Effect of Capital Adequacy Ratio, Non-Performing Loan, Operation Efficiency and Bank Size on Profitability of Nepalese Commercial Banks

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Abstract

This study examines the effect of capital adequacy ratio, non-performing loan, operation efficiency and bank size on the profitability of Nepalese commercial banks. Return on assets (ROA) and return on equity (ROE) are the selected dependent variables. The selected independent variables are bank size, operating efficiency, net interest margin, non-performing loan, capital adequacy ratio, and loan-to-deposit ratio. The study is based on secondary data of 12 commercial banks with 108 observations for the study period from 2014/15 to 2022/23. The data were collected from Bank Supervision Report published by Nepal Rastra Bank (NRB) and annual reports of the selected commercial banks. The correlation coefficients and regression models are estimated to test the significance and importance of capital adequacy ratio, non-performing loan, operation efficiency and bank size on the profitability of Nepalese commercial banks.

The study showed that non-performing loan has a negative impact on return on assets. It indicates that higher the non-performing loans, lower would be the return on assets. In contrast, non-performing loan has a positive impact on return on equity. It indicates that increase in non-performing loan leads to increase in return on equity. Similarly, capital adequacy ratio has a positive impact on return on assets. It indicates that higher the capital adequacy ratio, higher would be the return on assets. However, capital adequacy ratio has a negative impact on return on equity. It indicates that higher the capital adequacy ratio, lower would be the return on equity. Further, net interest margin has a positive impact on return on assets and return on equity. It indicates that increase in net interest margin leads to increase in return on assets and return on equity. In addition, loan to deposit ratio has a negative impact on return on assets and return on equity. It indicates that higher the loan to deposit ratio, lower would be the return on assets and return on equity. Similarly, operating efficiency has a negative impact on return on assets. It indicates that higher the operating efficiency, lower would be the return on assets. In contrast, operating efficiency has a positive impact on return on equity. It indicates that increase in operating efficiency leads to increase in return on equity. In addition, bank size has a negative impact on return on assets and return on equity. It indicates that larger the bank size, lower would be the return on assets and return

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on equity.

1. Introduction

Profitability performance is a critical metric for assessing the success or failure of a bank. A profitable bank is generally considered more stable and less likely to face financial distress. A bank that consistently generates profits can distribute dividends to its shareholders, increasing their wealth and attracting new investors. Conversely, sustained losses can erode shareholder value and lead to a decline in investor confidence. By evaluating profitability performance, it is merely easy to measure the efficiency and effectiveness of a bank's resource utilization during a specific period of time (Ngurah and Panji, 2021). The strong profitability of a bank shows a higher capacity to earn profit and a bigger contribution to the economic growth of a country (Adiatmayani and Panji, 2021). Financial institutions are very important in the economic growth of a nation as it helps in the easy flow of credit which leads to the investment opportunities in productive sectors. Therefore, the soundness of banking institutions is an essential consideration for financial system stability. The efficient and effective performance of the banking industry over time guarantees the financial stability of any nation. Factors that affect firms' performance are either macro or micro factors which have an important impact on firms' performance. Macro factors are those factors that are out the control of the company, whereas micro factors include the factors that are under the control of the company. The high level of profitability describes the good performance of a company, which means that the bank has been operating effectively and efficiently (Langodai and Lutfillah, 2019).

Banks largely depends on competitive marketing strategy that determines their success and growth. The modalities of the banking business have changed a lot in the new millennium compared to the way they used to be in the years bygone (Hussain and Bhatti, 2010). Harahap (2018) argued that capital structure/leverage, operating efficiency, non-performing loan, and capital adequacy ratio are the key parameters of banks' performance. These indicators have a relationship with and influence on the profitability performance of a bank. Banks are subject to many risks while conducting their business practices, such as credit risk, operating risk, interest rate risk, regulatory risk, market risk, liquidity risk, insolvency risk, and foreign exchange risk. Banking is about taking and handling the risk, rather than preventing it

(Mendoza and Rivera, 2017). Despite the operating costs of holding a large portfolio of loans, bank profitability should increase with a higher ratio of loans to assets as long as interest rates on loans are liberalized and the bank applies markup pricing. Among 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).

Mehzabin *et al.* (2023) investigated the influence of capital structure as estimated by leverage ratio and long-term debt, operating efficiency and non-interest income on the profitability of the banking industry in 28 countries of Asia. The study showed that that an increase in total debt ratio increases the profit margin of the bank and the debt financing increases the profitability of the firm. In addition, the findings showed that lowering the operating expenses and managing of costs effectively can boost the profitability of bank. Furthermore, non-interest income plays a vital role when the interest rates are lower. Similarly, Mule et al. (2015) revealed that there is a positive significant relationship between firm size and profitability implying that a unit change in firm size leads to an increase in return on equity of firms. Moreover, Brastama *et al.* (2020) examined the role of profitability in mediating the capital adequacy ratio and non-performing loans on banking stock prices. The results of the analysis showed that the capital adequacy ratio has a positive effect on return on assets and non-performing loans has a negative effect on the return on assets. Similarly, capital adequacy ratio variable has a positive effect on stock prices. However, non-performing loan has a negative effect on stock prices. Furthermore, Demirguc-Kunt and Huizingz (1999) examined the determinants of banking performance for 80 countries, both developed and developing, during the period 1988-1995. The result showed that there is positive relationship between the capital ratio and financial performance. Syafrizal *et al.* (2023) analyzed the effect of capital adequacy ratio, non performing financing, financing to deposit ratio and operating expenses and operating income on profitability at PT. Sharia Aceh Bank. The results showed that the capital adequacy ratio partially has no effect, non-performing financing partially has a positive and significant effect, financing to deposit ratio partially has an effect negative and significant. Indrayani *et al.* (2016) showed there is a positive and partially significant influence of NIM on ROA of commercial banks. Uddin (2022) analyzed the influence of leverage, operating efficiency, non-performing loan, and capital adequacy ratio on the profitability of commercial banks in Bangladesh. The analytical

result of the study showed that the leverage as measured by the debt-equity ratio (DER) has a negative and insignificant influence on profitability (ROA). Non-performing loan (NPL) also has a negative and insignificant effect on ROA. The study found that the operating efficiency as measured by BOPO ratio has a positive and insignificant impact on ROA. The study revealed that the capital adequacy ratio (CAR) has a positive and significant effect on ROA.

Surtikanti *et al.* (2022) implicated the influence of capital adequacy ratio and net interest margin on bank profitability (return on asset) in listed foreign exchange commercial banks in Indonesia Stock Exchange from 2011 to 2015. The study found that capital adequacy ratio significantly influences the profitability (return on asset) while net interest margin variable significantly influences bank profitability. Widyakto *et al.* (2021) revealed that NIM incorporates a critical positive impact on ROE. Moreover, NPL contains a noteworthy negative impact on ROE. Hasmiana and Pintor (2022) analyzed the partial effects of financial risk, capital structure, and liquidity on operational efficiency, as well as the partial effects of financial risk, capital structure, liquidity, and operational efficiency on profitability. The findings showed that financial risk, capital structure, liquidity, and operational efficiency individually had a significant impact on profitability. However, financial risk, capital structure, and liquidity did not show a significant effect on profitability through operational efficiency. Likewise, Chimkono *et al.* (2016) investigated the effect of non-performing loan ratio and other determinants on the financial performance of commercial banks in the Malawian banking sector. The study found that non-performing loan ratio, cost efficiency ratios and average lending interest rate had a significant effect on the performance of banks in Malawi. Moreover, cash reserve ratio was positively related to bank performance but was not significant. Setiawati *et al.* (2022) showed that the capital adequacy ratio (CAR) and net interest margin (NIM) have positive and significant effect on bank profitability. Meanwhile, non-performing finance (NPF) has a negative and insignificant effect on bank profitability.

In the context of Nepal, Mahaseth et al. (2023) revealed that debt-to-equity ratio, asset growth and deposit growth, have negative impact on return on assets. Similarly, debt to asset ratio, loan to deposit ratio and capital adequacy ratio have a positive impact on return on assets. The study showed that asset growth, deposit growth, loan to deposit ratio and capital adequacy ratio have negative impact on return on equity. Similarly, debt-to-equity ratio and debt to asset ratio have a positive impact on return on equity. Likewise, the study also concluded that loan to deposit ratio followed by

capital adequacy ratio is the most influencing factor that explains the changes in return on equity in context of Nepalese commercial banks. Moreover, Singh *et al.* (2021) investigated the effect of non-performing loan on profitability in case of empirical evidence from Nepalese commercial banks. The study concluded that non-performing loans have negative impact on profitability. In addition, Darlami (2023) showed that non-performing loan, loan loss provision, leverage ratio, loan to deposit ratio and cost to income ratio have negative impact on return on assets. However, capital adequacy ratio has positive impact on return on assets. Likewise, capital adequacy ratio, non-performing loan, loan loss provision, leverage ratio, loan to deposit ratio and cost to income ratio have negative impact on return on equity. Thapa and Bhandari (2023) revealed that capital adequacy ratio is negatively related to return on equity. Likewise, the study revealed that credit to deposit ratio, non-performing loan ratio, cash reserve ratio and liquid assets ratio are negatively related to return on assets and return on equity.

The above discussion shows that empirical evidences vary greatly across the studies on the effect of capital adequacy ratio, non-performing loan, operation efficiency and bank size on profitability 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 major objective of the study is to examine the effect of capital adequacy ratio, non-performing loan, operation efficiency and bank size on the profitability of Nepalese commercial banks on profitability of Nepalese commercial banks. Specifically, it examines the relationship of bank size, operating efficiency, net interest margin, non-performing loan, capital adequacy ratio, and loan-to-deposit ratio on return on assets 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 section draws the conclusion.

2. Methodological aspects

The study is based on the secondary data which were collected from 12 Nepalese commercial banks from 2014/15 to 2022/23, leading to a total of 108 observations. The study has employed convenience sampling method. The

main sources of data collected from annual audited financial statements and websites 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 banks	Study period	Observation
	Public banks		
1	Nepal Bank Limited	2014/15-2022/23	9
2	Rastriya Banijya Bank Limited	2014/15-2022/23	9
	Joint venture banks		
3	Himalayan Bank Limited	2014/15-2022/23	9
4	Everest Bank Limited	2014/15-2022/23	9
5	NMB Bank Limited	2014/15-2022/23	9
6	Standard Chartered Bank Nepal Limited	2014/15-2022/23	9
	Private banks		
7	Nepal SBI Bank Limited	2014/15-2022/23	9
8	Machhapuchchhre Bank Limited	2014/15-2022/23	9
9	Sanima Bank Limited	2014/15-2022/23	9
10	Siddhartha Bank Limited	2014/15-2022/23	9
11	Prime Commercial Bank Limited	2014/15-2022/23	9
12	Citizens International Bank Limited	2014/15-2022/23	9
	Total number of observations		**108**

Thus, the study is based on 108 observations.

The model

The model used in this study assumes that profitability of banks depends upon capital adequacy ratio, non-performing loan, operation efficiency and bank size. The dependent variables selected for the study are return on assets and return on equity. Similarly, the selected independent variables are non-performing loans, capital adequacy ratio, net interest margin, loan-to-deposit ratio, operating efficiency and bank size. Therefore, the models take the following forms

$$ROA = \beta_0 + \beta_1 NPL + \beta_2 CAR + \beta_3 NIM + \beta_4 LDR + \beta_5 OE + \beta_6 BSIZE + e_{it}$$

$$ROE = \beta_0 + \beta_1 NPL + \beta_2 CAR + \beta_3 NIM + \beta_4 LDR + \beta_5 OE + \beta_6 BSIZE + e_{it}$$

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 ratio of net income to total equity, in percentage.

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

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

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

LDR = Credit to deposit ratio as measured by the ratio of total loans to total deposits, in percentage.

OE = Operating efficiency as measured by the ratio of operating expenses to operating income, in percentage.

BS = Bank size as measured by total assets, Rs. in billion.

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

Bank size

Larger banks often have a more diversified portfolio of assets, which can help mitigate risks associated with individual loans or investments. This diversification can contribute to more stable and consistent profitability. Aladwan (2015) investigated the effect of bank size on its profitability for Jordanian listed commercial banks within different size bank categories. The study found a positive relationship between bank size measured by total assets and bank profitability. Similarly, Halkos and Salamouris (2004) investigated the efficiency measurement of the Greek commercial banks with the use of financial ratios. The study concluded that the larger the bank assets, higher would be the efficiency. Similarly, Mule *et al.* (2015) assessed the relationship between corporate size, profitability and firm value listed companies at the

Nairobi Securities Exchange using data for the period 2010 through 2014. The study indicated that there is a positive and significant relationship between firm size and return on equity. Based on it, this study develops the following hypothesis:

H_1: There is a positive relationship between bank size and profitability of banks.

Non-performing loan

Higher levels of NPLs require banks to increase their provisions, which directly reduces their profitability by reducing the profits available for distribution. Non-performing loans typically stop generating interest income for the bank, further reducing the bank's income stream. This can significantly impact profitability, especially if a substantial portion of the loan portfolio becomes non-performing (Laryea *et al.,* 2016). Kwashie (2022) showed that the non-performing loans have a negative impact on the measures of financial performance. Likewise, Safitri and Oktavia (2022) found that NPL has a negative and significant effect on ROA. Non-performing loans represent a significant risk to a bank's financial health and can have a substantial negative impact on its profitability. Similarly, Bandara *et al.* (2021) showed that nonperforming loans have negative and significant association with return on assets. Furthermore, Do *et al.* (2020) revealed that non-performing loans have negative impact on the bank's profitability. Trujillo-Ponce (2013) evaluated the determinants of productivity among Spanish commercial banks. The study found that NPLs has a negative impact on both ROA and ROE. Based on it, this study develops the following hypothesis:

H_2: There is a negative relationship between non-performing loan and profitability of banks.

Operating efficiency

Efficient operations enable banks to achieve higher levels of productivity with the same or fewer resources. Operational efficiency illustrates the capability of management to regulate expenditures. Uddin (2022) revealed that operating inefficiency has a negative and insignificant impact on profitability. Likewise, Anggraeni *et al.* (2022) implicated that operational inefficiency ratio has a significant negative impact on bank profitability. Similarly, Setyowati (2019) showed that operational inefficiency has a negative and significant effect on the profitability of Islamic banking. Furthermore, Adam *et al.* (2018)

found that operational inefficiency negatively affects the bank profitability. Sufian and Chong (2008) examined the determinants of Philippines banks profitability during the period 1990–2005. The study found that operational inefficiency negatively influences bank profitability. Based on it, this study develops the following hypothesis:

H_3: There is a negative relationship between operating efficiency and profitability of banks.

Capital adequacy ratio

Capital adequacy ratio is a bank performance ratio that assesses the extent to which the capital owned by the bank is able to face the risk of credit failure faced by the bank. Hersugondo *et al.* (2021) revealed that capital adequacy has a significant negative impact on bank performance. Similarly, Dao and Nguyen (2020) found that the most controversial result comes up with the negative relationship between capital adequacy ratio and profitability. Likewise, Al-Homaidi *et al.* (2020) showed that capital adequacy ratio has a negative significant impact on ROA. Furthermore, Islam *et al.* (2020) revealed that capital adequacy ratio has a significant negative impact on the performance of banks. Capital adequacy requirement provide a cover against losses not covered by current bank earnings and to protect depositors and other creditors against loss in the event of liquidation (Ikpefan, 2013). Based on it, this study develops the following hypothesis:

H_4: There is a negative relationship between capital adequacy ratio and profitability of banks.

Loan-to-deposit ratio

Abreu and Mendes (2002) found that there is a statistically significant and positive relationship between loans to deposits ratio and bank profitability. A higher credit-to-deposit ratio suggests that the bank is lending out a larger portion of its deposits. This can lead to higher interest income for the bank, positively impacting profitability, assuming the loans are performing well and the interest earned exceeds the cost of funding. Similarly, Sharifi and Akhter (2016) found that loans to deposits ratio positively influence public sector bank's financial performance. Likewise, Ulandari *et al.* (2016) found that loan to deposit ratio has a positive effect on profitability. Moreover, Shafana (2015) found that credit to deposit ratio has a significant positive effect on profitability of financial institutions. Monitoring and managing credit risk,

liquidity risk, and interest rate risk are essential considerations for banks in optimizing their credit-to-deposit ratios to enhance profitability. Similarly, Bolek and Wilinski (2012) found that credit to deposit ratio has a positive impact on the profitability. Based on it, this study develops the following hypothesis:

H_5: There is a positive relationship between loan-to-deposit ratio and profitability of banks.

Net interest margin

Net interest margin (NIM) is the ratio of net interest income to total interest-earning assets. It is measured by the difference between interest revenues received from loans and interest costs paid for deposits. Le *et al.* (2022) found that net interest margin has a positive and significant effect on profitability. A higher net interest margin means that the bank is earning more interest income on its assets compared to the interest it pays on its liabilities. This increased interest income directly contributes to higher revenues and profitability for the bank. Similarly, Marlina (2022) concluded that NIM has a positive and insignificant effect on ROA. Likewise, Sukmadewi (2020) assessed the effect of capital adequacy ratio, loan to deposit ratio, operating-income ratio, non-performing loans, net interest margin on banking financial performance. The results showed that net interest margin has a positive and significant effect on return on assets. Furthermore, Widyakto *et al.* (2021) revealed that NIM incorporates a critical positive impact on ROE. Banks with higher net interest margins may have a competitive advantage in the market, allowing them to attract deposits at lower interest rates while charging higher interest rates on loans. This pricing power enables them to maintain higher margins and profitability compared to their competitors. Based on it, the study develops following hypothesis:

H_6: There is a positive relationship between net interest margin and profitability of banks.

3. Results and discussion

Descriptive statistics

Table 2 presents the descriptive statistics of selected dependent and independent variables during the period 2014/15 to 2022/23.

Table 2

Descriptive statistics

This table shows the descriptive statistics of dependent and independent variables of 12 Nepalese commercial banks for the study period of 2014/15 to 2022/23. The dependent variables are ROA (Return on assets as measured by the ratio of net profit to total asset, in percentage) and ROE (Return on equity as measured by the ratio of net profit to total equity, in percentage). The independent variables are NPL (Non-performing loans as measured by the ratio of non-performing loans to total loans, in percentage), CAR (Capital adequacy ratio as measured by the ratio of total capital to total risk weighted exposure, 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 percentage), OE(Operating efficiency as measured by the ratio of operating expenses to operating income, in percentage.), and BSIZE (Bank size as measured by total assets, Rs. in billions).

Variables	Minimum	Maximum	Mean	Std. Deviation
ROA	0.47	3.22	1.54	0.45
ROE	3.78	69.56	16.29	8.66
NPL	0.01	5.35	1.41	1.27
CAR	7.49	22.99	13.69	2.17
NIM	1.67	6.49	3.16	0.74
LDR	48.32	96.70	80.90	10.06
OE	20.35	78.25	41.63	9.27
BSIZE	19.16	394.02	144.35	74.95

Source: SPSS Software

Correlation analysis

Having indicated the descriptive statistics, Pearson's 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 12 Nepalese commercial banks for the study period of 2014/15 to 2022/23. The dependent variables are ROA (Return on assets as measured by the ratio of net profit to total asset, in percentage) and ROE (Return on equity as measured by the ratio of net profit to total equity, in percentage). The independent variables are NPL (Non-performing loans as measured by the ratio of non-performing loans to total loans, in percentage), CAR (Capital adequacy ratio as measured by the ratio of total capital to total risk weighted exposure, 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 percentage), OE (Operating efficiency as measured by the ratio of operating expenses to operating income, in percentage), and BSIZE (Bank size as measured by total assets, Rs. in billions).

Variables	ROA	ROE	NPL	CAR	NIM	LDR	OE	BSIZE
ROA	1							
ROE	0.389**	1						
NPL	-0.180	0.256**	1					
CAR	0.276**	-0.307**	-0.353**	1				
NIM	0.222*	0.195*	0.264**	-0.05	1			
LDR	-0.248**	-0.398**	-0.214*	-0.113	-0.058	1		
OE	-0.602**	0.101	0.415**	-0.326**	0.007	0.047	1	
BSIZE	-0.444**	-0.309**	0.414**	-0.104	-0.269**	0.091	0.409**	1

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

Table 3 shows that non-performing loan has a negative relationship with return on assets. It indicates that increase in non-performing loan leads to decrease in return on assets. Similarly, 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. Likewise, there is a positive relationship between net interest margin and return on assets. It indicates that increase in net interest margin leads to increase in return on assets. In contrast, loan-to-deposit ratio has a negative relationship with return on assets. It indicates that higher the loan-to-deposit ratio, lower would be the return on assets. In addition, operating efficiency has a negative relationship with return on assets. It indicates that increase in debt-to-equity ratio leads to decrease in return on assets. Moreover, bank size has a negative relationship with return on assets. It indicates that larger the bank size, lower would be the return on assets.

Similarly, the result also shows that non-performing loan has a positive relationship with return on equity. It indicates that increase in non-performing loan leads to increase in return on equity. Similarly, there is a negative relationship between capital adequacy ratio and return on equity. It indicates that increase in capital adequacy ratio leads to decrease in return on equity. Likewise, there is a positive relationship between net interest margin and return on equity. It indicates that increase in net interest margin leads to increase in return on equity. In contrast, loan-to-deposit ratio has a negative relationship with return on equity. It indicates that higher the loan-to-deposit ratio, lower would be the return on equity. In addition, debt-to-equity ratio has a positive relationship with return on equity. It indicates that increase in debt-to-equity ratio leads to increase in return on equity. Moreover, bank size has a negative relationship with return on equity. It indicates that larger the bank size, lower 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 4 shows the regression results of non-performing loans, operating efficiency, capital adequacy ratio, net interest margin, loan-to-deposit ratio and bank size with return on asset of Nepalese commercial banks.

Table 4

Estimated regression results of non-performing loans, capital adequacy ratio, net interest margin, loan-to-deposit ratio, operating efficiency and bank size on return on assets

The results are based on panel data of 12 commercial banks with 108 observations for the period of 2014/15 to 2022/23 by using the linear regression model and the model is $ROA = \beta_0 + \beta_1 NPL_{it} + \beta_2 CAR_{it} + \beta_3 NIM_{it} + \beta_4 LDR_{it} + \beta_5 OE_{it} + \beta_6 BSIZE_{it} + e_{it}$ where, the dependent variable is ROA (Return on assets as measured by the ratio of net profit to total asset, in percentage). The independent variables are NPL (Non-performing loans as measured by the ratio of non-performing loans to total loans, in percentage), CAR (Capital adequacy ratio as measured by the ratio of total capital to total risk weighted exposure, 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 percentage), OE(Operating efficiency as measured by the ratio of operating expenses to operating income, in percentage.), and BSIZE (Bank size as measured by total assets, Rs. in billions).

Model	Intercepts	Regression coefficients of						Adj. R_bar²	SEE	F-value
		NPL	CAR	NIM	LDR	OE	BSIZE			
1	1.634 (25.334)**	-0.064 (1.886)						0.023	0.445	3.559
2	0.758 (2.816)**		0.057 (2.952)**					0.067	0.437	8.713
3	1.117 (5.979)**			0.135 (2.344)*				0.040	0.443	5.492
4	2.445 (7.084)**				-0.011 (2.631)**			0.052	0.440	6.922
5	2.767 (17.121)**					-0.029 (7.754)**		0.356	0.363	60.118
6	3.061 (8.565)**						-0.723 (4.273)**	0.139	0.420	18.258
7	0.901 (2.920)**	-0.034 (0.949)	0.05 (2.426)*					0.660	0.437	4.803
8	0.443 (1.324)	-0.061 (1.736)	0.048 (2.371)*	0.169 (2.986)**				0.132	0.421	6.415
9	1.608 (3.130)**	-0.089 (2.508)*	0.036 (1.799)	0.171 (3.116)**	-0.012 (2.917)**			0.190	0.407	7.285
10	2.804 (6.042)**	-0.009 (0.283)	0.015 (0.896)	0.136 (2.956)**	-0.009 (2.684)**	-0.027 (6.758)**		0.435	0.340	17.49
11	3.019 (5.821)**	-0.002 (0.067)	0.018 (1.031)	0.121 (2.489)*	-0.009 (2.414)*	-0.026 (6.112)**	-0.156 (0.929)	0.434	0.340	14.7

Notes:

    i.   Figures in parenthesis are t-values.

    ii.   The asterisk signs (**) and (*) indicate that the results are significant at on percent and five percent level respectively.

    iii.   Return on assets is the dependent variable.

Table 4 that the beta coefficients for non-performing loan are negative

with return on assets. It indicates that non-performing loan has a negative impact on return on assets. This finding is similar to the findings of Safitri and Oktavia (2022). Similarly, the beta coefficients for capital adequacy ratio are positive with return on assets. It indicates that capital adequacy ratio has a positive impact on return on assets. This finding is similar to the findings of Islam *et al.* (2020). Likewise, the beta coefficients for net interest margin are positive with return on assets. It indicates that net interest margin has a positive impact on return on assets. This finding is consistent with the findings of Marlina (2022). In addition, the beta coefficients for 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 consistent with the findings of Bolek and Wilinski (2012). Further, the beta coefficients for operating efficiency are negative with return on assets. It indicates that operating efficiency has a negative impact on return on assets. This finding is similar to the findings of Uddin (2022). Moreover, the beta coefficients for bank size are negative with return on assets. It indicates that bank size has a negative impact on return on assets. This finding contradicts with the findings of Halkos and Salamouris (2004).

Table 5 shows the estimated regression results of non-performing loans, capital adequacy ratio, net interest margin, loan-to-deposit ratio, operating efficiency and bank size on return on equity.

Table 5

Estimated regression results of non-performing loans, capital adequacy ratio, net interest margin, loan-to-deposit ratio, operating efficiency and bank size on return on equity

The results are based on panel data of 12 commercial banks with 108 observations for the period of 2014/15 to 2022/23 by using the linear regression model and the model is ROE = $\beta_0 + \beta_1 NPL_{it} + \beta_2 CAR_{it} + \beta_3 NIM_{it} + \beta_4 LDR_{it} + \beta_5 DER_{it} + \beta_6 BSIZE_{it} + e_{it}$ where, the dependent variable is ROE (Return on equity as measured by the ratio of net profit to total equity, in percentage). The independent variables are NPL (Non-performing loans as measured by the ratio of non-performing loans to total loans, in percentage), CAR (Capital adequacy ratio as measured by the ratio of total capital to total risk weighted exposure, 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 percentage), OE(Operating efficiency as measured by the ratio of operating expenses to operating income, in percentage.), and BSIZE (Bank size as measured by total assets, Rs. in billions).

Model	Intercepts	Regression coefficients of						Adj. R_bar²	SEE	F-value
		NPL	CAR	NIM	LDR	OE	BSIZE			
1	13.828 (11.403)**	1.74 (2.732)**						0.057	8.412	7.464
2	33.036 (6.477)**		-1.223 (3.323)**					0.086	8.282	11.042
3	9.12 (2.536)**			2.264 (2.049)*				0.029	8.536	4.2
4	43.972 (7.033)**				-0.342 (4.460)**			0.150	7.986	19.895
5	12.351 (3.207)**					0.095 (1.049)		0.001	8.658	1.101
6	37.63 (5.298)**						-10.166 (3.023)**	0.071	8.350	9.141
7	28.156 (4.864)**	1.148 (1.728)	0.985 (2.528)**					0.103	8.206	7.118
8	23.484 (3.631)**	0.864 (1.264)	-1.014 (2.618)**	1.726 (1.577)				0.115	8.148	5.641
9	59.35 (6.405)**	0.017 (0.026)	-1.382 (3.869)**	1.767 (1.790)	-0.368 (4.981)**			0.280	7.350	11.403
10	59.011 (5.858)**	0.006 (0.009)	-1.376 (3.770)**	1.776 (1.781)	-0.369 (4.934)**	0.008 (0.088)		0.273	7.386	9.036
11	76.399 (7.198)**	0.912 (1.304)	-1.172 (3.361)**	0.579 (0.581)	-0.311 (4.299)**	0.109 (1.254)	-12.683 (3.683)**	0.353	6.969	10.718

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 equity is the dependent variable.

Table 5 shows the beta coefficients for non-performing loans are positive with return on equity. It indicates that non-performing loans has a positive impact on return on equity. This finding is not consistent with the findings of Kwashie (2022). Similarly, the beta coefficients for capital adequacy ratio are negative with return on equity. It indicates that capital adequacy ratio has a negative impact on return on equity. This finding is similar to the findings of Hersugondo *et al.* (2021). Likewise, the beta coefficients for net interest margin are positive with return on equity. It indicates that net interest margin has a positive impact on return on equity. This finding is consistent with the findings of Sukmadewi (2020). Further, 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 Ulandari *et al.* (2016). Moreover, the beta coefficients for operational efficiency are positive with return on equity. It indicates that debt-to-equity ratio has a positive impact on return on equity. This finding is similar to the findings of Anggraeni *et al.* (2022). Furthermore, the beta coefficients for bank size are negative with return on equity. It indicates that bank size has a negative impact on return on equity. This finding contradicts with the findings of Mule *et al.* (2015).

4. Summary and conclusion

Banking institutions are business entities dedicated to financial intermediation, involving the allocation of surplus liquidity among different economic agents. They use deposits and other liabilities from people or firms with a surplus of resources, redirecting them to economic agents who lack such resources, in the form of loans and other assets. The banking sector is a pivotal segment in many countries so there is a need for continuous implementation of adequate policy measures and reforms in order to ensure that the banking sector performs its function efficiently. Commercial banks have a greater capacity for varying the aggregate volume of credit than other financial intermediaries. A sound, profitable, competent and well managed banks enables both the economy and the country to stay competitive and able to withstand any negative shocks.

This study attempts to analyse the effect of capital adequacy ratio, non-performing loan, operation efficiency and bank size on profitability of Nepalese commercial banks. The study is based on secondary data of 12 commercial banks with 108 observations for the period from 2014/15 to 2022/23.

The study showed that non-performing loans, net interest margin and operating efficiency have positive effect on return on equity. However, capital adequacy ratio, loan-to-deposit ratio and bank size have negative effect on return on equity. The study showed that capital adequacy ratio and net interest margin have positive effect on return on assets. However, non-performing loans, loan-to-deposit ratio, operating efficiency and bank size have negative effect on return on assets. Likewise, the study also concluded that net interest margin followed by capital adequacy ratio is the most influencing factor that explains the changes in the return on asset in the context of Nepalese commercial banks. Similarly, the study also concluded that net interest margin followed by non-performing loan is the most influencing factor that explains the changes in return on equity in the context of Nepalese commercial banks.

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