Nepalese
Journal of Management

Banks' non-interest income and systematic risk: A case of Nepalese commercial banks

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Abstract

The study examines the determinants of non-interest income and systematic risk of Nepalese commercial banks. Non-interest income and systematic risk are selected as the dependent variables. The selected independent variables are nonperforming loan ratio, equity to total asset ratio, return on assets, net interest margin, bank size, operating efficiency and liquidity ratio. The study is based on secondary data of 27 commercial banks with 162 observations for the period from 2013/14 to 2018/19. The data are collected from the publications and websites of Nepal Rastra Bank and Ministry of Finance and annual reports of the selected commercial banks. The regression models are estimated to test the significance and importance of different variables on non-interest income and systematic risk of Nepalese commercial banks.

The study showed that non-performing loan and net interest margin have a negative impact on non-interest income. It indicates that increase in non-performing loan and net interest margin leads to decrease in non-interest income. Likewise, equity to total asset ratio and return on assets have a positive impact on non-interest income. It implies that increase in equity to total asset ratio and return on assets leads to increase in non-interest income. Likewise, non-performing loan, operating efficiency, bank size and liquidity have a negative impact on systematic risk. It indicates that increase in non-performing loan, operating efficiency, bank size and liquidity leads to decrease in systematic risk.

Keywords: Non-interest income, systematic risk, bank loan ratio, equity-asset ratio, return on asset, net interest margin, operating efficiency and liquidity.1.

1. Introduction

The banking industry is facing challenges of new banking environment due to increase in the competition. This force the banks to adopt the diversification strategy to play a new role in the financial sector (Gutierrez-Lopez and Abad-Gonzalez, 2020). Banks not only rely on the traditional ways of generating income but they also opt for non-interest income to survive in

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a competitive environment. Banks are diversifying their income from interest to non-interest sources in order to reduce risk and generate high returns. Competition in the banks leads to decline in interest revenue, which ultimately forces the banks to generate non-traditional income source. Therefore, banks have experienced a big change in their income structure (Hunjra *et al*., 2020).

According to Tennant and Sutherland (2014), non-interest income generation is determined by bank-specific characteristics and country-level environmental factors. The study found that large, solvent, liquid and efficient banks tend to gain profit mostly from non-interest income. Banks also gain profit from fee income in countries with a higher level of financial development and bank concentration as well as high inflation volatility. Dvorak and Hanousek (2009) argued that non-interest income is related to banking industry concentration and macroeconomic volatility. Trends such as globalization, disintermediation and re-regulation have influenced the competitive viability of banks and nature of the intermediation business. Changes in the nature of financial intermediation have been accompanied by a change in the nature of bank income (Allen and Santomero, 2001).

According to Khan *et al*. (2019), risk controlling in financial institutions is connected with safeguarding interest of stakeholders and maintaining discipline and stability within financial system. Various efforts are made to quantify and explain risk taking behavior including systematic risk within financial institutions. Macroeconomics shocks make the banking system vulnerable. Similarly, the excessive risk taking by banks also adds to the vulnerability of banking crisis. Levine and Zervos (1998) indicated that the countries which possess an advanced banking system grow faster than weak banking system. According to DeYoung and Rice (2014), more unstable earnings stream of a bank leads to higher level of risks. Non-interest income is more stable than interest income and that fee-based activities reduce bank risk through diversification. Cooper *et al*. (2003) found that non-interest income is significantly associated with lower risk-adjusted stock returns. Ekanayake and Azeez (2015) revealed that non-interest income activities have a positive impact on the risk adjusted return on equity. It implies that marginal increase in non-interest income activities improves the shareholder's risk-return trade off. Similarly, Chiorazzo *et al*. (2008) found that diversification of income improves risk adjusted returns for larger banks. Ngendo (2012) examined the relationship between non-interest income and financial performance of commercial banks in Kenya. The study showed that there is a negative relationship between increase in non-interest income and financial

performance. Zhuofan and Mingfeng (2011) examined the relationship between non-interest income and bank's profitability. The study found that non-interest income has a positive impact on ROA and ROE. However, Smith *et al*. (2003) found that non- interest income exhibited more volatility than net interest income over time. Bian *et al.* (2015) found that the banks having more revenues from service operations would be able to minimize bank risk, while revenues from security trading activities and investment activities will minimize bank profitability. Rossi *et al*. (2009) showed that diversification increases profit efficiency while reducing banks realized risk.

Elsas *et al*. (2010) found that diversification directly increases bank profitability and indirectly affects market value. The study also revealed that shifting to non-interest activities could lower cost-income ratios which subsequently lead banks to gain a higher margin. According to Trujillo-Ponce (2013), income diversification has a positive impact on bank profitability. However, Mercieca *et al*. (2007) examined the case of small European banks in terms of income diversification. The study found an inverse relationship between non-interest income and risk-adjusted bank performance. Duho *et al.* (2020) revealed that bank income sources are diversified significantly in the Ghanaian banking industry. The study also found that both interest and non-interest activities significantly influence bank performance. Similarly, Kohler (2014) examined the impact of banks' non-interest income share on risk in the German banking sector. The study indicated that non-interest income on risk significantly depends on the activities used to generate non-interest income with retail-oriented activities being significantly less risky than investment-oriented activities. The study also showed that banks are significantly less risky if they have a more balanced income structure. Furthermore, Stiroh (2014) examined the potential benefit of diversification for US banks engaging in non-interest activities. The study showed that increased exposure to non-interest income increases the volatility of equity market returns. Moreover, Templeton and Severiens (1992) showed that business diversification can decrease the volatility of shareholders earnings. In addition, Bian *et al.* (2015) found that the banks having more revenues from service operations would be able to minimize bank risk, while revenues from security trading activities and investment activities will minimize bank profitability.

Gorner *et al.* (2013) determined whether non-interest income affects the riskiness of banking companies and whether the market returns of these companies are sensitive to any changes in risk. The study found that non-interest income is associated with riskier stock returns. In contrast, the study

found almost no evidence linking non-interest income to changes in the total risk, interest rate risk or idiosyncratic risk. Moreover, Muneer *et al*. (2016) found a positive impact of income diversification on the performance of commercial banks in Pakistan. Similarly, Das and Ghosh (2009) argued that public sector banks are more efficient because they generate a substantial amount of fee-based income from many governments sponsored programs (e.g., personal provident fund collection, tax collection). Likewise, Gu and Kim (2002) showed that there is a negative relationship between bank risk and non-interest income activities which implies that non-interest activities reduce bank risk through diversification of earnings.

Cotugno and Stefanelli (2012) found a positive relationship between product diversification and bank performance. Likewise, Fengju *et al.* (2013) investigated the effect of commission activities on return and the risk of Iranian banks. The study revealed that non-interest based activities have insignificant effect on the return on equity. Operating efficiency (OE) also affects the systematic risk of bank. In addition, Gu and Kim (2002) argued that bank systematic risk can be reduced by generating higher profit with a higher OE. In addition, some banking system is risk sharing (Ashfaque *et al*., 2020). However, Eldomiaty *et al*. (2009) found a negative relationship between OE and systematic risk of non-financial sector. The study also showed that systematic risk has a negative relationship with financial market liquidity. Lee and Jang (2007) showed a negative relationship among systematic risk with liquidity. Borde (1998) found a negative relationship between profitability of the financial institution and systematic risk. It indicates that higher level of profitability reduces the financial instability of firm.

In the context of Nepal, Nepali (2018) revealed that non-interest income, foreign ownership and bank size are positively correlated to risk adjusted returns. The study also found that the income diversification followed non-interest income, equity to total assets ratio and foreign ownership are the most dominant factors that affect the risk return trade off in the context of Nepalese commercial banks. According to Gajurel and Pradhan (2012), market for interest based income is more competitive than the market of fee based income. The study also revealed that equity capital has a negative effect on revenue generation in Nepalese banking industry. Similarly, Prajapati and Shah (2019) investigated the effect of income diversification on risk-adjusted profitability of commercial and development banks in Nepal. The study revealed that Herfindahl Hirschman Index (HHI), equity multiplier, non-interest income and foreign holding have significant positive impact on risk

adjusted return on assets of commercial banks. Dhungel (2019) examined the relationship among non-interest income, profitability and risk in Nepalese commercial banks. The study showed that non-interest income has a positive impact on return on assets and risk-adjusted return on assets. Likewise, Shah *et al.* (2020) explored the impact of non-interest income on financial performance of joint venture banks in Nepal. The study indicated that assets size, letter of credit fee, guarantee income, remittance fee, dividend income, exchange income, service charge, and renewal fee have a significant impact on financial performance of joint venture banks in Nepal.

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

The main purpose of the study is to analyze the determinants of non-interest income and systematic risk of Nepalese commercial banks. Specifically, it examines the relationship of nonperforming loan ratio, bank size, operating efficiency and liquidity rate with systematic risk of Nepalese commercial banks. It also examines the relationship of nonperforming loan ratio, equity-asset ratio, return on asset and net interest margin with non-interest income 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

The study is based on the secondary data which were gathered from 27 Nepalese commercial banks from 2013/14 to 2018/19, leading to a total of 162 observations. The main sources of data include publications and websites of Nepal Rastra Bank (NRB), Ministry of Finance (MoF), 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	Agricultural Development Bank Limited	2013/14-2018/19	6
2	Bank of Kathmandu Limited	2013/14-2018/19	6
3	Century Commercial Bank Limited	2013/14-2018/19	6
4	Citizens Bank International Limited	2013/14-2018/19	6
5	Civil Bank Limited	2013/14-2018/19	6
6	Everest Bank Limited	2013/14-2018/19	6
7	Global IME Bank Limited	2013/14-2018/19	6
8	Himalayan Bank Limited	2013/14-2018/19	6
9	Kumari Bank Limited	2013/14-2018/19	6
10	Laxmi Bank Limited	2013/14-2018/19	6
11	Machhapuchchhre Bank Limited	2013/14-2018/19	6
12	Mega Bank Nepal Limited	2013/14-2018/19	6
13	Nabil Bank Limited	2013/14-2018/19	6
14	Nepal Bangladesh Bank Limited	2013/14-2018/19	6
15	Nepal Bank Limited	2013/14-2018/19	6
16	Nepal Credit and Commerce Bank Limited	2013/14-2018/19	6
17	Nepal Investment Bank Limited	2013/14-2018/19	6
18	Nepal SBI Bank Limited	2013/14-2018/19	6
19	NIC Asia Bank Limited	2013/14-2018/19	6
20	NMB Bank Limited	2013/14-2018/19	6
21	Prabhu Bank Limited	2013/14-2018/19	6
22	Prime Commercial Bank Limited	2013/14-2018/19	6
23	Rastriya Banijya Bank Limited	2013/14-2018/19	6
24	Sanima Bank Limited	2013/14-2018/19	6
25	Siddhartha Bank Limited	2013/14-2018/19	6
26	Standard Chartered Bank Nepal Limited	2013/14-2018/19	6
27	Sunrise Bank Limited	2013/14-2018/19	6
Total number of observations			**162**

Thus, the study is based on 162 observations.

The model

The model used in this study assumes that non-interest income and systematic risk depends on different variables. The dependent variables selected for the study are non-interest income and systematic risk. Similarly, the selected independent variables in this study are loan ratio, equity-assets ratio, return on assets, net-interest margin, operating efficiency, and liquidity. The following model equations are designed to test the hypothesis.

$$NII_{it} = \beta_0 + \beta_1 NPL_{it} + \beta_2 EAR_{it} + \beta_3 ROA_{it} + \beta_4 NIM_{it} + e_{it}$$

$$SR_{it} = \beta_0 + \beta_1 NPL_{it} + \beta_2 BS_{it} + \beta_3 OE_{it} + \beta_4 LIQ_{it} + e_{it}$$

Where,

NII = Non-interest income is the total sum of exchange income other income other operating income, commission and discount, Rs in million.

SR = Systematic risk as measured by the ratio of market risk weighted exposure for market risk to total risk exposure, in percentage.

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

EAR =Equity to total asset ratio as measured by the ratio of total equity to total assets, in percentage.

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

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

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

OE = Operating efficiency ratio as measured by the ratio of net interest income to total assets, in percentage.

LIQ =Liquidity as measured by the ratio of total loan to total deposit, in percentage.

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

Bank size

Olibe *et al.* (2008) argued that large firms should have lower systematic risk due to economics of scale. Logue and Merville (1972) showed that there is a negative relationship between bank size and systematic risk. Likewise, Gu and Kim (2002) concluded that big firm size reduces the systematic risk of a firm. Sullivan (1978) contended that in large companies, systematic risk is low because the large firms have the ability to reduce the effect of economic changes. Similarly, Titman and Wessels (1998) argued that big firms have more chances for diversifications . Due to diversification, bankruptcy rate lower down and chances of systematic risk will also reduce. Beltrame *et al.* (2018) showed a negative effect of bank

size on systematic risk. Based on it, this study develops the following hypothesis:

H_1: There is a negative relationship between bank size and systematic risk.

Operating efficiency

Gu and Kim (2002) argued that bank systematic risk can be reduced by generating higher profit with a higher operating efficiency. In addition, Ashfaque *et al*. (2020) found that increase in operating efficiency of banks leads to decrease a systematic risk of banks. Eldomiaty *et al.* (2009) examined the fundamental determinants of systematic risk and financial transparency in DFM General Index. The study found a negative relationship between operating efficiency and systematic risk of non-financial sector. Shah *et al.* (2020) assessed the determinants of systematic risk in commercial banks of Pakistan. The study showed a negative relationship between operating efficiency and systematic risk of banks in Pakistan. Iqbal and Shah (2012) showed that increase in operating efficiency leads to decrease in systematic risk. Lee and Jang (2007) explored the systematic-risk determinants of US airline industry. The study revealed that operating efficiency is negatively related to the systematic risk. Rani and Khan (2017) found a negative relationship of industry size, operating efficiency, and profitability with systematic risk in cement industries. Based on it, this study develops the following hypothesis:

H_2: There is a negative relationship between operating efficiency and systematic risk.

Liquidity

Logue and Merville (1972) concluded a negative relationship between systematic risk and liquidity. Moyer and Charlfield (1983) found a strong negative relationship between dividend policy, liquidity, earnings growth and systematic risk. Similarly, Gu and Kim (2002) found a negative impact of liquidity on systematic risk. Moreover, Lee and Jang (2007) concluded that there is negative impact of liquidity on systematic risk in US airline industry. In addition, Eldomiaty *et al.* (2009) found a negative relationship among systematic risk and liquidity. The study argued that with increase in liquidity of the firm, the systematic risk decreases. Based on it, this study develops the following hypothesis:

H_3: There is a negative relationship between liquidity and systematic risk.

Return on asset

Kohler (2014) found a positive relationship between return on assets

and non-interest income. Similarly, Lee *et al.* (2014) examined the non-interest income, profitability, and risk in banking industry. The study showed a positive influence of profitability measured as return on assets on non-interest income. Smith *et al.* (2003) revealed a positive relationship between profitability and non-interest income. Similarly, Ahamed (2017) indicated a positive impact of bank profitability on non-interest income in India. Moreover, Hahm (2008) investigated the determinants and consequences of non-interest income diversification of commercial banks in OECD countries. The study showed that return on assets has a positive impact on non-interest income. Based on it, this study develops the following hypothesis:

H_4: There is a positive relationship between return on assets and non-interest income.

Net interest margin

Le (2017) investigated the interrelationship between non-interest income and net interest margin in the Vietnamese banking system. The findings showed a negative two-way link between non-interest income ratio and net interest margin. Likewise, Liya *et al.* (2014) showed that there is a negative relationship between net interest margin and non-interest income. Vithyea (2014) showed a negative linkage between bank net interest margin and non-interest income in Cambodian banking industry. The study also argued that there is a trade-off between interest margin and non-interest income. Wang and Guo (2014) showed that there is a U-shaped relationship between non-interest income ratio and net interest margin. Yuksel and Zengin (2017) examined the influencing factors of net interest margin in Turkish banking sector. The study showed a negative relationship between net interest margin and non-interest income. Based on it, this study develops the following hypothesis:

H_5: There is a negative relationship between net interest margin and non-interest income.

Non-performing loan

Ismail *et al.* (2014) examined the bank efficiencies and non-performing loan of commercial banks in Malaysia. The study showed that there is an inverse relationship between non-performing loan and non-interest income. Similarly, Yudha *et al.* (2017) found a negative impact of non-performing loan on non-interest income. Likewise, Damankah *et al.* (2014) analyzed the non-interest income of commercial banks in Ghana. The study revealed that non-performing loan is negatively and significantly associated with non-interest

income. In addition, Bian *et al.* (2015) concluded that non-performing loan has a significant negative impact on non-interest income. Vatansever and Hepsen (2015) showed a negative impact of non-performing loan ratio on non-interest income in Turkish banking sectors. Moreover, Patwary and Tasneem (2019) showed a negative impact of non-performing loan on profitability of banks in Bangladesh. Furthermore, Abedifar *et al.* (2018) showed that non-performing loan ratio has a negative impact on non-interest income. Shah *et al.* (2020) assessed the determinants of systematic risk in commercial banks of Pakistan. The study showed that asset quality has a significant impact on systematic risk of banks in Pakistan. Mirza *et al.* (2015) found a negative relationship between banks' assets quality and systematic risk. Liang *et al.* (2013) found that the asset quality has a significant negative impact on systematic risk in China. Musyimi (2016) found a negative relationship between asset quality and the risk adjusted returns. The study also found that systematic risk decreases bank assets quality. Similarly, Idris (2017) found that there is a negative relationship between banks' asset quality and systematic risk amongst OPEC countries. Based on it, this study develops the following hypothesis:

H_6: There is a negative relationship between non-performing loan and non-interest income.

H_7: There is a negative relationship between asset quality and systematic risk.

Equity to total assets

Hahm (2008) examined the determinants and consequences of non-interest income diversification of commercial banks in OECD countries. The study showed that there is a positive relationship between equity-assets ratio and non-interest income. Williams (2016) assessed the relationship between non-interest income and bank risk in Australia. The study showed a positive impact of equity ratio on non-interest income on bank. Williams and Prather (2010) investigated the bank risk and return and the impact of bank non-interest income. The study revealed that there is a positive impact of equity ratio on non-interest income. Based on it, this study develops the following hypothesis:

H_8: There is a positive relationship between equity to total assets and non-interest income.

3. Results and discussion

Descriptive statistics

Table 2 presents the descriptive statistics of the selected dependent and

independent variables during the period 2013/14 to 2018/19.

Table 2: Descriptive statistics

This table shows the descriptive statistics of dependent and independent variables of 27 Nepalese commercial banks for the study period of 2013/14 to 2018/19. The dependent variables are NII (Non-interest income is the total sum of exchange income other income other operating income, commission and discount, Rs in million) and SR (Systematic risk as measured by the ratio of market risk weighted exposure for market risk to total risk exposure, in percentage). The independent variables are NPL (Non-performing loan ratio as measured by the ratio of non-performing loan to total loan, in percentage), EAR (Equity to total asset ratio as measured by the ratio of total equity to total assets, in percentage), ROA (Return on assets as measured by the ratio of net income to total assets, in percentage), NIM (Net interest margin as measured by the ratio of net interest income to total assets, in percentage), OE (Operating efficiency ratio as measured by the ratio of net interest income to total assets, in percentage) and LIQ (Liquidity as measured by the ratio of total loan to total deposit, in percentage).

Variables	Minimum	Maximum	Mean	Std. Deviation
NII	66.23	4498.51	849.937	554.277
SR	0.02	2.79	0.669	0.7031
NPL	0.02	24.29	1.899	2.363
EAR	1.95	56.51	11.458	4.773
ROA	-1	4	1.64	.654
NIM	2.06	5.60	3.228	0.659
BS	20.57	230.52	85.183	43.814
OE	-0.12	2.32	1.295	0.397
LIQ	42.63	81.54	67.913	7.102

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 27 Nepalese commercial banks for the study period of 2013/14 to 2018/19. The dependent variables are NII (Non-interest income is the total sum of exchange income other income other operating income, commission and discount, Rs in million) and SR (Systematic risk as measured by the ratio of market risk weighted exposure for market risk to total risk exposure, in percentage). The independent variables are NPL (Non-performing loan ratio as measured by the ratio of non-performing loan to total loan, in percentage), EAR (Equity to total asset ratio as measured by the ratio of total equity to total assets, in percentage), ROA (Return on assets as measured by the ratio of net income to total assets, in percentage), NIM (Net interest margin as measured by the ratio of net interest income to total assets, in

percentage), BS (Bank size as measured by the total assets, Rs in billion), OE (Operating efficiency ratio as measured by the ratio of net interest income to total assets, in percentage) and LIQ (Liquidity as measured by the ratio of total loan to total deposit, in percentage).

Variables	NII	SR	NPL	EAR	ROA	NIM	BS	OE	LIQ
NII	1								
SR	-0.026	1							
NPL	-0.279**	-0.144	1						
EAR	0.258**	0.044	-0.149	1					
ROA	0.449**	0.144	-0.350**	0.205**	1				
NIM	-0.313**	-0.013	0.001	0.100	0.113	1			
BS	0.555**	-0.170*	-0.139	0.130	0.428**	0.173*	1		
OE	0.281**	-0.032	-0.250**	0.133	0.108	0.051	0.149	1	
LIQ	-0.122	-0.133	-0.026	-0.028	-0.256**	-0.132	-0.015	0.043	1

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

Table 3 shows non-performing loan is negatively correlated to non-interest income. It indicates that increase in non-performing loan ratio leads to decrease in non-interest income. However, equity to total asset ratio is a positively related to non-interest income. It reveals that higher the equity to total asset ratio, higher would be the non-interest income. Similarly, return on assets has a positive relationship with non-interest income. It indicates that increase in return on assets leads to increase in non-interest income. Likewise, net interest margin has a negative relationship with non-interest income. It reveals that increase in net interest margin leads to decrease in non-interest income.

Similarly, the study shows that non-performing loan has a negative relationship with systematic risk. It reveals that increase in non-performing loan leads to decrease in systematic risk. Similarly, bank size is negatively related to systematic risk. It indicates that larger bank size leads to decrease in systematic risk. Further, operating efficiency is negatively related to systematic risk. It reveals that increase in operating efficiency leads to decrease in systematic risk. In addition, liquidity is negatively related to systematic risk. It reveals that increase in liquidity leads to decrease in systematic risk.

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 loan ratio, equity-asset ratio, return on assets, and net interest margin on non-interest income of Nepalese

commercial banks.

Table 4: Estimated regression results of non-performing loan ratio, equity to total asset ratio, return on assets, and net interest margin on non-interest income

The results are based on panel data of 27 commercial banks with 162 observations for the period of 2013/14-2018/19. The linear regression model estimated is $NII_{it} = \beta_0 + \beta_1 NPL_{it} + \beta_2 EAR_{it} + \beta_3 ROA_{it} + \beta_4 NIM_{it} + e_{it}$ *where, the dependent variable is NII (Non-interest income is the total sum of exchange income other income other operating income, commission and discount, Rs in million). The independent variables are NPL (Non-performing loan ratio as measured by the ratio of non-performing loan to total loan, in percentage), EAR (Equity to total asset ratio as measured by the ratio of total equity to total assets, in percentage), ROA (Return on assets as measured by the ratio of net income to total assets, in percentage) and NIM (Net interest margin as measured by the ratio of net interest income to total assets, in percentage).*

Model	Intercept	Regression coefficients of				Adj. R_bar^2	SEE	F-value
		NPL	EAR	ROA	NIM			
1	6.696 (105.87)**	-0.077 (3.670)**				0.072	0.627	13.467
2	6.147 (47.612)**		0.035 (3.383)**			0.061	0.63	11.447
3	5.818 (46.695)**			0.448 (6.338)**		0.197	0.584	40.164
4	5.553 (22.752)**				-0.309 (4.168)**	0.092	0.619	17.375
5	6.332 (46.028)**	-0.068 (3.274)**	0.30 (2.956)**			0.115	0.612	11.4269
6	5.017 (21.157)**			0.418 (6.133)**	-0.264 (3.912)**	0.263	0.559	29.540
7	5.012 (19.773)*	-0.038 (2.916)**	0.019 (2.845)**	0.342 (4.741)**	-0.257 (3.874)**	0.292	0.549	17.502

Notes:

i. Figures in parenthesis are t-values.

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

iii. Non-interest income is the dependent variable.

Table 4 shows that the beta coefficients for non-performing loan are negative with non-interest income. It indicates that non-performing loan has a negative impact on non-interest income. This finding is consistent with the findings of Abedifar *et al.* (2018). However, the beta coefficients for equity to total asset ratio are positive with non-interest income. It indicates that equity to total asset ratio has a positive impact on non-interest income. This finding is consistent with the findings of Williams and Prather (2010). However, the beta coefficients for return on assets are positive with non-interest income. It indicates that return on assets has a positive impact non-interest income. This

finding is consistent with the findings of Hahm (2008). Similarly, the beta coefficients for net interest margin are negative with non-interest income. It indicates that net interest margin has a negative impact on non-interest income. This finding is consistent with the findings of Yuksel and Zengin (2017).

The regression results of non-performing loan, bank size operating efficiency and liquidity on systematic risk of Nepalese commercial banks have been presented in Table 5.

Table 5: Estimated regression results of non-performing loan, bank size operating efficiency and liquidity on systematic risk of Nepalese commercial banks

The results are based on panel data of 27 commercial banks with 162 observations for the period of 2013/14-2018/19. The linear regression model estimated is $SR_{it} = \beta_0 + \beta_1 NPL_{it} + \beta_2 BS_{it} + \beta_3 OE_{it} + \beta_4 LIQ_{it} + e_{it}$ *where, the dependent variable is SR (Systematic risk as measured by the ratio of market risk weighted exposure for market risk to total risk exposure, in percentage). The independent variables are NPL (Non-performing loan ratio as measured by the ratio of non-performing loan to total loan, in percentage), BS (Bank size as measured by the total assets, Rs in billion), OE (Operating efficiency ratio as measured by the ratio of net interest income to total assets, in percentage) and LIQ (Liquidity as measured by the ratio of total loan to total deposit, in percentage).*

Model	Intercept	Regression coefficients of				Adj. R_bar^2	SEE	F-value
		NPL	BS	OE	LIQ			
1	0.751 (10.667)	-0.043 (1.847)				0.015	0.697	3.411
2	1.617 (3.692)		-0.220 (2.181)*			0.123	0.695	4.755
3	0.597 (3.152)			-0.056 (0.403)		0.005	0.7049	0.162
4	1.566 (2.956)				0.013 (1.701)	0.012	0.699	2.894
5	1.847 (4.149)	-0.051 (2.205)*	0.251 (2.492)*			0.096	0.686	4.866
6	1.491 (2.692)			0.067 (0.038)	-0.013 (1.716)	0.097	0.701	1.555
7	2.773 (3.977)	-0.050 (2.130)*	-0.258 (2.557)*	-0.045 (0.317)	-0.014 (1.848)	0.095	0.684	3.324

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. Systematic risk is the dependent variable.

Table 5 shows that the beta coefficients for non-performing loan are negative with systematic risk. It indicates that non-performing loan has a

negative impact on systematic risk. This finding is consistent with the findings of Musyimi (2016). Similarly, the beta coefficients for bank size are negative with systematic risk. It indicates that bank size has a negative impact on systematic risk. This finding is consistent with the findings of Beltrame *et al.* (2018). However, the beta coefficients for operating efficiency are negative with systematic risk. It indicates that operating efficiency has a negative impact on systematic risk. This finding is consistent with the findings of Rani and Khan (2017). Likewise, the beta coefficients for liquidity are negative with systematic risk. It indicates that liquidity has a negative impact on systematic risk. This finding is consistent with the findings of Eldomiaty *et al.* (2009).

4. Summary and conclusion

Stability of the financial system in an economy is an important catalyst for economic growth due to its function in facilitating exchange of value. Through their functions, they facilitate the flow of funds from surplus households to deficit households in a more efficient manner thereby promoting economic growth and development. Commercial banks need to proactively study the operating environment and develop relevant strategies that would reduce the severity of their exposure to situations that are likely to affect their financial stability.

This study attempts to analyze the determinants of non-interest income and systematic risk of Nepalese commercial banks. The study is based on secondary data of 27 commercial banks with 162 observations for the period from 2013/14 to 2018/19.

The study showed that non-performing loan and net interest margin have a negative impact on non-interest income. However, equity to total asset ratio and return on assets have a positive impact on non-interest income. Likewise, non-performing loan, operating efficiency, bank size and liquidity have a negative impact on systematic risk. The study concluded that return on assets followed by net interest margin, non-performing loan and equity to total assets ratio are the most influencing factors that explains the changes in non-interest income of Nepalese commercial banks. The study also concluded that bank size followed by assets quality, operating efficiency and liquidity are the most influencing factors that explains the changes in systematic risk of Nepalese commercial banks.

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