

Table 4: F-Test for variance between growth rate of sampled banks and inflation

	Growth Rate	Inflation	F	P-Value	F Critical
Mean	19.9345	7.1309	6.0232	0.0045	2.9782
Variance	28.1891	4.6800			
Observations	11	11			
Df	10	10			

Source: Author's Calculations

Together with descriptive data analysis, the study undertook inferential statistics to establish a relationship between the variables. Correlation matrix between the variables has been obtained to test the relationship between the variables and used to establish the relationship between variables. The results are presented in Table 5.

Table 5: Correlation analysis between variables

Variables	RoE	RoA	CAR	CDR	LLPR	NPLR	INF	Assets
RoE	1							
RoA	0.68	1						
CAR	-0.19*	-0.07**	1					
CDR	-0.19*	-0.32*	-0.04	1				
LLPR	0.06*	0.02*	0.54**	-0.01*	1			
NPLR	-0.05**	0.17*	-0.35**	-0.01	-0.41**	1		
INF	0.24*	0.09**	-0.40**	-0.16	-0.20*	0.24*	1	
Assets	0.01*	-0.11*	0.23**	0.35*	0.22**	-0.41**	-0.60**	1

** Correlation is significant at the 0.01 level (2-tailed).

* Correlation is significant at the 0.05 level (2-tailed).

Source: Author's Calculations

The results suggest that there exists a weak level of correlation between the studied variables which indicates that their relationships are not very strong or consistent. Further, RoE and RoA have a moderately strong level of correlation; assets and inflation have a strong negative relationship; and weak correlations exist among the other variables. This suggests that factors other than those considered in this analysis may play a more substantial role in explaining the variations in these variables. The significant correlation coefficients indicate that the assumptions of classical Ordinary Least Squares regression are not violated, and it is possible to derive valid results from a multivariate regression analysis. These correlation results can serve as a basis for developing a regression model to further analyse the relationships among the variables studied.

This study applies multivariate regression in testing the relationship between the independent variable and dependent variables. The logarithmic value of total assets has been used in multiple regression to minimize calculation error with regard to the explanatory variables. The regression coefficients and significance tests of each of the independent variables in the model have been presented in table 6. The estimated coefficients for each independent variable have been presented along with their standard errors, t-statistics, p-values, F statistics and Significance-f. Three different models under multivariate regression were developed to examine the relationship between independent variables and the growth parameter as well as financial performance parameters (i.e., dependent variable). Among the three models, the first model with growth parameter as dependent variable has highest R^2. The intercept has a coefficient of 4.05, and the result suggests that the intercept is statistically significant and indicates that there is a non-zero asset value even when all independent variables are zero. The coefficient for CAR is -3.21 which indicates a negative relationship with assets and a p-value of 0.26 elucidates that the CAR fails to predict dependent variable and is not statistically significant in the given model. The coefficient for LLPR is 0.02 which establishes a positive relationship with the dependent variables; however, it fails to establish the relationship with the dependent variables and therefore is not statistically significant.

Table 6: Multivariate regression coefficients

Model	Dependent Variable	Independent Variables	Coefficients	S.E.	t Stat	P-value	R^2	F-Stat	Sig-F
Growth Parameter	Assets	Intercept	4.05	0.77	5.29	-	50.8	23.36	0.01
		CAR	-3.21	2.84	-1.13	0.26			
		CDR	0.03	0.01	3.90	0.01			
		LLPR	0.02	0.03	0.68	0.50			
		NPLR	-0.11	0.03	-3.90	0.01			
		INF	-17.55	2.51	-6.99	0.01			
Financial Performance Parameter	RoA	Intercept	4.66	1.02	4.59	-	14.8	3.91	0.01
		CAR	-3.37	3.77	-0.90	0.37			
		CDR	-0.04	0.01	-3.68	0.01			
		LLPR	0.06	0.04	1.42	0.16			
		NPLR	0.08	0.04	2.03	0.04			
		INF	-0.51	3.33	-0.15	0.88			
	RoE	Intercept	0.31	0.07	4.21	-	14.2	3.75	0.01
		CAR	-0.68	0.28	-2.46	0.02			
		CDR	0.00	0.00	-2.00	0.05			
		LLPR	0.01	0.00	1.85	0.07			
		NPLR	0.00	0.00	-1.06	0.29			
		INF	0.41	0.24	1.68	0.10			

Source: Author's Calculations

On the other hand, CDR, NPLR and INF are statistically significant to predict the dependent variables. Further, the tolerance value and the Variable Inflation Factor of each variable confirms that there is no issue of multicollinearity i.e., all independent variables can be used in the same regression model. In addition, Durbin-Watson statistics of 1.841 indicates that there is no auto-correlation between variables since the test value lies within the range of 1.5-2.5 for the proposed model. The model has been adopted preliminary for the further part of this study, since 2nd and 3rd models have relatively low R^2 values. Further, the 2nd model including financial performance parameter as dependent variables provides identical result with 1st model, however inflation has failed to become a significant predictor of RoA while both CDR and NPLR are significant predictors of RoA. On the contrary 3rd model was inconsistent with the previous models where NPLR and INF were statistically insignificant to predict RoA while CDR and CAR were significant. Further the F-Stat indicates that the regression model is statistically significant, and the independent variables collectively explain a significant portion of the variation in the dependent variable. The value of F is 23.36, which reaches the significance level with p-value of 0.01. Similarly, both 2nd and 3rd models have significant F-statistics result. There was no statically significant difference between mean

value of regression model and mean value of residuals. Hence, the null hypotheses of equal means between two groups are true; and also the error variance is approximately of equal magnitudes in the proposed multivariate regression model, so it is considered that reliable results can be produced by this regression model. These results estimate that the p-value of the F-statistics is at the tolerable significance level, thus there is a possibility of rejecting the null hypothesis in further analysis.

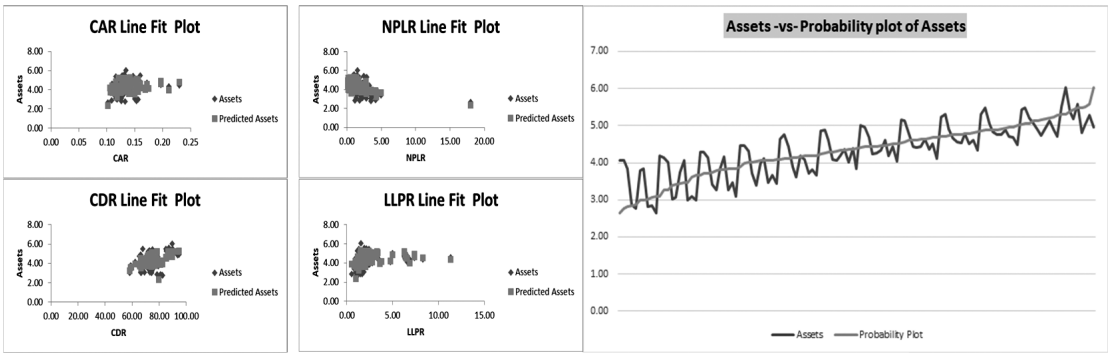

Figure 2: Line fit plot of dependent variables and regression model fit plot

In the first model, R^2 of 0.51 indicates that approximately 51 percentage of the variation in the dependent variable can be explained by the independent variables. Std. Error of 0.51 indicates that the model's predictions are typically off by about 0.51 units from the actual values. Therefore, the model summary table represents the satisfactory result according to the general rule of thumbs and there is no need for adjusting the data because the regression model matched properly. Further it can be inferred that the model is normal and free from the problems of autocorrelations and serial correlations among the variables.

The study has proposed five different hypotheses based on literature review. To test the hypotheses whether they are accepted or rejected, the p-value of regression coefficient for growth parameter has been used. If p-value is less than the standardized p-value *($p < 0.05$)* the null hypothesis is rejected, otherwise it is accepted. The table 7 below exhibits the summary of hypothesis.

Table 7: Results of hypotheses testing

S.N.	Null Hypotheses	Result
H1	There is no significant relationship between Bank's growth and Capital Adequacy ratio.	Accepted
H2	There is no significant relationship between Bank's growth and Credit to Deposit ratio.	Rejected
H3	There is no significant relationship between Bank's growth and Loan Loss Provision Ratio.	Accepted
H4	There is no significant relationship between Bank's growth and Non-Performing Loan ratio.	Rejected
H5	There is no significant relationship between Bank's growth and Inflation.	Rejected

Conclusion and implication

The study aims to examine the effect of credit risk factors on the growth of commercial banks in Nepal. The study found that Non-Performing Loan and Inflation have a significant negative relationship, while credit to deposit has positive relationship with growth of the commercial banks in Nepal. The credit risk management is essential for banks to maintain their financial stability (IMF, 2011). The study revealed that credit management practices among Nepalese commercial banks are suboptimal consistent with the finding of Bhattarai (2016). Since NPLs are a major cause of bank failures, and the banks with high NPL ratios are more likely to fail (Bank for International Settlements, 2010) and therefore NPL should be adjusted to mitigate their negative effects. This can be done by improving their credit risk assessment and monitoring procedures, and by strengthening their loan loss provisions. The study further suggests that the regulatory authority should periodically review the credit risk management tools employed by banks in order to mitigate the credit risks.

This study faces some limitations due to the lower time frame of data; the model's explanatory power is relatively low with a R^2 of 0.51, which could be due to the limited time frame of the data used in the study. Therefore, further studies should be conducted with a larger time frame and with more inclusive samples to ensure higher coefficient of determination; and improve the accuracy of the model's predictions. Due to the changes in regulatory framework over the period by Central Bank of Nepal such as merger, BASEL Framework, interest rate capping and percolation laws on determination of credit risk in banks, an event study can be pursued to further this study. Furthermore, this research is anticipated to offer valuable insights to scholars, serving as a source of knowledge for further research.

References

Al-Naser, M. H. (2019). Public governance and economic growth: Conceptual Framework. *International Journal of Business Ethics and Governance*, *2*(2), 1-15.

Al-Tamimi, H. A. H., & Al-Mazrooei, F. M. (2007). Banks' risk management: A comparison study of UAE national and foreign banks. *The Journal of Risk Finance*, *8*(4), 394–409. https://doi.org/10.1108/15265940710777333.

Bank for International Settlements. (2010). *Non-performing loans: What's driving them up and what can be done about them.* Bank for International Settlements.

Bagale, S. (2023). Credit risk management and profitability of commercial banks in Nepal. *International Journal of Credit and Commerce, 5*(1), 60-67.

Bams, D. W., & Ebrahimnejad, A. (2011). *Developing a commercial credit risk rating model: Case study of a Petrochemical company.* FMA.

Bessis, J. (2011). *Risk management in banking.* John Wiley & Sons.

Bhatt, T. K., Ahmed, N., Iqbal, M. B., & Ullah, M. (2023). Examining the Determinants of Credit Risk Management and Their Relationship with the Performance of Commercial Banks in Nepal. *Journal of Risk and Financial Management*, *16*(4), 1-23.

Bhattarai, Y. R. (2016). Effect of credit risk on the performance of Nepalese commercial banks. *NRB Economic Review, 28(1), 41-64.*

Boffey, R. and Robson, G. (1995). Bank credit risk management. *Journal of Managerial Finance*, *21*(1),66-78. https://doi.org/10.1108/eb018497

Chijoriga, M. M. (2011). Application of multiple discriminate analyses (MDA) as a credit scoring and risk assessment model. *International Journal of Emerging Markets, 6*(2), 132-147.

Coyle, B. (2000). *Framework for credit risk management*. Chartered Institute of Bankers.

Daniel, N., Chantal, M. M., & Nadege, M. (2020). The assessment of loan management on financial performance of banking institutions in Rwanda. *International Journal of All Research Writings, 1*(11), 115-125.

Edwin, K., & Omagwa, J. (2018). Credit management practices and financial performance of microfinance institutions in Nairobi central business district, Kenya. *International Journal of Scientific and Education Research, 2*(5), 64-80.

Felix, A. T., & Claudine, T. N. (2008). *Bank performance and credit risk management* (Unpublished Masters Dissertation). University of Skovde.

Fite, D., & Pfleiderer, P. (1995). *Should firms use derivatives to hedge risk.* William Beaver.

Gieseche, K. (2004). Credit risk modeling and valuation: An introduction to credit risk. *Models and Management, 2*, 1-40.

Haidary, Q., & Abbey, B. (2018). Financial performance of commercial banks in Afghanistan. *International Journal of Economics and Financial Issues*, *8*(1), 242.

International Money Fund. (2011). *Global financial stability report: Grappling with crisis legacies.* World Economic and Financial Services.

Jin, Y., & Jorion, P. (2006). Firm value and hedging: Evidence form US oil and gas producer. *The Journal of Finance, 61*(2), 893-919.

Khanal, P., & Sapkota, P. (2023). Credit risk management and its impact on performance of commercial banks with reference to Nepal. *International Journal of Credit and Commerce, 5*(1), 68-74.

Klimczak, M. K. (2007). *Risk management theory: A comprehensive empirical assessment.* Leon Kozminski academy of entrepreneurship and management.

Lan, L. L., & Heracleous, L. (2010). Rethinking agency theory: The view from law. *Academy of Management Review, 35*(2), 294-314.

Mayers, D., & Smith, C. W. (1987). Corporate insurance and the under-investment problem. *The Journal of Risk and Insurance, 54*(1), 45-54.

Mercylynne, M. W., & Omagwa, J. (2017). Credit risk management and financial performance of selected commercial banks in Kenya. *Journal of Business and Management*, *19*(11), 92-98.

Nabi, S., & Siddiqui, D. A. (2019). Impact of credit risk on profitability of commercial banks in Pakistan. *Journal of Applied Accounting Research, 20(*1*),* 110-127.

Nagarkar, J. J. (2015). Analysis of financial performance of banks in India. *Annual Research Journal of Symbiosis Centre for Management Studies, 3,* 26-37.

Nepal Rastra Bank. (2023). *List of commercial banks in Nepal*. Nepal Rastra Bank. https://www.nrb.org.np/fmis/paymentsystem/commercial-banks.php.

Nikolaidou, E., & Vogiazas, S. (2014), Credit risk determinants for the Bulgaria banking system. *International Advance Economics Research, 20*(87), 102.

Nkusu, M. (2011). Non-performing loans and macro financial vulnerabilities in advanced economies. *Journal of Banking & Finance, 35*(5), 1399-1414.

Olabamiji, O., & Michael, O. (2018). Credit management practices and bank performance: Evidence from First Bank. *South Asian Journal of Social Studies and Economics*, *1*(1), 1-10.

Omasete, C. A. (2014). *The effect of risk management on financial performance of insurance companies in Kenya* (Doctoral dissertation). University of Nairobi.

Ongore, V. O., & Kusa, G. B. (2013). Determinants of financial performance of commercial banks in Kenya. *International Journal of Economics and Financial Issues, 3*(1), 237-252.

Rao, K. V., & Ibrahim, F. (2017). Financial performance analysis of banks–A study of IDBI bank. *International Journal of Research in IT and Management*, *7*(1), 64-72.

Singh, Y., & Milan, R. (2023). Analysis of financial performance of public sector banks in India. *Journal of Economic Theory and Practice, 22*(1), 86-112.

Smith, C. W., & Stulz, R. M. (1985). The determinants of firms' hedging policies. *Journal of Financial and Quantitative Analysis*, *20*(4), 391-405.

Thapa, M., & Bhandari, N. (2023). Risk management and its impact on profitability of commercial banks in Nepal. *International Journal of Credit and Commerce, 5*(1), 92-98.