Impact of Credit Diversification on Credit Risk of Nepalese Commercial Banks

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Abstract

This study examines the impact of credit diversification on the credit risk of Nepalese commercial banks. Non-performing loan and net interest margin are the selected dependent variables. The selected independent variables are loan to deposit ratio, overdraft loan, term loan, deprived sector loan, real estate loan and staff loan. The study is based on secondary data of 13 commercial banks with 104 observations for the study period from 2015/16 to 2022/23. The data were collected from Banking and Financial Statistics published by Nepal Rastra Bank, reports published by Ministry of Finance and annual report of respective commercial banks. The correlation coefficients and regression models are estimated to test the significance and importance of credit diversification on the credit risk of Nepalese commercial banks.

The study showed that overdraft loan has a negative effect on non-performing loan and net interest margin. It means that increase in overdraft loans leads to decrease in non-performing loan and net interest margin. Similarly, term loan has a positive effect on non-performing loan. It means that increase in term loans leads to increase in non-performing loan. In addition, deprived sector loan has a positive effect on non-performing loan. It means that increase in deprived sector loan leads to increase in non-performing loan. Likewise, real estate loan has a negative effect on non-performing loan and net interest margin. It means that increase in real estate loan leads to decrease in non-performing loan and net interest margin. Moreover, staff loan has a positive effect on non-performing loan and net interest margin. It means that increase in staff loan leads to increase in non-performing loan and net interest margin.

Keywords: non-performing loan, net interest margin, loan to deposit ratio, overdraft loan, term loan, deprived sector loan, real estate loan, staff loan

1. Introduction

The banking sector is the prime participant in the financial system of any country in this world. Economic development and growth in any country highly relay on the robust banking system of the respective countries. To become a sound banking system, banks must ensure good management of liquidity and credit risk. Credit diversification is an essential part of risk management, with the goal of distributing credit exposure among different types of borrowers, different industries, and different geographical areas.

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This tactic reduces the effect of possible losses from particular industries or borrowers in particular. The benefits of credit diversity are reduced risk, stable portfolios, and the possibility of higher risk-adjusted returns (Senyo et al., 2015). Nonetheless, there are issues including information asymmetry, correlation hazards during systemic shocks, and over-diversification. Diversification can lead to a more stable stream of income for banks. When one sector experiences a downturn, other sectors may still be performing well, providing a buffer against losses. This stability in income can contribute to overall profitability and sustainability. Diversification allows banks to tap into different markets and capitalize on opportunities for growth. By offering a variety of loan products tailored to different customer segments, banks can attract a broader range of borrowers and expand their customer base. Regulatory authorities often encourage or mandate diversification to ensure the resilience of the banking sector. By diversifying their loan portfolios, banks may find it easier to comply with regulatory requirements and maintain a healthy balance sheet. Managing a diverse portfolio requires sophisticated risk management practices. Banks that actively monitor and adjust their loan portfolios based on changing market conditions and risk profiles can improve their overall credit risk management, leading to better performance over time (Lin et al., 2012).

Christianti (2011) examined the effect of credit diversification on the profitability and the risk of failure in the banking industry in Indonesia. The study concluded that diversification based on economic sectors influences bank profitability, while credit diversification based on the type of use has a positive effect on the probability of bank failure. Similarly, Mulwa (2018) investigated the effect of diversification of economic sector financing on the financial performance of the East African banking industry and asset quality. The study showed that credit diversification based on the economic sector has a negative and significant effect on the increasing profitability of banks in East Africa. Likewise, Belguith and Bellouma (2018) investigated the effect of economic diversification of credit on profitability and bank credit risk in Tunisia during 2000-2015. This study found that the focus of lending to several economic sectors is more profitable than diversifying to various sectors. Further, Maubi and Jagongo (2014) analyzed that corporate loan portfolio diversification and credit risk management among commercial banks in Kenya. The study found that there is no association between loan portfolio diversification and credit risk management. Increased loan diversification has a positive impact on bank performance under certain conditions. Diversification allows banks to spread their risk across various types of loans, which can help mitigate the impact of

defaults or economic downturns in specific sectors. By diversifying their loan portfolio across different sectors, geographic regions, and types of borrowers, banks can reduce their exposure to any single source of risk. This can help safeguard their financial stability during times of economic turbulence or sector-specific downturns (Chiorazzo et al., 2008). However, excessive diversification without proper risk management can also have drawbacks. It may dilute expertise in specific sectors, increase operational complexities, and even mask underlying weaknesses in the portfolio. Therefore, while diversification can improve bank performance, it needs to be approached strategically and balanced with effective risk management practices.

Credit diversification strategies can reduce credit risk that can be influenced by other variables such as differences in total banking assets, liquidity levels, implementation of monitoring in the form of good corporate governance implementation and many other factors (Rossi et al., 2009). Prastiwi and Anik (2020) assessed the effect of credit diversification in the economic sector on credit risk and performance of commercial banks in Indonesia. The results showed that credit diversification based on the economic sector has a significant effect on increasing the profitability of commercial banks in Indonesia. The credit diversification based on the economic sector also has a significant effect in reducing credit risk. Two control variables, namely company size and banking liquidity have a significant negative effect on profitability respectively. In the case of credit risk, the company size has a positive effect, while the banking liquidity has no effect. These findings support the traditional banking theory which states that banks that diversify their credit portfolios can reduce the credit risk and increase profitability. Tabak et al. (2011) examined whether diversification of the credit portfolio at the bank level leads to better performance and lower risk. The study employed a new high frequency (monthly) panel data for the Brazilian banking system with information at the bank level for loans by economic sector. The study found that loan portfolio concentration increases return and also reduces default risk; the impact of concentration on bank's return is decreasing on bank's risk; foreign and state-owned banks seem to be less affected by the degree of diversification. An important additional finding is that there is an increasing concentration trend after the breakout of the recent international financial crisis, especially after the failure of Lehman Brothers.

Huynh and Dang (2021) assessed the relationship between loan portfolio diversity and bank return. The study discovered that greater loan portfolio diversity among different types of loan products led to better risk-

adjusted performance. Diversification is a key principle in risk management across various financial sectors, including banking and lending. When a financial institution diversifies its loan portfolio by offering different types of loan products, it spreads its risk across various sectors of the economy. This diversification can lead to better risk-adjusted performance because losses in one segment of the loan portfolio can be offset by gains or stable performance in other segments. It helps to reduce the overall volatility of the portfolio and can improve the institution's resilience to economic fluctuations. However, it's important for financial institutions to manage this diversification effectively, considering factors like correlation between different types of loans, macroeconomic trends, and regulatory requirements. Nikita (2020) examined the impact of credit portfolio diversification on the financial stability of Russian Bank. The study found that the increase in the level of credit portfolio diversification has a positive effect on the Bank's financial stability. Simpasa and Pla (2017) examined whether the higher concentration of Zambian bank credit distribution has an impact on improving banking performance. The study showed that the concentration of bank credit is inversely proportional to risk. Singh (2014) examined the effect of credit diversification on credit risk and profitability. The study found that diversification does not help banks in Punjab to increase profits, but on the contrary, it has a negative effect on profits. The study also found that diversification has no significant effect on credit risk. It means that it cannot help banks to reduce credit risk. Loan portfolio diversification does not improve banks' profitability nor reduce banks' credit risks (Adzobu *et al.,* 2017).

In the context of Nepal, Oli (2021) investigated the empirical impact of deprived sector lending on the nonperforming loans of commercial banks in Nepal. The study showed that beta coefficient of deprived sector lending is negative which indicates higher the ratio of deprived sector lending, the lower would be the NPL. Malla (2017) assessed the concentration of banks for credit portfolio management by analyzing security wise loan, product wise loan and sector wise concentration of loan. The study revealed that the portfolio management of the Nepalese banking sector has been improving for its better financial performance. Maharjan (2023) examined the effect of credit portfolio diversification on the performance of Nepalese commercial banks. The study showed that real estate loan has a positive impact on return on equity. It reveals that higher the real estate loan, higher would be the return on equity. In addition, the study showed that overdraft loan has a positive impact on return on equity. It indicates that increase in overdraft loans leads to increase in return on equity. Likewise, deprived sector loan has a positive

impact on return on equity. It reveals that higher the deprived sector loan, higher would be the return on equity. Moreover, the study showed that non-performing loan has a negative impact on return on equity. It indicates that increase in non-performing loans leads to decrease in return on equity. Furthermore, capital adequacy ratio has a positive impact on return on assets. It indicates that increase in capital adequacy ratio leads to increase in return on assets.

The above discussion shows that empirical evidences vary greatly across the studies on the impact of credit diversification on credit risk of commercial banks. Though there are above mentioned empirical evidences in the context of other countries and in Nepal, no such findings using more recent data exist in the context of Nepal. Therefore, in order to support one view or the other, this study has been conducted.

The main purpose of the study is to analyze the impact of credit diversification on credit risk in the context of Nepalese commercial banks. Specifically, it examines the relationship of loan to deposit ratio, overdraft loan, term loan, deprived sector loan, real estate loan and staff loan on non-performing loan and net interest margin in the context of Nepalese commercial banks.

The remainder of this study is organized as follows. Section two describes the sample, data and methodology. Section three presents the empirical results and the final sections draws conclusion.

2. Methodological aspects

The study is based on the secondary data which were collected from 13 Nepalese commercial banks from 2015/16 to 2022/23, leading to a total of 104 observations. The study has employed convenience sampling method. The main sources of data include Banking and Financial Statistics published by Nepal Rastra Bank, reports published by Ministry of Finance and annual report of respective commercial banks. This study is based on descriptive as well as causal comparative research designs. Table 1 shows the list of commercial banks selected for the study along with the study period and number of observations.

Table 1

List of commercial banks selected for the study along with study period and number of observations

S.N.	Name of the commercial banks	Study period	Observations
1	Rastriya Banijya Bank Limited	2015/16-2022/23	8
2	Agricultural Development Bank Limited	2015/16-2022/23	8
3	Everest Bank Limited	2015/16-2022/23	8
4	Nepal Bank Limited	2015/16-2022/23	8
5	Machhapuchchhre Bank Limited	2015/16-2022/23	8
6	Nepal SBI Bank Limited	2015/16-2022/23	8
7	NIC Asia Bank Limited	2015/16-2022/23	8
8	NMB Bank Limited	2015/16-2022/23	8
9	Siddhartha Bank Limited	2015/16-2022/23	8
10	Citizens Bank International Limited	2015/16-2022/23	8
11	Prime Commercial Bank Limited	2015/16-2022/23	8
12	Sanima Bank Limited	2015/16-2022/23	8
13	Standard Chartered Bank Nepal Limited	2015/16-2022/23	8
Total number of observations			104

Thus, the study is based on the 104 observations.

The model

The model used in this study assumes that bank credit risk depends on various financial ratios and loan portfolio. The dependent variables selected for the study are non-performing loan and net interest margin. Similarly, the selected independent variables in this study are loan to deposit ratio, overdraft loan, term loan, deprived sector loan, real estate loan and staff loan. Therefore, the models take the following forms:

$$NPL_{it} = ß_0 + ß_1 LDR_{it} + ß_2 OL_{it} + ß_3 RSL_{it} + ß_4 SL_{it} + ß_5 DSL_{it} + ß_6 TL_{it} + _{it}$$

$$NIM_{it} = ß_0 + ß_1 LDR_{it} + ß_2 OL_{it} + ß_3 RSL_{it} + ß_4 SL_{it} + ß_5 DSL_{it} + ß_6 TL_{it} + _{it}$$

Where,

NPL = Non-performing loan as measured by the ratio of non-performing loans to total loans, in percentage.

NIM = Net interest margin as measured by the ratio of net interest income to total assets, in percentage.

LDR = Loan to deposit ratio as measured by the ratio of total loans to total deposits, in Rs. Ten million.

OL = Overdraft loan, in Rs. Ten million.

RSL = Real estate loan, in Rs. Ten million.

SL = Staff loan, in Rs. Ten million.

DSL = Deprived sector loan, in Rs. Ten million.

TL = Term loan, in Rs. Ten million.

The following section describes the independent variables used in this study along with hypothesis formulation.

Loan to deposit ratio

Wuyep and Eze (2023) examined the effect of bank-specific attributes on non-performing loans (NPLs) in deposit money banks in Nigeria. The study showed that loan-to-asset ratio has a positive and significant effect on non-performing loans. Sari and Septiano (2020) examined the effects of loan to deposit ratio on bank profitability. The study showed that the loan to deposit ratio has negative effect on credit risk and return on assets. A higher loan to deposit ratio typically indicates that the bank is more aggressive in its lending activities, which can potentially increase credit risk. Likewise, Wood and Skinner (2018) examined loan to deposit ratio is significantly related to non-performing loans. Moreover, Yulianti *et al*. (2018) revealed that loan to deposit ratio positively affects nonperforming loans. Based on it, this study develops the following hypothesis:

H_1: There is a positive relationship between loan to deposit ratio and credit risk.

Real estate loan

When real estate prices decline, the value of the collateral backing the loans weakens. This increases the risk of defaults and losses for the bank (Imbierowicz and Rauch, 2014). Real estate loans often constitute a significant portion of a bank's loan portfolio. The quality and performance of these loans can heavily influence the overall credit risk profile of the bank. If a large portion of the bank's loans are concentrated in real estate and these loans default or perform poorly, it can lead to substantial losses for the bank (Blasko and Sinkey, 2006). Rahman and Shahimi (2010) examined the credit risk and financing structure of Malaysian Islamic Banks. the results showed a negative association between credit risk and real estate loan. Based on it, this study develops the following hypothesis:

H_2: There is a negative relationship between real estate loan and credit risk.

Overdraft loan

Overdraft loans are a form of short-term credit provided by banks to their customers, allowing them to withdraw funds exceeding the balance available in their accounts. Overdraft loans expose banks to default risk, as customers may not repay the overdraft amounts within the specified time frame. This risk

is particularly relevant for unsecured overdrafts where there is no collateral backing the loan (Melzer and Morgan, 2015). The results also showed that There is a positive relationship between overdraft loan and credit risk of bank. Banks must assess the creditworthiness of customers before granting overdraft facilities to mitigate the risk of default. Banks need to conduct thorough credit assessments and apply sound underwriting standards when offering overdraft facilities. This involves evaluating the financial health, repayment capacity, and credit history of customers. Poor underwriting practices can lead to higher default rates and increased credit risk for the bank (Jimenez and Saurina, 2004). Overdraft loans can also pose liquidity risk for banks, especially if a large number of customers simultaneously draw on their overdraft facilities (Aduda and Gitonga, 2011). Based on it, this study develops the following hypothesis:

H_3: There is a negative relationship between overdraft loan and credit risk.

Term loan

Alkan *et al*. (2022) revealed that longer repayment terms increase the duration of the bank's exposure to borrower credit risk. If economic conditions deteriorate or borrower financial health weakens over time, the probability of default on term loans rises, heightening credit risk for the bank. According to Hosen et al. (2020), if a bank's loan portfolio is heavily concentrated in term loans, particularly to borrowers with higher credit risk profiles, the overall credit risk of the bank increases. Adzobu *et al.* (2017) investigated whether diversifying credit portfolios across economic sectors could enhance profitability and mitigate credit risks for Ghanaian banks. The study stated that term loans may be extended to borrowers with varying levels of creditworthiness. If a significant portion of term loans are made to borrowers with weaker financial positions or limited repayment capacity, the likelihood of defaults and credit losses rises, increasing the credit risk for the bank. Based on it, this study develops the following hypothesis:

H_4: There is a negative relationship between term loan and credit risk.

Deprived sector loan

Loans extended to deprived sectors, such as small and medium-sized enterprises (SMEs) or individuals with lower income levels, may carry a higher probability of default compared to loans to more financially stable sectors or borrowers. These borrowers may have limited access to credit, weaker financial profiles, or less stable sources of income, making them more vulnerable to economic downturns or unexpected financial shocks (Oli, 2021). According to Jimenez and Saurina, (2004), deprived sectors

often exhibit greater sensitivity to economic fluctuations. During periods of economic instability or recession, borrowers in these sectors may face increased financial strain, leading to higher default rates on loans. Banks heavily exposed to deprived sectors may experience amplified credit risk during economic downturns, as loan performance deteriorates. Borrowers in deprived sectors may have limited assets or collateral to offer as security for loans. This lack of collateral reduces the bank's recourse in the event of borrower default, increasing the credit risk associated with loans to deprived sectors (Rahman and Shahimi, 2010). Based on it, this study develops the following hypothesis:

H_5: There is a positive relationship between deprived sector loan and credit risk.

Staff loan

Staff loans may be offered at preferential terms and conditions, such as lower interest rates, flexible repayment schedules, or reduced fees. These favorable terms incentivize staff members to repay their loans promptly and responsibly, reducing the likelihood of default and credit losses for the bank (Boahene et al., 2012). Staff loans may be secured by collateral or guaranteed by the borrower's employment status, providing an additional layer of security for the bank. Collateralized staff loans offer recourse in the event of default, mitigating credit risk and enhancing the bank's ability to recover funds in case of borrower non-payment (Berrios, 2013). Banks typically have robust internal controls and governance mechanisms in place to manage staff loans and prevent conflicts of interest or abuse. By adhering to strict policies and procedures governing staff lending activities, banks can minimize the potential for misconduct or fraudulent behavior that could undermine credit quality and credit risk (Ahmed and Malik, 2015). Based on it, this study develops the following hypothesis:

H_6: There is a negative relationship between staff loan and credit risk of bank.

3. Results and discussion

Descriptive statistics

Table 2 presents the descriptive statistics of the selected dependent and independent variables during the period 2015/16 to 2022/23.

Table 2

Descriptive statistics

This table shows the descriptive statistics of dependent and independent variables of 13 Nepalese commercial bank for the study period from 2015/16 to 2022/23. The dependent

variables are NPL (Non-performing loan as measured by ratio of non-performing loan to total loans, in percentage) and NIM (Net interest margin as measured by ratio of net interest income to total assets, in percentage). The independent variables are OL (Overdraft loan, Rs. in ten million), TL (Term loan, Rs. in ten million), DSL (Deprived sector loan, Rs. in ten million), RSL (Real estate loan, Rs. in ten million), SL (Staff Loan, Rs. in ten million), LDR (Loan to deposit ratio, in percentage).

Variables	Minimum	Maximum	Mean	Std. Deviation
NPL	0.01	4.85	1.44	1.31
NIM	1.82	5.60	3.15	0.71
OL	68.86	8231.41	1508.08	1362.79
TL	207.36	8094.83	2468.63	1949.61
DSL	1.37	8298.53	477.22	937.06
RSL	0.00	2466.01	582.52	413.29
SL	3.63	959.53	157.25	152.80
LDR	57.00	107.00	83.75	8.58

Source: SPSS output

Correlation analysis

Having indicated the descriptive statistics, Pearson's correlation coefficients are computed and results are presented in Table 3.

Table 3

Pearson's correlation coefficients matrix

This table shows the bivariate Pearson's correlation coefficients of dependent and independent variables of 13 Nepalese commercial banks for the study period from 2015/16 to 2022/23. The dependent variables are NPL (Non-performing loan as measured by ratio of non-performing loan to total loans, in percentage) and NIM (Net interest margin as measured by ratio of net interest income to total assets, in percentage). The independent variables are OL (Overdraft loan, Rs. in ten million), TL (Term loan, Rs. in ten million), DSL (Deprived sector loan, Rs. in ten million), RSL (Real estate loan, Rs. in ten million), SL (Staff Loan, Rs. in ten million), LDR (Loan to deposit ratio, in percentage).

Variables	NPL	NIM	OL	TL	DSL	RSL	SL	LDR
NPL	1							
NIM	0.443**	1						
OL	-0.011	-0.145	1					
TL	0.180	-0.205*	0.324**	1				
DSL	0.085	-0.026	0.152	0.055	1			
RSL	-0.101	-0.155	0.465**	0.427**	-0.037	1		
SL	0.347**	0.141	0.219*	0.195*	0.192	-0.081	1	
LDR	-0.134	-0.006	0.005	0.121	-0.028	-0.041	0.016	1

Note: The asterisk signs (**) and (*) indicate that the results are significant at one percent and five percent levels respectively.

Table 3 shows that there is negative relationship between overdraft loan and non-performing loan. It means that increase in overdraft loans leads to decrease in non-performing loan. Similarly, there is positive relationship between term loan and non-performing loan. It means that increase in term loans leads to increase in non-performing loan. In addition, there is positive relationship between deprived sector loan and non-performing loan. It means that increase in deprived sector loan leads to increase in non-performing loan. Likewise, there is negative relationship between real estate loan and non-performing loan. It means that increase in real estate loan leads to decrease in non-performing loan. Moreover, there is positive relationship between staff loan and non-performing loan. It means that increase in staff loan leads to increase in non-performing loan. Likewise, there is negative relationship between loan to deposit ratio and non-performing loan. It means that increase in loan to deposit ratio leads to decrease in non-performing loan.

Furthermore, the result shows that there is negative relationship between overdraft loan and net interest margin. It indicates that higher the overdraft loan, lower would be the net interest margin. Likewise, the result shows that there is negative relationship between term loan and net interest margin. It indicates that higher the term loan, lower would be the net interest margin. Similarly, the result shows that there is negative relationship between deprived sector loan and net interest margin. It indicates that higher the deprived sector loan, lower would be the net interest margin. Moreover, the result shows that there is negative relationship between real estate loan and net interest margin. It indicates that higher the real estate loan, lower would be the net interest margin. In addition, the result shows that there is positive relationship between staff loan and net interest margin. It shows that higher the staff loans, higher would be the net interest margin. However, the result shows that there is negative relationship between loan to deposit ratio and net interest margin. It indicates that higher the loan to deposit ratio, lower would be the net interest margin.

Regression analysis

Having indicated the Pearson's correlation coefficients, the regression analysis has been carried out and the results are presented in Table 4 and Table 5. More specifically, Table 4 shows the regression results of shows the regression results of overdraft loan (OL), term loan (TL), deprived sector loan (DSL), real estate loan (RSL), staff loan (SL), loan to deposit ratio (LDR) on non-performing loan (NPL).

Table 4

Estimated regression results of overdraft loan (OL), term loan (TL), deprived sector loan (DSL), real estate loan (RSL), staff loan (SL), loan to deposit ratio (LDR) with non-performing loan (NPL)

The results are based on panel data of 13 Nepalese commercial banks with 104 observations for the period of 2015/16-2022/23 by using the linear regression model and the model is $NPL_{it} = ß_0 + ß_1 LDR_{it} + ß_2 OL_{it} + ß_3 RSL_{it} + ß_4 SL_{it} + ß_5 DSL_{it} + ß_6 TL_{it} + _{it}$ where, the dependent variable is NPL (Non-performing loan measured as ratio of non-performing loans to total loans, in percentage) and the independent variables are OL (Overdraft loan, Rs. in ten million), TL (Term loan, Rs. in ten million), DSL (Deprived sector loan, Rs. in ten million), RSL (Real estate loan, Rs. in ten million), SL (Staff Loan, Rs. in ten million), LDR (Loan to deposit ratio, in percentage).

Model	Intercept	Regression coefficients of						Adj. R_bar^2	SEE	F-value
		OL	TL	DSL	RSL	SL	LDR			
1	1.459 (7.581)**	-1.01 (0.107)						0.01	1.317	0.011
2	1.146 (5.593)**		0.180 (1.849)					0.023	1.291	3.419
3	1.387 (9.631)**			0.085 (0.858)				0.003	1.307	0.737
4	1.629 (7.341)**				-0.101 (1.025)			0.004	1.302	1.053
5	0.977 (5.629)**					0.003 (1.124)		0.112	1.230	13.945
6	3.157 (2.511)**						-0.134 (1.370)	0.008	1.303	1.877
7	1.216 (5.387)**	-0.077 (0.748)	0.205 (1.988)*					0.019	1.295	1.981
8	1.178 (5.119)**	0.090 (0.864)	0.205 (1.98)*	0.087 (0.881)				0.017	1.293	1.577
9	1.355 (5.459)**	-0.011 (0.095)	0.269 (2.484)*	0.064 (0.646)	-0.209 (1.789)			0.038	1.281	2.009
10	1.026 (3.946)**	-0.093 (0.843)	0.197 (1.852)	0.023 (0.244)	-0.115 (0.997)	0.315 (3.134)**		0.116	1.227	3.715
11	3.210 (2.657)**	-0.090 (0.823)	0.227 (2.137)*	0.016 (0.173)	-0.137 (1.196)	0.311 (3.129)**	-0.172 (0.185)	0.138	1.212	3.743

Notes:

i. Figures in parenthesis are t-values.
ii. The asterisk signs (**) and (*) indicate that the results are significant at one percent and five percent level respectively.
iii. Non-performing loan is the dependent variable.

Table 4 shows that the beta coefficients for overdraft loan are negative with non-performing loan. It indicates that the overdraft loan has a negative impact on non-performing loan. This finding is consistent with the finding of Jimenez and Saurina (2004). Similarly, the beta coefficients for term loan are positive with non-performing loan. It indicates that the term loan has positive impact on non-performing loan. This finding is similar to the finding of Adzobu *et al.* (2017). Similarly, the beta coefficients for deprived sector loan are positive with non-performing loan. It indicates that the deprived sector loan has positive impact on non-performing loan. The finding is consistent with the finding of Rahman and Shahimi (2010). Moreover, the beta coefficients

for real estate loan are negative with non-performing loan. It indicates that the for real estate loan has negative impact on non-performing loan. This finding is similar to the finding of Blasko and Sinkey (2006). Similarly, the beta coefficients for staff loan are positive with non-performing loan. It indicates that the staff loan has positive impact on non-performing loan. This finding is inconsistent with the finding of Ahmed and Malik (2005).

Table 5 shows the regression results of shows the regression results of overdraft loan (OL), term loan (TL), deprived sector loan (DSL), real estate loan (RSL), staff loan (SL), loan to deposit ratio (LDR) on net interest margin (NIM).

Table 5

Estimated regression results of overdraft loan (OL), term loan (TL), deprived sector loan (DSL), real estate loan (RSL), staff loan (SL), loan to deposit ratio (LDR) with net interest margin (NIM)

The results are based on panel data of 13 Nepalese commercial banks with 104 observations for the period of 2015/16-2022/23 by using the linear regression model and the model is $NIM_{it} = ß_0 + ß_1 LDR_{it} + ß_2 OL_{it} + ß_3 RSL_{it} + ß_4 SL_{it} + ß_5 DSL_{it} + ß_6 TL_{it} + _{it}$ where, the dependent variable is NIM (Net interest margin as measured by ratio of net interest income to total assets) and the independent variables are OL (Overdraft loan, Rs. in ten million), TL (Term loan, Rs. in ten million), DSL (Deprived sector loan, Rs. in ten million), RSL (Real estate loan, Rs. in ten million), SL (Staff Loan, Rs. in ten million), LDR (Loan to deposit ratio, in percentage).

Model	Intercept	Regression coefficients of						Adj. R_bar^2	SEE	F-value
		OL	TL	DSL	RSL	SL	LDR			
1	3.264 (31.445)**	-0.145 (1.478)						0.011	0.707	2.184
2	3.334 (30.016)**		-0.205 (2.118)*					0.033	0.70	4.485
3	3.159 (40.108)**			-0.026 (0.264)				0.009	0.715	0.07
4	3.305 (27.512)**				-0.155 (1.585)			0.014	0.706	2.513
5	3.046 (30.496)**					0.141 (1.436)		0.010	0.708	2.063
6	3.189 (4.612)**						-0.006 (0.057)	0.010	0.715	0.003
7	3.378 (27.621)**	-0.087 (0.852)	-0.177 (1.724)					0.030	0.701	2.599
8	3.379 (26.999)**	-0.087 (0.835)	0.177 (1.715)	-0.003 (0.032)				0.020	0.705	1.716
9	3.405 (24.84)**	-0.065 (0.572)	-0.159 (1.450)	-0.010 (0.096)	-0.057 (0.484)			0.013	0.707	1.336
10	3.282 (22.261)**	-0.122 (1.057)	-0.209 (1.886)	-0.037 (0.376)	0.007 (0.057)	0.216 (2.065)		0.044	0.698	1.957
11	3.169 (4.548)**	-0.122 (1.054)	-0.212 (1.879)	-0.037 (0.367)	0.009 (0.073)	0.216 (2.058)	0.016 (0.167)	0.035	0.699	1.619

Notes:

i. Figures in parenthesis are t-values.
ii. The asterisk signs (**) and (*) indicate that the results are significant at one percent and five percent level respectively.
iii. Net interest margin is the dependent variable.

Table 5 shows that the beta coefficients for overdraft loan are negative with net interest margin. It indicates that the overdraft loan has a negative impact on net interest margin. This finding is consistent with the finding of Melzer and Morgan (2015). Similarly, the beta coefficients for term loan are negative with net interest margin. It indicates that the term loan has negative impact on net interest margin. This finding is similar to the finding of Alkan *et al*. (2022). Similarly, the beta coefficients for deprived sector loan are negative with net interest margin. It indicates that the deprived sector loan has negative impact on net interest margin. The finding is consistent with the finding of Oli (2021). Moreover, the beta coefficients for real estate loan are negative with net interest margin. It indicates that the for real estate loan has negative impact on net interest margin. This finding is similar to the finding of Imbierowicz and Rauch (2014). Similarly, the beta coefficients for staff loan are positive with net interest margin. It indicates that the staff loan has positive impact on net interest margin. This finding is inconsistent with the finding of Boahene et al. (2012).

4. Summary and conclusion

The expansion of the financial system can have a favorable impact on a country's economic growth. A bank's sound financial health provides a promise not only to its depositors, but also to its shareholders, staff, and the entire economy. Banking operation in competitive environment is more stable as they diversify their portfolio that results in to enhanced performance and risk adjusted returns for bank. A strong financial system plays a critical role in enabling growth and reducing vulnerability to crises among commercial banks by minimizing credit risks.

This study attempts to analyze the impact of credit diversification on credit risk in the context of Nepalese commercial banks. The study is based on secondary data of 13 commercial banks with 104 observations for the study period from 2015/16 to 2022/23.

The major conclusion of the study is that term loans, deprived sector loans, and staff loans exhibit a positive effect on non-performing loans, indicating that higher levels of term loans, deprived sector loans, and staff loans may escalate non-performing loan ratios. Conversely, overdraft loans, real estate loans, and the loan-to-deposit ratio have a negative association with non-performing loans, suggesting that increased proportions of these variables might lead to lower non-performing loan occurrences. Furthermore, overdraft loans, term loans, deprived sector loans, and real estate loans exhibit a negative effect on net interest margin, while staff loans display a positive

effect on net interest margin. The study also concluded that term loans and staff loans are the most influencing factors that determine the changes in credit risk in the context of Nepalese commercial banks.

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