Effects of non-performing loan and operational efficiency on profitability of Nepalese commercial

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Abstract

This study examines the effects of non-performing loan and operational efficiency on profitability of Nepalese commercial banks. Return on asset and return on equity are selected as the dependent variables. Similarly, loan to deposit ratio, capital adequacy, loan loss provision, non-performing loan, operating income and operating expenses are selected as the independent variables. This study is based on secondary data of 15 commercial banks with 105 observations for the study period from 2015/16 to 2021/22. The data were collected from Banking and Financial Statistics published by Nepal Rastra Bank(NRB), annual reports of the selected commercial banks and reports published by Ministry of Finance. The correlation coefficients and regression models are estimated to test the significance and importance of loan to deposit ratio, capital adequacy ratio, loan loss provision, non-performing loan, operating income and operating expenseson the profitability of Nepalese commercial banks.

The study showed that that loan loss provision ratio, non-performing loan ratio and capital adequacy ratio are the positive impact return on assets (ROA). It indicates that higher the loan loss provision ratio, non-performing loan ratio and capital adequacy ratio, higher would be the bank return on assets (ROA) of commercial banks in Nepal. Similarly, the study also shows that loan to deposit ratio, operating income ratio and operating expenses ratio have a negative impact on return on assets(ROA). It indicates that higher the loan to deposit ratio, operating income ratio and operating expenses ratio lower would be the return on assets of Nepalese commercial banks. However, the study

also shows that the operating income ratio and operating expenses ratio have a positive impact on the profitability measured by return on equity. It indicates that higher the operating income ratio and operating expenses ratio, higher would be the return on equity of Nepalese commercial banks. Likewise, loan loss provision ratio, non-performing loan ratio, capital adequacy ratio and loan to deposit ratio are negative impact on return on equity (ROE). It indicates that higher the loan loss provision ratio, non-performing loan ratio, capital adequacy ratio and loan to deposit ratio, lower would be the return on equity (ROE) of Nepalese commercial banks.

Keywords: *Return on asset, return on equity ratio, capital adequacy ratio, loan to deposit, loan loss provision, operating income, operating expenses and non-performing loan.*

1. Introduction

Banks are the most integral part of the financial sector of any country as they dominate the financial sector by contributing much to the economic growth of the country (Saha and Bishwas, 2021). Soundness of a bank is the result of an assessment of the bank condition conducted on the risks and performance of the bank. Banks also play a remarkable roleingeneratingemploymentopportunities,enhancingfinancialresources, and theoveralldevelopment ofa country. It contributes to enlarge the industrial activities and investment activities. Bank's financialperformance is the result of the bank's internal roles, regulation, policies, activities, effectiveness, efficiency and overall performance in the monetary terms. A country's efficient governance system supports firms in improving their financial performance macro governance elements, such as; political stability, regulatory quality, government effectiveness, control of corruption, the rule of law, and voice and accountability, form institutional quality and play an essential role in improving efficiency in the banking sector (Chan *et al*., 2015; Uddin *et al.,* 2019). Similarly, governance is one mechanism that promotes bank efficiency and influences bank performance (Wang *et al.,* 2012). In today's competitive and dynamic business world, financial decision plays a fundamental role in the firm's day to day performance and operations.

Bank profitability is an important ingredient of financial development, its relevance spans through banking firm performance to macroeconomic stability. At the firmlevel, a higher return to a large extent reduces bank fragility. At the macro level,

increased profitability of a sustainable banking sector can finance economic growth and development (Osuagwa, 2014). The banking is one of the most important sector that supports the development of the country's economy and its financial stability (Ryu*et al.,* 2012).Commercial bank is a financial institution which performs the role of savings and mobilization of fund. However, poor performance of these institution result in slowdown of economic growth. Every bank tries to earn and achieve good profits in order to be in the business especially at the time of growing competition in the financial markets. At the macro level, a profitable banking sector should be able to absorb external negative shocks and to achieve the stability of the financial system (Akhter *et al*., 2011).The impact of credit risk on the profitability of banks is not clear-cut; it may be positive or negative. On one hand, when banks take higher credit risk they normally earn a higher profit. On the other hand, the profitability of banks may drop when bank management fails to collect the loans. Pracoyo and Imani (2018) indicated that there is an inverse relationship between bank liquidity and profitability. Theoretically, when banks hold a greater amount of liquid assets they lose the gains in term of opportunity cost. However, the banks holding a lesser amount of liquid assets normally earn a greater profit. The high level of bank capital boosts the confidence and trust of the public about the soundness of the bank. Stronger banks can channelize available funds in business activities and make high profits (Pasaribu and Sari, 2011).

Operational efficiency is defined as the ability to deliver products and services cost effectively without sacrificing quality. It can also be defined as the right combination of people, process, and technology to enhance the productivity and value of any business operation, while driving down the cost of routine operations to a desired level (Shawk, 2008). Increasing operational efficiency directly affects the organization's profitability, efficient businesses are more cost-effective. Any aspects of operational efficiency business types are crucial and must be earned by management for consideration healthy and sustainable financial performance (Sufian, 2007). Banks operate efficiently by channeling savings from deposits mobilized toward those companies with high expected social and economic returns. After lending them, banks monitor these resources to ensure effective and efficient utilization. On the other hand, commercial banks which are wasteful and inefficient in channeling savings tend to slowdown economic growth and community welfare (Athanasoglou et al., 2008).

Beck et al. (2010) argued that economic growth and high productivity are associated with efficiency of the financial system in allocating financial resources in the

economy. The different types of risk which are faced by banks, credit risk seems to have more impact on a bank's profitability because a bank's revenue is generated from loans from which interest is derived (Laryea et al., 2016). Banks wish to lend as many as they can of loans just show they have a high number of borrowers and regardless of the quality of the clients will end up bankrupt, (Baselega-Pascual et al., 2015). Loan would fall under the non-performing loan when the payment of its principal and interest had passed the due date by the period of three months or ninety days or more, (Dimitras et al., 2016).

Non-performing loans are considered determinants of profitability because, high levels of non-performing loans adversely affect bank net profit through provisioning of doubtful debts and write-offs of bad debts, which normally affect profitability and capital levels (Ombaba, 2013). Non-performing loan affect the operational efficiency, which in turn affects profitability, liquidity and solvency positions of banks (Michael et al., 2006). The NPAs are considered as an important parameter to judge the performance and financial health of banks and NPAs is one of the drivers of financial stability and growth of the banking sector (Vallabh et al., 2007).

Loan loss provisions are used as a cushion to adapt to the expected loss resulted from the missed payment of installment on a bank's loan portfolio; it is interchangeably known as provision for bad debts (Ozili and Outa, 2017). When a bank can predict a loan loss, it needs to be charged to the income statement as "provision" to set a loan loss provision (LLP) accounts to be shown on the balance sheet. If the principal and interest on a loan becomes bad debts, the amount of the loan balance is decreased by charging it to the LLPs which was kept as a reserve on the balance sheet (Angklomkliew et al., 2009). The banks normally keep requisite provisions against their unclassified and NPLs from their operating profits in a bid to mitigate financial risks (Islam, 2018). Loan-loss provisioning policy is critical in assessing financial system stability, in that it is a key contributor for fluctuations in banks' profitability and capital positions, which has a bearing on banks' supply of credit to the economy (Beatty and Liao, 2009). Banks rely significantly on customer deposits to allocate credits to other customers, thus, enabling banks to provide more loan opportunities. In general, with deposits being the main source of funding for banks, it is commonly assumed that customer deposits affect banking performance positively, if there is a satisfactory demand for loans in the market. It is expected that higher growing deposits would be able to expand the business of the bank and consequently generate more profits (Menicucci et al., 2016). In addition, the ratio of total deposits to total assets is another liquidity indicator, yet it is considered as a liability.

Nevertheless, several factors affect the impact on profitability that are caused from increase in banks' deposits (Menicucci et al., 2016). First, the impact is affected by the bank's ability to transform deposit liabilities into income-earning assets. In addition, Naceur and Goaied (2001) showed that the best-performing banks are those that have preserved high levels of deposit accounts related to their assets.

In Nepalese context, Gautam (2018) examined the impact of non-performing loan on profitability of Nepalese commercial banks. The study showed that credit to deposit ratio, net profit to loan and advances, nonperforming loan to total loan, interest income to loan and advance have positive impact on profitability. Similarly, Paudel (2012) found that a risk management indicators, default rate (NPLR) is the single most influencing predictor of bank financial performance in Nepal whereas cost per loan assets is not significant predictors of bank performance. Pradhan et al. (2017) examined the impact of capital adequacy and bank operating efficiency on financial performance of Nepalese commercial banks. The study showed bank operating efficiency, loan ratio, total deposit to total assets, loan loss provision to total equity have significantly positive impact on financial performance of commercial banks whereas loan loss provision to total loan, core capital ratio, risk weighted ratio, total capital ratio have negative impact on financial performance of Nepalese commercial banks. Budhathoki et al. (2020) examined the impact of liquidity, leverage, and total assets size of the bank on profitability during the period of 2010/11 – 2016/17. The study revealed that there is a negative relationship of loan to deposit ratio (low level of liquidity) on the bank's ROA, ROE, and NIM. However, ROE and NIM were statistically insignificant. Furthermore, higher equity to assets ratio (lower leverage) positively affected ROA and NIM and was statistically significant but was negatively related to ROE and statistically insignificant. In addition, the higher bank size appeared favorable to the Nepalese commercial banks and was found to have positive effects on ROA, ROE, and NIM. Similarly, Poudel (2018) found that solvency ratio, interest spread rate, and inflation have the insignificant negative impact on profitability whereas capital adequacy ratio, total assets, and GDP growth have the significant positive impact on profitability of commercial banks in Nepal. Neupane (2020) revealed that the bank profitability measured by ROA of Nepalese commercial banks is significantly affected by concentration ratio, banking sector development, GDP growth, inflation and exchange rate significantly in opposite direction rather it is not significantly affected by the internal factors like bank size, capital base, deposit, loan, off-balance sheet activities and number of branches.

The above discussion shows that the studies dealing with the impact of financial ratios, operational efficiency and non-performing loans on the profitability of banks are of greater importance. Hence, this study focuses on the impact of financial ratios, operational efficiency and non-performing loans on the profitability of Nepalese commercial banks.

The main purpose of the study is to analyze the effects of non-performing loan and operational efficiency on profitability of Nepalese commercial banks. More specifically, the study examines the relationship of capital adequacy ratio, loan to deposit ratio, operating income ratio, operating expenses ratio, non-performing loan, and loan loss provision with return on asset and return on equity 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 the conclusion.

2. Methodological aspects

This study is based on secondary data which were gathered from15 commercial banks in Nepal from 2015/2016 to 2021/2022, leading to a total of 105 observations. The main sources of data include annual reports published by concerned commercial banks and annual audited financial statement of the respective 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 the commercial banks selected for the study along with study period and number of observations

S.N.	Name of commercial banks	Study period	Observations
1	Nepal Bank Limited	2015/16-2021/22	7
2	Agricultural Development Bank Limited	2015/16-2021/22	7
3	RastriyaBanijya Bank Limited	2015/16-2021/22	7

S.N.	Name of commercial banks	Study period	Observations
4	NMB Bank Limited	2015/16-2021/22	7
5	Everest Bank Limited	2015/16-2021/22	7
6	NIC Asia Bank Limited	2015/16-2021/22	7
7	Machhapuchchhre Bank Limited	2015/16-2021/22	7
8	Sanima Bank Limited	2015/16-2021/22	7
9	Sunrise Bank Limited	2015/16-2021/22	7
10	Prime Commercial Bank Limited	2015/16-2021/22	7
11	Siddhartha Bank Limited	2015/16-2021/22	7
12	Nepal SBI Bank Limited	2015/16-2021/22	7
13	Citizens Bank International Limited	2015/16-2021/22	7
14	Laxmi Bank Limited	2015/16-2021/22	7
15	Standard Chartered Bank Nepal Limited	2015/16-2021/22	7
Total number of observations			**105**

Thus, the study is based on the 105 observations.

The model

The model used in this study analyze the effects of non-performing loan and operational efficiency on profitability of Nepalese commercial bank. The model estimated in this study assumes that assumes that the profitability depends on several independent variables. The dependent variables selected for the study are return on assets and return on equity. Similarly, the selected independent variables in this study are capital adequacy ratio, loan to deposit ratio, operating income ratio, operating expenses ratio, non-performing loan, and loan loss provision. The following model equations are designed to test the hypothesis.

Profitability = *f* (LDR, NPL, LLP, OIR, OER,CAR)

More specifically, the given model has been segmented into following models:

$ROA_{it} = \beta_0 + \beta_1 LDR_{it} + \beta_2 NPL_{it} + \beta_3 LLP_{it} + \beta_4 OIR_{it} + \beta_5 OER_{it} + \beta_6 CAR_{it} + e_{it}$

$ROE_{it} = \beta_0 + \beta_1 LDR_{it} + \beta_2 NPL_{it} + \beta_3 LLP_{it} + \beta_4 OIR_{it} + \beta_5 OER_{it} + \beta_6 CAR_{it} + e_{it}$

Where,

ROA = Return on assets as measured by the ratio of net income to total assets, in percentage.

ROE = Return on equity as measured by the net income to total equity, in percentage.

LDR = Loan to deposit ratio as measured by the ratio of bank's total loans to total deposit, in percentage.

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

LLP = Loan loss provision as measured by the ratio of sum of provisions set for the loans created to total loans, in percentage.

OIR = Operating income as measured by the ratio of Gross profit by net income, in times.

OER = Operating expenses as measured by the operating expenses by net income, in times.

CAR = Capital adequacy ratio as measured by the ratio of total capital to total risk weighted assets, in percentage.

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

Capital Adequacy Ratio (CAR)

Capital adequacy ratio (CAR) is defined as the ratio of capital to the risk-weighted sum of a bank’s assets (Hyun & Rhee, 2011). Jadhav et al. (2021) found that capital adequacy ratio has a positive impact on profitability. Similarly, Iftikhar (2016) found that capital adequacy ratio has a positive and significant impact on financial performance.

Likewise, Ebenezer et al. (2017) stated that CAR has a positive and significant effect on bank profitability. In addition, Burke (1989) examined the determinants of banks' performance for twelve countries selected from Europe, North America and Australia and found significant positive relation between capital adequacy and profitability. In addition, Olalekan and Adeyinka (2013) showed a positive and significant relationship between capital adequacy and profitability of bank. Furthermore, Al-Sabbah (2004) found capital adequacy as the most significant and positive determinant of banks' profitability in Jordan. Likewise, Bennaceur and Goaied (2008) examined the impact of bank specific variables and macroeconomic indicators and financial structure's effect on banking sector's profitability in Tunisia from 1980 to 2000 period. The study concluded that capital adequacy ratio had positive effect on profitability. However, Silaban (2017) showed that CAR has no effect on ROA. Jayaraman et al. (2021) investigated the impact of financial variables on firm profitability. The study revealed that the capital adequacy ratio has a negative effect on profitability. Similarly, Goddard et al. (2010) found a negative relationship between the capital ratio and profitability. Based on it, this study develops the following hypothesis:

H1: There is a positive relationship between capital adequacy ratio and profitability of Nepalese commercial banks.

Loan-deposit ratio (LDR)

The bank makes most of its profit from the return on equity. The ratio of loans to deposits ratio is calculated by dividing the total loan amount to the total deposits (Towpek&Borhan, 2006). Abreu and Mendes (2002) found that there was a statistically significant and positive relationship between loans to deposits ratio and bank profitability. Similarly, Sharifi and Akhter (2016) found that the CDR impact positively on public sector banks financial performance. Likewise, Ulandari et al. (2016) found that loan to deposit ratio has a positive effect on profitability. Similarly, Harun (2016) found that loan to deposit ratio has a positive significant effect on profitability. In addition, Nugraha et al. (2021) stated that loan to deposit ratio has a significant positive effect on return on assets. However, Shafana (2015) found that credit to deposit ratio has a significant and negative effect on profitability of financial institutions. Similarly, Bolek and Wilinski (2012) found that loan to deposit ratio has a negative impact on the profitability. Likewise, Sabir et al. (2012) showed LDR has a negative significant effect on ROA. Based on it, this study develops the following hypothesis:

H3: There is a positive relationship between loan-deposit ratio and profitability of Nepalese

commercial banks.

Non-performing loan

Non- performing loan is the amount of borrowed money that the debtor has failed to pay the scheduled payments for about ninety days. It is the non-productive assets of the banks. Uddin (2022) examined the effect of non-performing loan on state-owned commercial banks profitability with operating efficiency as mediating variable. The study showed that non-performing loan has a negative and significant impact on profitability in presence of the operating efficiency. Similarly, Gizaw*et al.* (2015) concluded that non-performing loan ratio is the major indicator of credit risk and it has statistically significant large negative effect on profitability. Likewise, Adebisi and Matthew (2015) revealed an inverse relationship with return on assets. Similarly, Jolevski (2017) argued that there is moderately high negative correlation with rates of return on equity and return on assets. Further,Nedelescu and Ciulei (2022) also found a negative effect of credit risk on financial profitability (ROA). Based on it, this study develops the following hypothesis:

H_5: There is negative relationship between non-performing loan and bank profitability.

Operating Income (OI)

Sufian and Chong (2008) examined the determinants of Philippines banks profitability during the period 1990–2005. The study found that operating income negatively affected bank profitability. Similarly, Kosmidou et al. (2004) investigated the performance of the UK banking sector focusing on the performance of the domestic banks as opposed to the performance of the foreign banks in order to test the hypothesis of higher performance of the domestic banks in a developed market. The study revealed that there is a significant negative effect of operating income on bank profitability. Likewise, Purwoko and Sudiyatno (2013) concluded that operating efficiency has impacted to the banks performance negatively. Similarly, Sabir et al. (2012) found that operating income has no significant effect on profitability. Moreover, Juwita et al. (2018) found a negative and significant effect of operational efficiency to ROA. In addition, Alam et al. (2022) concluded that operational efficiency has a negative impact on ROA (Return on Assets). However, Ramlall (2009) stated that bank profitability is positively related to operating efficiency. Similarly, Yesmine and Bhuiyah (2015) revealed that operating income have

significant positive impact on banks profitability. Likewise, Sukmadewi (2020) concluded that operational efficiency had a positive and significant effect on Return on Assets (ROA). Based on it, this study develops the following hypothesis:

H5: There is a negative relationship between operating income and profitability of Nepalese commercial banks.

Operating Expenses (OE)

Anggraeni et al. (2022) implicated if liquidity, non-performing assets, sensitivity, and efficiency have an impact on the profitability and capital of Indonesian state-owned banks and revealed that operating expenses ratio has a significant negative impact on both profitability. Similarly, Uddin (2022)examined the effect of non-performing loans on profitability with operating expenses as an intervening variable. The result found that the direct effect operating expenses has a negative and insignificant impact on profitability. Likewise, Hasmiana and Pintor(2022)analyzed the effect of financial risk, capital structure, liquidity, and operational efficiency state-owned banks and private commercial banks and showed that operating expenses partially had a significant effect on profitability.Farooq*et al.* (2021), found that return on equity is significantly affected by operating expenses while assessing the impact of bank-specific and macro-economic factors on commercial banks profitability in Pakistan. Furthermore, Phan *et al.* (2020) estimated the factors affecting the profitability of listed commercial banks in Vietnam and revealed that operating expenses have a positive impact on profitability. Similarly, Adam *et al.* (2018) asserted that the influence of company size, liquidity and operating expenses on bank profitability with problem credit risk as a moderating variable at commercial banks that are listed on the Indonesia stock exchange. The results showed that operating expenses negatively affected profitability. Based on it, this study develops the following hypothesis:

H_7:There is a negative relationship between operating expenses and profitability.

Loan loss provision

Loan loss provision is the total accumulated fund that is allocated by an organization for the protection of possible losses arises from total loan created. Mennawi (2020) found that there is a significant and negative impact on the financial performance of Islamic banks in Sudan. Islam (2018) showed that loan loss provision as an important factor in affecting profitability of banks in ideal condition. A well establish bank is

supposed to be having less loan loss provision and higher profitability. Similarly, Alhadab and Alsahawneh (2016) found that loan loss provision has a negative impact on the profitability of Jordanian commercial banks. Likewise, Teshome*et al.* (2018) found negative and statistically significant effect. Annor and Obeng (2017) concluded that there is a significant adverse affiliation of loan loss provision with profitability of commercial banks listed on the Ghana stock exchange. Based on it, this study develops the following hypothesis:

H_6: There is negative relationship between loan loss provision and bank profitability.

3. Results and discussion

Descriptive statistics

Table 2 presents the descriptive statistics of selected dependent and independent variables during the period 2015/16-2021/22.

Table 2: Descriptive statistics

This table shows the descriptive statistics of dependent and independent variables of 15 Nepalese commercial banks for the study period from 2015/16 to 2021/22. The dependent variables are ROA (Return on assets as measured by the ratio of net income to total assets, in percentage) and ROE (Return on assets as measured by the ratio of net income to total equity, in percentage). The independent variables are LDR (Loan to deposit ratio as measured by the ratio of total loan to total deposit, in times), NPL (Non-performing loan as measured by the ratio of non-performing loan to total loans, in percentage), LLP (Loan loss provision as measured by the ratio of sum of provisions set for the loans created to total loans, in percentage), OIR (Operating income ratio as measured by the ratio of operating income to net income, in Rupees), OER (Operating expenses ratio as measured by the ratio of operating expenses to net income, in Rupees) and CAR (Capital adequacy ratio as measured by the ratio of capital risk to total shareholder equity, in percentage).

Variables	Minimum	Maximum	Mean	Std. Deviation
ROA	0.70	2.79	1.58	0.45

Variables	Minimum	Maximum	Mean	Std. Deviation
ROE	1.89	23.38	13.95	4.04
NPL	0.01	4.75	1.30	1.19
LLP	0.09	5.00	2.13	0.99
CAR	10.20	22.99	14.13	2.41
LDR	58.46	96.69	85.22	7.70
OI	1.50	14.30	5.53	2.43
OE	1.00	9.80	3.05	1.88

Source: SPSS output

Correlation analysis

Having indicated the descriptive statistics, Pearson correlation coefficients are computed and the 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 15Nepalese commercial banks for the study period from 2015/16 to 2021/22. The dependent variables are ROA (Return on assets as measured by the ratio of net income to total assets, in percentage) and ROE (Return on equity as measured by the ratio of net income to total equity, in percentage). The independent variables are LDR (loan to deposit ratio as measured by the ratio of total loan to total deposit, in percentage), NPL (Non-performing loan as measured by the ratio of non-performing loan to total loans, in percentage), LLP (Loan loss provision as measured by the ratio of sum of provisions set for the loans created to total loans, in percentage) OI (operating income ratio as measured by the ratio of operating income to to net income, in times), OE (Operating expenses ratio as measured by the ratio of operating expenses to operating income, in times) and CAR (Capital adequacy ratio as measured by the ratio of capital to risk weighted assets, in percentage.

Variables	ROA	ROE	NPL	LLP	CAR	LDR	0I	0E
ROA	1							
ROE	0.415**	1						
NPL	0.224*	-0.061	1					
LLP	0.139	-0.088	0.902**	1				
CAR	0.353**	-0.206*	0.052	0.037	1			
LDR	-0.141	-0.270**	-0.192*	-0.181	0.002	1		
OI	-0.081	0.036	0.444**	0.498**	0.136	-0.020	1	
OE	-0.067	0.09	0 .14	0.170	-0.117	0.021	0.282**	1

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

Table 4.10 shows that non-performing loan ratio has a positive relationship with return on assets. It means that increase in non-performing loan leads to increase in return on assets. In contrast, loan loss provision has a positive relationship with return on assets. It shows that higher the loan loss provision, higher would be the return on assets. Likewise, there is a positive relationship between capital adequacy ratio and return on assets. It indicates that increase in capital adequacy ratio leads to increase in return on assets. However, Loan to deposit ratio has a positive relationship with return on assets. It indicates that increase in loan to deposit ratio leads to decrease in return on assets. Similarly, there is a negative relationship between loan to deposit ratio and return on assets. It means that lower the loan to deposit ratio, lower would be the return on assets. In addition, operating income ratio has a negative relationship between operating income and return on assets. It means that lower the operating income ratio lower would be the return on assets. Similarly, operating expenses ratio has a negative relationship between return on assets. It indicates that decrease in operating expenses ratio leads to decrease in return on assets.

The result also shows that non-performing loan has is a negative relationship between non-performing loan and return on equity. It means that decrease in non-

performing loan leads to decrease in return on equity. Likewise, loan loss provision has a negative relationship with return on equity. It shows that lower the loan loss provision, lower would be the return on equity. Similarly, there is a negative relationship between capital adequacy ratio and return on equity. It indicates that decrease in capital adequacy ratio leads to decrease in return on equity. In addition, loan to deposit ratio has a negative relationship with return on equity. It indicates that lower the loan to deposit ratio, lower would be the return on equity. Similarly, operating income has a positive relationship between operating income and return on equity. Further, this study shows that there is a positive relationship between operating expenses and return on equity. It means that larger the operating expenses, larger would be the return on equity.

Regression analysis

Having indicated the Pearson's correlation coefficients, the regression analysis has been carried out and results are presented in Table 4 and Table 5. More specifically, Table 4shows the regression results of impact of non-performing loan, loan loss provision, capital adequacy ratio, loan to deposit ratio, operating income ratio and operating expenses ratio on return onassets of selected Nepalese commercial banks.

Table 4: Etimated regression results of non-performing loan, loan loss provision, loan to deposit ratio, capital adequacy ratio, operating income ratio, operating expenses ratio on return on assets

The results are based on panel data of 15 commercial banks with 105 observations for the period of 2015/16 to 2021/22 by using linear regression model. The model is $ROA_{it} = \beta_0 + \beta_1 NPL_{it} + \beta_2 LLP_{it} + \beta_3 CAR + \beta_4 LDR_{it} + \beta_5 OI_{it} + \beta 6\ OE + e_{it}$ *where, the dependent variable is ROA (Return on assets as measured by the ratio of net income to total assets, in percentage). The independent variables are NPL (Non-performing loan as measured by the ratio of non-performing loan to total loans, in percentage), LLP (Loan loss provision as measured by the ratio of sum of provisions set for the loans created to total loans, in percentage), CAR (Capital adequacy ratio as measured by the ratio of capital to risk weighted assets, in percentage), LDR (Loan to deposit ratio as measured by the ratio of total loan to total deposit ratio, in percentage), OI(Operating income ratio as measured by the ratio of operating income to net income, in times) and OE (Operating expenses ratio as measured by the ratio of operating efficiency to operating income, in times).*

Models	Intercepts	Regression coefficients of						Adj. R_bar^2	SEE	F-value
		LLP	NPL	CAR	LDR	OI	OE			
1	1.450 (14.021)**	0.063 (1.423)						0.019	0.010	2.025
2	1.473 (23.100)**		0.085 (2.336)*					0.041	0.438	5.456
3	0.658 (2.683)**			0.066 (3.832)**				0.116	0.421	14.682
4	2.281 (4.704)**				-0.008 -(1.442)			0.010	0.445	2.079
5	1.667 (15.243)**					-0.015 -(0.825)		-0.003	0.449	0.681
6	1.632 (19.497)**						-0.016 -(0.697)	0.005	0.449	0.461
7	1.650 (12.607)**	0.201 (2.407)*	-0.154 -(1.544)					0.054	0.435	3.959

8	0.761 (2.859)**	0.188 (2.392)*	-0.146 (1.553)	0.063 -(3.774)**				0.163	0.409	7.731
9	1.305 (2.458)*	0.182 (2,311)*	-0.148 (1.579)	0.063 (3.796)**	-0.006 -(1.184)			0.166	0.409	6.172
10	1.273 (2.454)*	0.179 (0.022)*	-0.089 (-0.940)	0.069 (4.174)**	-0.005 -(1.017)	-0.045 -(2.399)*		0.204	0.399	6.324
11	1,261 (2.405)*	0.180 (2.323)*	-0.090 -(0.943)	0.069 (4.132)**	-0.005 -(1.018)	-0.046 -(2.362)*	0.004 (0.199)	0.196	0.402	5.225

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. Return on assets is the dependent variable.

Table 4 shows that, the beta coefficients for loan loss provision are positive with return on assets. It indicates that loan loss provision has a positive impact on return on assets. This finding is contradict with the findings of Mennawi (2020). Similarly, the beta coefficients for non-performing loan are positive with return on assets. It indicates that non-performing loan has a positive impact on return on assets. This finding is consistent

with the findings of Amalia (2021). Similarly, the beta coefficients for capital adequacy ratio are positive with return on assets. It indicates, the beta coefficients for capital adequacy ratio are positive with return on assets. This finding is consistent with the findings of Habibniya*et al.* (2022). However, the loan to deposit ratio are negative with return on assets. It indicates that loan to deposit ratio has a negative impact on return on assets. This finding is inconsistent with the findings of Jibreel*et al.* (2022). Likewise, the beta coefficients for operating income are negative with return on assets. It indicates that operating income has a negative impact on return on assets. This finding is similar to the findings of Ripaluddin*et al.* (2023). Similarly, the operating expenses ratio are negative impact on return on assets. It indicates that operating expenses has a negative impact on return on assets. This finding is consistent with the findings of Vu *et al.* (2020).

Table 5 shows the regression results of loan loss provision ratio, non-performing loan, capital adequacy ratio, loan to deposit ratio, operating income ratio and operating expenses ratio on return on equity of Nepalese commercial banks.

Table 5: Estimated regression results of loan loss provision ratio, non-performing loan and loan to deposit, capital adequacy ratio, operating income and operating expenses ratio on return on equity.

The results are based on panel data of 15 commercial banks with 105 observations for the period of 2015/16 to 2021/22 by using linear regression model. The model is $ROE_{it} = \beta_0 + \beta_1 LLP_{it} + \beta_2 NPL_{it} + \beta_3 CAR_{it} + \beta_4 TDR_{it} + \beta_5 OI_{it} + \beta_6 OE_{it} + e_{it}$ *where, the dependent variable is ROE (Return on equity as measured by the ratio of net income to total equity, in percentage). The independent variables are LLP (Loan loss provision ratio as measured by the ratio of sum of provisions set for the loans created to total loans, in percentage total debt to total equity capital, in times), NPL (Non-performing loan as measured by the ratio of non-performing loan to total loans, in percentage), LTD (Loan to deposit ratio as measured by the ratio of total loan to total deposit, in times), CAR (Capital adequacy ratio as measured by the ratio of capital to risk weighted assets, in percentage), OI(Operating income ratio as measured by the ratio of operating income to net income, in times) and OE (Operating expenses ratio as measured by the ratio of operational efficiency to operating income, in times).*

Model	Intercept	Regression coefficients of	Adj.	SEE	F-

s	s	NPL	LLP	CAR	LDR	OI	OE	R_bar^2		value
1	14.225 (24.150)**	-0.207 -(0.619)						-0.006	4.051	0.383
2	14.721 (15.687)**		-0.360 -(0.900)					0.002	4.043	0.810
3	18.832 (8.142)**			-0.345 -(2.139)*				0.033	3.972	4.576
4	26.034 (6.118)**				-0.142 -(2.850)**			0.064	3.907	8.123
5	13.627 (13.782)**					0.059 (0.361)		-0.008	4.056	0.131
6	13.352 (17.716)**						0.198 -(0.940)	-0.001	4.053	0.883
7	15.065 (12.351)**	0.345 (0.443)	-0.732 (0.786)					-0.010	4.059	0.501
8	19.927	0.415	-0.776	-0.344				0.024	3.991	1.839

Models	Intercepts	Regression coefficients of NPL	LLP	CAR	LDR	OI	OE	Adj. R_bar^2	SEE	F-value
	(7.692)**	(0.543)	(-0.849)	-(2.118)*						
	33.182	0.256	-0.820	-0.338	-0.153			0.099	3.834	
9	(6.668)**	(0.347)	-(0.932)	-(2.166)*	-(3.075)**					3.860
	33.379	0.274	-1.186	-0.371	-0.159	0.281		0.112	3.807	
10	(6.754)**	(0.374)	-(1.312)	-(2.373)*	-(3.213)*	(1.564)				3.622
	32.981	0.290	-1.216	-0.352	-0.160	0.247	0.153	0.159	3.812	
11	(6.617)**	(0.395)	-(1.341)	(2.220)*	-(3.228)**	(1.331)	(0/728)			3.093

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. Earnings per share is the dependent variable.

Table 5 shows that the beta coefficients for non-performing loan are negative with return on equity. It indicates that non-performing loan has a negative impact on return on equity. This finding is inconsistent with the findings of Nedelescu and Ciulei (2022). Similarly, the beta coefficients for loan loss provision are negative with return on equity. It indicates that loan loss provision has a negative impact on return on equity. This

finding is similar to the findings of Quoc and Tang (2022). Further, the beta coefficients for capital adequacy ratio are positive with return on equity. It indicates that capital adequacy ratio has a negative impact on return on equity. This finding is consistent with the findings of Alifiana and Indah (2021). In addition, the beta coefficients for loan to deposit ratio are negative with return on equity. It indicates that loan to deposit ratio has a negative impact on return on equity. This finding is consistent with the findings of Lawal*et al.* (2022). Likewise, the beta coefficients for operating income are positive with return on equity. It indicates that operating income ratio has a positive impact on return on equity. This finding is similar to the findings of Hasyim and Nuraeni (2022). However, the beta coefficients for operating expenses ratio are positive with return on equity. It indicates that operating expenses ratio has a positive impact on return on equity. This finding contradicts with the findings of Nugraha*et al.* (2020).

4. Summary and conclusion

Financial sector is regarded as one of the major areas of the economy that plays a vital role in developing the nation. A strong financial system promotes investment by financing productive business opportunities, mobilizing savings, efficiently allocating resources, makes easy the trade of goods and services and it directly or indirectly affect the activity of every sector of the economy. The success and stability of commercial banks depends on profitability. Loan is the major component of earning assets of commercial banks. However, the profitability depends on the various factors like bank capital, liquidity, credit risk etc. Profitability is an important criterion to measure the performance of bank.

This study attempts to examine the impact of bank capital, bank liquidity and credit risk on profitability of Nepalese commercial Banks. The study is based on secondary data of 15 commercial bank of Nepal with 105 observations for the period 2015/16 to 2021/22.

The study is based on the secondary data which were gathered from 15 commercial banks in Nepal for the period of 7 years from 2015/6 to 2021/22 leading to total of 105 observations by using convenience sampling method. The secondary data have been obtained from related banks website, annual report and annual audited financial statements of selected commercial banks.

The study showed that loan loss provision ratio, operating income, operating expenses and non-performing loan have positive impact on return on equity. However, capital adequacy ratio has a negative impact on return on equity. Likewise, the study concluded that operating income and operating expenses ratio are the most influencing factor that explains the changes in the return on asset of Nepalese commercial banks. Similarly, the study also concluded that loan to deposit ratio is the most influencing factor that explains the changes in the return on equity in context of Nepalese commercial banks.

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