Impact of Revenue Diversification on Bank Profitability and Stability: A Case of Nepalese Commercial Banks

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Abstract

This study examines the impact of revenue diversification on the financial profitability and stability of Nepalese commercial banks. Return on assets (ROA) and Z-score are the selected dependent variables. The selected independent variables are bank size, non-interest income to total assets, capital adequacy ratio, gross domestic product growth rate, operating income expenses ratio and credit risk. The study is based on secondary data of 16 commercial banks with 128 observations for the study period from 2013/14 to 2020/21. 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 revenue diversification on the financial profitability and stability of Nepalese commercial banks.

The study showed that credit risk has a negative impact on return on assets and Z-score. It indicates that increase in non-performing loan leads to decrease in return on assets and Z-score. Similarly, capital adequacy ratio has a positive impact on return on assets and Z-score. It indicates that increase in capital adequacy ratio leads to increase in return on assets and Z-score. Likewise, non-interest income to total assets has a positive impact on return on assets and return on equity. It indicates that increase in non-interest income to total assets leads to increase in return on assets and return on equity. In contrast, gross domestic product growth rate has a positive impact on return on assets and return on equity. It indicates that higher the gross domestic product growth rate, higher would be the return on assets and return on equity. In addition, bank size has a positive impact on Z-score. It indicates that increase in bank size leads to increase in Z-score. Moreover, operating income expenses ratio has a positive impact on return on assets and return on equity. It indicates that increase in operating income expenses ratio leads to increase in return on assets and Z-score.

Keywords: bank size, non-interest income to total assets, capital adequacy ratio, gross domestic product growth rate, operating income expenses ratio, return on assets, Z-score

1. Introduction

Deregulation and increased competition have led banks to expand their activities and to develop new lines of businesses beside their traditional interest activities. Banks have diversified their income sources by performing

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new activities, such as underwriting and trading securities, brokerage and investment banking and other activities, which generate non-interest income. Revenue diversification may benefit banks if diversified activities are inherently less risky and possess high returns, while it may hurt banks if diversified activities are riskier and have low returns. Banks can potentially reduce the variability of their revenue by diversifying beyond traditional lending activities into noninterest revenue sources. The economic effect of the pandemic resulted in tightened credit standards and reduced demand for many types of loans. Li et al. (2021) revealed that noninterest revenue sources are positively related to performance but inversely related to risk. These results are consistent with a beneficial diversification effect during the pandemic from banks expanding beyond traditional lending sources of revenue. The process of spreading an investment across assets (and thereby forming a portfolio) is called diversification. The principle of diversification states that spreading an investment across many assets will eliminate some of the risk (Ross et al., 2016). Banks can potentially reduce the variability of their revenue streams by altering the geographic and loan-type mix of their loan portfolios. Alternatively, banks can diversify by expanding beyond traditional lending activities into a variety of noninterest revenue sources (e.g., service charges, trading account revenue, fiduciary activities, etc.).

Diversification in different types of non-interest activities may have a different impact on bank profitability and stability depending on the exact nature of non-interest income. For example, it may be fee and commission income from different non-financial services such as issuing bank guarantees, letters of credit, shipping guarantees, making import payments, advising letters of credit, handling export documents and export proceeds, credit card fee, etc. The other non-interest income sources may include charges for any kind of services provided by a bank to customers, like providing safe deposit lockers, issuing demand drafts, check book charges, clearing checks, underwriting initial public offerings (IPOs), capital gains from dealing in government securities and equity markets, trading income, gains from foreign exchange markets, revaluation of fixed assets such as office buildings, selling miscellaneous assets, monthly or annual account maintenance charges, income from selling insurance, and so on. Stiroh (2004) revealed that increased dependence on noninterest income is related to greater bank risk and lower risk-adjusted profits. The study also revealed that a potential dark side to diversification is that banks may enter businesses where they have little experience or comparative advantage. DeYoung and Torna (2013) investigated the relation between nontraditional banking activities and

bank failures during the financial crisis. The study also found that not all noninterest revenue sources have the same impact of the likelihood of failure. Instead, the study found the probability of failure declined with activities, such as insurance sales and securities brokerage, while venture capital, asset securitization, and investment banking increased the probability of failure. The study also showed that banks taking greater risk in nontraditional activities also tended to take greater risks in their traditional activities.

Using a sample of small European banks, Mercieca et al. (2007) found no direct benefits from diversification within and across business lines. Further, the study revealed an inverse relation between bank performance and noninterest income. They argue these results are due to small European banks entering lines of business in which they lack expertise and experience. However, Kohler (2015) investigated bank stability in 15 EU countries and finds that banks are significantly more stable and profitable if they increase their share of noninterest income sources. The study revealed that there are substantial benefits from income diversification. Chiorazzo et al. (2008) found that the income diversification increases risk-adjusted returns for a sample of Italian banks. Finally, Maudos (2017) addressed the relation between the use of noninterest income and risk and profitability for European banks during the 2002–2012 period. The study revealed that an increase in noninterest income has a negative effect on profitability but is associated with an increase in risk. Berger et al. (2010) found that diversification is associated with reduced profits and higher costs for Chinese banks over the period of 1996–2006. Lee et al. (2014) revealed a positive association between the use of noninterest income sources and risk reduction for a sample of banks from 22 Asian countries over the period of 1995–2009. However, the study does not find an increase in profitability. For banks in the Philippines, Meslier et al. (2014) showed that an increased focus on noninterest activities increases risk-adjusted profits. In a study of South Asian banks, Edirisuriya et al. (2015) found that as banks diversify from traditional lending activities into noninterest business lines, they realize improved solvency and higher market-to-book valuations. However, beyond a certain level, higher diversification is negatively related to these indicators. Nisar et al. (2018) investigated the effect of revenue diversification on the profitability and stability of South Asian banks. The study revealed that increased revenue diversification into noninterest income sources increases the profitability and stability of South Asian banks.

Li and Zhang (2013), using Chinese banks data over the period 1986–

2008, concluded that a rise in non-interest income has diversification benefits. However, as non-interest income has higher instability and cyclicality than net interest income, it relies more on non-interest income may aggravate the risk/return trade-off. Saunders et al. (2014) established that bank revenue diversification causes higher profits and less insolvency risk for US banks. Portfolio theory also suggests that non-interest income is an avenue through which risk in banking, which would usually be concentrated in a bank's loan portfolio, can be spread to other non-interest income-generating activities, thereby increasing profitability. De Jonghe (2010), using data for European banks from 1992–2007, also found a negative relationship between income diversification and bank stability. Sanya and Wolfe (2011) investigated the effect of a shift toward non-interest income on bank performance and insolvency risk using a panel dataset of 226 listed banks across 11 emerging economies. Applying system GMM methodology, the study concluded that diversification across and within both interest and non-interest income-generating activities decreases insolvency risk (increases stability). Doumpos et al. (2016) also found a positive relationship between diversification and financial strength (stability).

Lepetit et al. (2008) investigated the relationship between product diversification and bank risk for the European banking industry from 1996–2002, when the composition of non-interest activities was changing. The study first showed that banks expanding into non-interest income activities represent a higher insolvency risk (instability) than banks that mainly supply loans. However, considering the size effects and splitting the non-interest activities into both trading activities and commission and fee activities, the study showed that the positive link with risk is mostly accurate for small banks and essentially driven by commission and fee-based activities. A higher share of trading activities (i.e., other non-interest income) is never associated with higher risk (instability). DeYoung and Roland (2001) examined the impact of shocks on fee-based activities on bank profit volatility for large US commercial banks. The study demonstrated that fee-based activities, which represent a growing share of bank activities, increase the volatility of bank profits (decrease stability). Pennathur et al. (2012) also found for Indian public sector banks that fee-based income significantly reduces default risk (increases stability). Hidayat et al. (2012) assessed the relationship between product diversification and bank risk for Indonesian banks during 2002–2008. The study concluded that product diversification decreases risk (increases stability) for small banks and increases risk (decreases stability) for large banks in the Indonesian context. Zhou (2014) concluded that there

is no significant relationship between revenue diversification and bank risk. Ashraf et al. (2016a), with reference to Gulf Cooperation Council (GCC) region banks, found that banks more involved in fee-based activities are more financially stable compared to banks that mainly generate their incomes only from interest-based activities. Ahamed (2017) concluded that an increased share of non-interest income increases the profitability and risk-adjusted profitability (stability) of Indian banks.

In the context of Nepal, Nepali (2018) examined the impact of income diversification on the risk return trade off in the Nepalese commercial banks. The results showed that non-interest income, foreign ownership and bank size are positively correlated to risk adjusted returns. It indicates that higher the non-interest income, foreign ownership and bigger the bank size, higher would be the risk adjusted returns. Prajapati and Shah (2019) revealed that income diversification, non-interest income and size of the commercial banks are the major determinants of risk adjusted profitability of commercial banks. Similarly, the study also showed that there is positive impact of diversification on the risk adjusted performances of the commercial banks. It shows Nepalese commercial banks are in process of diversifying their income. Non-interest income has positive and significant impact on risk adjusted performance of commercial banks. It indicates commercial banks should focus on generating non-interest income through modern banking activities to generate higher risk adjusted return.

The above discussion shows that empirical evidences vary greatly across the studies on the impact of revenue diversification on the financial profitability and stability 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 impact of revenue diversification on the financial profitability and stability of Nepalese commercial banks. Specifically, it examines the relationship of bank size, non-interest income to total assets, capital adequacy ratio, gross domestic product growth rate, operating income expenses ratio and credit risk on return on asset and Z-score 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 16 Nepalese commercial banks from 2013/14 to 2020/21, leading to a total of 128 observations. The study employed purposive sampling method. The main sources of data collected from the Bank Supervision Report published by Nepal Rastra Bank (NRB) and annual reports of the selected 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	Observations
1	Nabil Bank Limited	2013/14 - 2020/21	8
2	Global IME Bank Limited	2013/14 - 2020/21	8
3	NIC Asia Bank Limited	2013/14 - 2020/21	8
4	Rastriya Banijya Bank Limited	2013/14 - 2020/21	8
5	Siddhartha Bank Limited	2013/14 - 2020/21	8
6	Agricultural Development Bank Limited	2013/14 - 2020/21	8
7	NMB Bank Limited	2013/14 - 2020/21	8
8	Nepal Investment Bank Limited	2013/14 - 2020/21	8
9	Kumari Bank Limited	2013/14 - 2020/21	8
10	Prime Commercial Bank Limited	2013/14 - 2020/21	8
11	Himalayan Bank Limited	2013/14- 2020/21	8
12	Mega Bank Nepal Limited	2013/14 - 2020/21	8
13	Prabhu Bank Limited	2013/14 - 2020/21	8
14	Everest Bank Limited	2013/14 - 2020/21	8
15	Sanima Bank Limited	2013/14 - 2020/21	8
16	Machhapuchchhre Bank Limited	2013/14 - 2020/21	8
Total number of observations			**128**

Thus, the study is based on the 128 observations.

The model

The model used in this study assumes that financial profitability and stability depends upon revenue diversification. The dependent variables selected for the study are return on assets and Z-score. Similarly, the selected independent variables are bank size, non-interest income to total assets, capital adequacy ratio, gross domestic product growth rate, operating income expenses ratio and credit risk. Therefore, the models take the following forms:

$$ROA = \beta_0 + \beta_1\,BS_t + \beta_2\,NIITA_{it} + \beta_3\,CAR_{it} + \beta_4\,GDP_{it} + \beta_5\,BOPO_{it} + \beta_6\,CR_{it} + e_{it}$$

$$Z\text{-Score}_{it} = \beta_0 + \beta_1\,BS_t + \beta_2\,NIITA_{it} + \beta_3\,CAR_{it} + \beta_4\,GDP_{it} + \beta_5\,BOPO_{it} + \beta_6\,CR_{it} + e_{it}$$

Where,

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

Z-score= Z-score as measured by the return on assets (ROA) plus the equity to assets for bank i for the given period divided by the standard deviation (SD) of ROA (%) over the sample period.

BOPO = Operating income expenses ratio as measured by ratio of operating income by operating expenses, in percentage.

CR= Credit risk 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.

NIITA = Non-interest income to total assets as measured by ratio of non-interest income by total assets, in percentage.

GDP = Gross domestic product growth rate at producer price, 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 the hypothesis formulation:

Bank size

Bank size has been remarkably considered as an important determinant of firm profitability. Larger firms are said to be able to produce goods more cheaply as compared to small firms. This is because the former has achieved more learning, greater cumulative experience and they are able to spread their fixed costs over a greater amount of production (Tharu and Shrestha, 2019). Mule et al. (2015) indicated that there is a positive and significant relationship between firm size and profitability. In contrast, Likewise, Ruslan et al. (2019) found that bank size has a positive impact on bank profitability in Indonesia. Similarly, Anggari and Dana (2020) stated that bank size has a positive and significant effect on profitability. Terraza (2015) showed that company size has a significant positive effect on profitability. Based on it, this study develops the following hypothesis:

H_1: There is a positive relationship of bank size with bank profitability and stability.

Non-interest income to total assets

Elsas et al. (2010) examined the banking sector of developed nations and revealed that the bank profitability is positively influenced by the diversified income. According to Hidayat et al. (2012), there is a positive relationship of non-interest income and economic growth with bank profitability in the context of Indonesian banking industry. Mehzabin et al. (2023) concluded that there is a positive relationship between non-interest income and profitability. Likewise, Ahamed (2017) concluded that noninterest income has partial significant and positive impact on financial performance of Indian banks. Similarly, Delpachitra and Lester (2013) found that there is a positive relationship between noninterest income and bank profitability. In addition, Alper and Le (2017) concluded that there is a positive and significant interrelationship between net interest margin and non-interest income. Based on it, this study develops the following hypothesis:

H_2: There is a positive relationship between non-interest income to total assets and bank profitability and stability.

Capital adequacy ratio

Capital adequacy ratio is the ratio of capital ability to show how far bank

assets have a risk. Bandaranayake and Jayasinghe (2014) found that capital adequacy has a positive and significant relationship with the profitability of banks. Generally, the capital is positively related to the financial performance of banks (Gul *et al.,* 2011). Smederevac and Vujnovic (2012) showed that the capital adequacy is positively and significantly related to profitability. Pasiouras (2007) found that there is a positive and significant impact of capital and loans on ROA and ROE. Based on it, this study develops the following hypothesis:

H$_3$: There is a positive relationship between capital adequacy ratio and bank profitability and stability.

GDP growth rate

GDP rate is defined as measure of the total economic activity and it is adjusted for inflation. Ghazali (2008) revealed that GDP positively influence the revenue of banks. Wong *et al.* (2008) argued that GDP and inflation have a significant impact on asset returns. Likewise, Ghazali (2008) also showed that GDP and inflation positively influence the revenue of bank. Furthermore, Sufian and Chong (2008) showed that there is insignificant and positive impact of GDP on ROA. Based on it, this study develops the following hypothesis:

H$_4$: There is a positive relationship between GDP growth rate and bank profitability and stability.

Operating income expenses ratio

Operational income operating costs (BOPO) is a comparison between operating costs and operating income. BOPO has an influence on bank profitability since it shows how much banks can do the cost efficiency incurred. This ratio is often referred to the efficiency of ratio that is used to measure the ability of a bank's management to control its operational costs against operating income. Setiawan and Hermanto (2017) showed that there is a significant negative influence between BOPO and ROA. Similarly, Jayathilaka (2020) found that BOPO has a negative and significant effect on bank profitability. Likewise, Almazari and Almumani (2016) found that BOPO has a negative and significant effect on bank profitability. Furthermore, Rasiah et al. (2010) stated that BOPO is negatively correlated to bank's profitability. Based on it, this study develops the following hypothesis:

H_5: There is a negative relationship of operating income expenses ratio with bank profitability and stability.

Credit risk

Credit risk is a potential loss due to the failure or inability of the customer to return the amount of the loan obtained from the bank and the interest in accordance with a predetermined period of time. Kolapo et al. (2012) found a negative relationship between credit risk and the profitability. Similarly, Ruziqa (2013) investigated the joint effect of credit risk and liquidity risk on the profitability of large banks of Indonesia. The study found negative effect of credit risk on the profitability. Moreover, Dietrich and Wanzenried (2011) found that credit risk has a negative association with bank profitability. Furthermore, Islam and Nishiyama (2016) found that credit risk has a negative impact on bank profitability. Likewise, Ongore and Kusa (2013) stated a negative relationship between credit risk and bank profitability. Based on it, this study develops the following hypothesis:

H_6: There is a negative relationship between credit risk and bank profitability and stability.

3. Results and discussion

Descriptive statistics

Table 2 presents the descriptive statistics of selected dependent and independent variables during the period 2013/14 to 2020/21.

Table 2

Descriptive statistics

This table shows the descriptive statistics of dependent and independent variables of 16 Nepalese commercial banks for the study period of 2013/14 to 2020/21. The dependent variables are ROA (Return on assets as measured by the ratio of net profit to total asset, in percentage) and Z-score (Z-Score as measured by return on assets (ROA) plus the equity to assets for bank i for the given period divided by the standard deviation (SD) of ROA (%) over the sample period). The independent variables are BS (Bank size as measured by total assets, Rs. in billion), NIITA (Non-interest income to total assets as measured by ratio of non-interest income by total assets, in percentage), CAR (Capital adequacy ratio as measured by the ratio of total capital to total risk weighted exposure, in percentage), GDP (Gross domestic product growth rate at producer price, in percentage), BOPO (Operating income expenses ratio as measured by ratio of operating income by operating expenses, in percentage) and CR

(Credit risk as measured by the ratio of non-performing loans to total loans, in percentage).

Variables	Minimum	Maximum	Mean	S. D.
ROA	0.58	2.89	1.61	0.45
Z-score	0.06	2.19	0.40	0.22
BS	20.57	346.15	125.69	69.52
NIITA	0.35	7.59	0.94	0.64
CA	1.95	18.72	10.65	2.67
GDP	-2.37	8.98	4.44	3.56
BOPO	135.56	469.91	262.26	64.10
CR	0.01	24.29	1.89	2.56

Source: SPSS output

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 16 Nepalese commercial banks for the study period from 2013/14 to 2020/21. The dependent variables are ROA (Return on assets as measured by the ratio of net profit to total asset, in percentage) and Z-score (Z-Score as measured by return on assets (ROA) plus the equity to assets for bank i for the given period divided by the standard deviation (SD) of ROA (%) over the sample period). The independent variables are BS (Bank size as measured by total assets, Rs. in billion), NIITA (Non-interest income to total assets as measured by ratio of non-interest income by total assets, in percentage), CAR (Capital adequacy ratio as measured by the ratio of total capital to total risk weighted exposure, in percentage), GDP (Gross domestic product growth rate at producer price, in percentage), BOPO (Operating income expenses ratio as measured by ratio of operating income by operating expenses, in percentage) and CR (Credit risk as measured by the ratio of non-performing loans to total loans, in percentage).

Variables	ROA	Z-score	BS	NIITA	CAR	GDP	BOPO	CR
ROA	1							
Z-score	0.482**	1						
BS	-0.170	0.117	1					
NIITA	0.098	0.055	0.067	1				
CAR	0.214**	0.505**	-0.005	0.130	1			
GDP	0.314**	0.226*	-0.218*	0.059	0.156	1		
BOPO	0.441**	0.247**	-0.170	0.162	0.213*	0.046	1	
CR	-0.046	-0.083	-0.115	-0.001	-0.193*	-0.003	-0.347**	1

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

Table 3 shows that bank size has a negative relationship with return on assets. It means that increase in bank size leads to decrease in return on asset. However, there is a positive relationship between non-interest income to total assets and return on asset. It means that increase in non-interest income to total assets leads to increase in return on asset. Similarly, capital adequacy ratio has a positive relationship with return on asset. It means that increase in capital adequacy ratio leads to increase in return on asset. Furthermore, there is a positive relationship between GDP growth rate and return on asset. It means that increase in GDP growth rate leads to increase in return on asset. In addition, interest income expenses ratio has a positive relationship with return on asset. It means that increase in interest income expenses ratio leads to increase in return on asset. Further, there is a negative relationship between credit risk and return on asset. It means that increase in credit risk leads to decrease in return on asset.

Similarly, the result also shows that bank size is positively correlated to Z-score. It means that increase in bank size leads to increase in Z-score. Similarly, there is a positive relationship between non-interest income to total assets and Z-score. It means that increase in non-interest income to total assets leads to increase in Z-score. Similarly, capital adequacy ratio has a positive relationship with Z-score. It means that increase in capital adequacy ratio leads to increase in Z-score. Furthermore, there is a positive relationship between GDP growth rate and Z-score. It means that increase in GDP growth rate leads to increase in Z-score. In addition, interest income expenses ratio has a positive relationship with Z-score. It indicates that increase in interest income expenses ratio leads to increase in Z-score. Further, there is a negative relationship between credit risk and Z-score. It means that increase in credit risk leads to decrease in Z-score in Nepalese commercial banks.

Regression analysis

Having indicated the Pearson's correlation coefficients, the regression analysis has been carried out and results are presented in Table 4. More specifically, it shows the regression results of bank size, non-interest income to total assets, capital adequacy ratio, gross domestic product growth rate, operating income expenses ratio and credit risk on return on asset of Nepalese commercial banks.

Table 4

Estimated regression results of bank size, non-interest income to total assets, capital adequacy ratio, gross domestic product growth rate, operating income expenses ratio and credit risk on return on asset

The results are based on panel data of 16 commercial banks with 128 observations for the period of 2013/14 to 2020/21 by using the linear regression model and the model is $ROA_{it} = \beta_0 + \beta_1\ BS_{it} + \beta_2\ NIITA_{it} + \beta_3\ CA_{it} + \beta_4\ GDP_{it} + \beta_5\ BOPO_{it} + \beta_6\ CR_{it} + e_{it}$ where the dependent variable ROA (Return on assets as measured by the ratio of net profit to total asset, in percentage). The independent variables are BS (Bank size as measured by total assets, Rs. in billion), NIITA (Non-interest income to total assets as measured by ratio of non-interest income by total assets, in percentage), CAR (Capital adequacy ratio as measured by the ratio of total capital to total risk weighted exposure, in percentage), GDP (Gross domestic product growth rate at producer price, in percentage), BOPO (Operating income expenses ratio as measured by ratio of operating income by operating expenses, in percentage) and CR (Credit risk as measured by the ratio of non-performing loans to total loans, in percentage).

Model	Intercept	Regression coefficients of						Adj. R_bar²	SEE	F-value
		BS	NIITA	CAR	GDP	BOPO	CR			
1	1.753 (21.394)**	-0.001 (1.932)						0.021	0.447	3.732
2	1.550 (21.962) **		0.068 (1.101)					0.002	0.451	1.213
3	1.228 (7.605) **			0.036 (2.464)*				0.038	0.443	6.072
4	1.438 (23.548)**				0.040 (3.707) **			0.091	0.431	13.739
5	0.798 (5.245) **					0.003 (5.519) **		0.188	0.407	30.457
6	1.630 (32.674) **						0.008 (0.512)	0.006	0.453	0.262
7	1.687 (17.333) **	-0.001 (2.016)*	0.076 (1.248)					0.025	0.446	2.653
8	1.147 (7.305) **			0.029 (2.005)*	0.036 (3.393) **			0.112	0.425	9.044
9	0.679 (3.933) **					0.003 (5.697) **	-0.022 (1.439)	0.195	0.405	16.393
10	1.337 (7.519) **	-0.001 (7.519)**	0.058 (0.955)	0.034 (2.335)*				0.059	0.438	3.649
11	0.543 (3.224) **				0.037 (3.869) **	0.003 (5.816) **	-0.021 (1.463)	0.276	0.384	17.140
12	1.223 (6.922) **	-0.001 (1.364)	0.048 (0.815)	0.028 (1.933)*	0.033 (2.977) **			0.115	0.425	5.126
13	0.593 (2.893) **	-0.002 (0.525)	0.006 (0.105)	0.014 (1.071)	0.035 (3.430)**	0.003 (5.007)**		0.260	0.388	9.918
14	0.421 (1.812)*	-0.001 (0.223)	0.002 (0.039)	0.017 (1.270)	0.035 (3.468) **	0.003 (5.253) **	-0.023 (1.539)	0.268	0.386	8.752

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 bank size are negative with return on asset. It indicates that bank size has a negative impact on return

on asset. This finding is inconsistent with the findings of Anggari and Dana (2020). Similarly, the beta coefficients for non-interest income to total assets are positive with return on asset. It indicates that non-interest income to total assets has a positive impact on return on asset. This finding is similar to the findings of Mehzabin et al. (2023). Likewise, the beta coefficients for capital adequacy are positive with return on asset. It indicates that capital adequacy ratio has a positive impact on return on asset. This finding is similar to the findings of Smederevac and Vujnovic (2012). Further, the beta coefficients for GDP growth rate are positive with return on asset. It indicates that GDP growth rate has a positive impact on return on asset. This finding is consistent with the findings of Ghazali (2008). In addition, the beta coefficients for operating income expenses ratio are positive with return on asset. It indicates that operating income expenses ratio has a positive impact on return on asset. This finding is similar to the findings of Almazari and Almumani (2016). However, the beta coefficients for credit risk are negative with return on asset. It indicates that credit risk has a negative impact on return on asset. This finding is similar to the findings Ongore and Kusa (2013).

Table 5 shows the estimated regression results of bank size, non-interest income to total assets, capital adequacy ratio, gross domestic product growth rate, operating income expenses ratio and credit risk on Z-score of Nepalese commercial banks.

Table 5

Estimated regression results of bank size, non-interest income to total assets, capital adequacy ratio, gross domestic product growth rate, operating income expenses ratio and credit risk on Z-score

The results are based on panel data of 16 commercial banks with 128 observations for the period of 2013/14 to 2020/21 by using the linear regression model and the model is $\text{Z-Score}_{it} = \beta_0 + \beta_1 \, BS_{it} + \beta_2 \, NIITA_{it} + \beta_3 \, CA_{it} + \beta_4 \, GDP_{it} + \beta_5 \, BOPO_{it} + \beta_6 \, CR_{it} + e_{it}$ where the dependent variable is Z-score (Z-Score as measured by return on assets (ROA) plus the equity to assets for bank i for the given period divided by the standard deviation (SD) of ROA (%) over the sample period). The independent variables are BS (Bank size as measured by total assets, Rs. in billion), NIITA (Non-interest income to total assets as measured by ratio of non-interest income by total assets, in percentage), CAR (Capital adequacy ratio as measured by the ratio of total capital to total risk weighted exposure, in percentage), GDP (Gross domestic product growth rate at producer price, in percentage), BOPO (Operating income expenses ratio as measured by ratio of operating income by operating expenses, in percentage) and CR (Credit risk as measured by the ratio of non-performing loans to total loans, in percentage).

Model	Intercept	Regression coefficients of						Adj. R_bar²	SEE	F-value
		BS	NIITA	CAR	GDP	BOPO	CR			
1	0.354 (8.440)**	0.002 (1.321)						0.006	0.228	1.744
2	0384 (10.678) **		0.020 (0.621)					0.005	0.229	0.386
3	-0.059 (0.814)			0.043 (6.561)**				0.249	0.198	43.053
4	0.337 (10.620) **				0.015 (2.604)*			0.044	0.224	6.781
5	0.170 (2.037)*					0.001 (2.867) **		0.054	0.223	8.221
6	0.416 (16.487)**						-0.007 (0.938)	0.001	0.229	0.880
7	0.339 (6.779) **	0.003 (1.278)	0.017 (0.535)					0.000	0.229	1.011
8	-0.081 (1.113)			0.041 (6.249)**	0.010 (1.961)*			0.265	0.196	23.936
9	0.168 (1.766)					0.001 (2.689)*	-0.000 (0.031)	0.046	0.223	4.078
10	-0.106 (1.313)	0.004 (1.570)	0.007 (0.240)	0.044 (6.557)**				0.252	0.198	15.233
11	0.117 (1.396)				0.014 (2.543)*	0.001 (2.810) **		0.093	0.218	7.523
12	-0.148 (1.829)*	0.201 (2.096)*	0.010 (0.381)	0.041 (6.245)**	0.012 (2.405)*			0.279	0.194	13.311
13	-0.297 (2.950) **	0.231 (2.551)*	0.020 (0.756)	0.038 (5.757)**	0.013 (2.534)*	0.001 (2.408)*		0.306	0.191	12.224
14	-0.371 (3.244) **	0.261 (2.770)*	0.024 (0.882)	0.039 (5.903)**	0.013 (2.560)*	0.001 (2.738)*	-0.010 (1.348)	0.311	0.190	10.557

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. Z-score is the dependent variable.

Table 5 shows that the beta coefficients for bank size are positive with Z-score. It indicates that bank size has a positive impact on Z-score. This finding is similar to the findings of Terraza (2015). Similarly, the beta coefficients for non-interest income to total assets are positive with Z-score. It indicates that non-interest income to total assets has a positive impact on Z-score. This finding is similar to the findings of Delpachitra and Lester (2013). Likewise, the beta coefficients for capital adequacy ratio are positive with Z-score. It indicates that capital adequacy ratio has a positive impact on Z-score. This finding is similar to the findings of Pasiouras (2007). Further, the beta coefficients for GDP growth rate are positive with Z-score. It indicates that GDP growth rate has a positive impact on Z-score. This finding is consistent with the findings of Sufian and Chong (2008). In addition, the beta coefficients for operating income expenses ratio are positive with Z-score. It indicates that operating income expenses ratio has a positive

impact on Z-score. This finding contradicts with the findings of Setiawan and Hermanto (2017). However, the beta coefficients for credit risk are negative with Z-score. It indicates that credit risk has a negative impact on Z-score. This finding is similar to the findings Dietrich and Wanzenried (2011).

4. Summary and conclusion

The banking business around the world plays a major role in the business of financial intermediation and has grown over the years, resulting in the diversity and complexity of its operations. Diversification is the idea that investors allocate money to different types of investment alternatives. An income diversification refers to the relative proportions of noninterest income and interest income in the operating income of the banks. Banks are transcending their normal business operations and diversifying their activities in response to economic and financial sector reforms. The banking business has grown over a period of time resulting in diversity and complex operations. Mixing a wide variety of investment within a portfolio is a great way to reduce risk which is also known as diversification.

This study attempts to analyze the impact of revenue diversification on the financial profitability and stability of Nepalese commercial banks. The study is based on secondary data of 16 commercial banks with 128 observations for the period from 2013/14 to 2020/21.

The major conclusion of this study is that non-interest income to total assets, capital adequacy ratio, gross domestic product growth rate and operating income expenses ratio have positive impact on return on assets and Z-score. It indicates that increase in non-interest income to total assets, capital adequacy ratio, gross domestic product growth rate and operating income expenses ratio leads to increase in return on assets and Z-score. Similarly, credit risk has a negative impact on return on assets and Z-score. It indicates that increase in credit risk leads to decrease in return on assets and Z-score. Likewise, the study also concluded that operating income expenses ratio is the most influencing factor that explains the changes in the return on asset of Nepalese commercial banks. Similarly, the study also concluded that capital adequacy ratio is the most influencing factor that explains the changes in Z-score in context of Nepalese commercial banks.

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