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Research Article

Impact of Bank-specific and Macroeconomic Factors on Non-Performing Loans in the Banking Sector of Nepal

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ABSTRACT

Non-performing loans (NPLs) in the banking sector serve as a crucial indicator for assessing the performance of banks, as the effective management of credit risk stands as a pivotal challenge for lending institutions. The study aimed to determine the significant determinants of bank-specific factors including bank types and macroeconomic factors that determine the magnitude of NPLs in the context of Nepal. The study has included 11 years of strongly balanced panel data of 16 commercial banks consisting of seven domestic private banks, six joint venture banks, and three government-owned banks and macroeconomic data for the period of 2011/12 to 2021/22. The study applied the Pool OLS regression model including bank-dummy variables to assess the impact of the bank-specific factors and macroeconomic factors. The results revealed that the non-performing loan is higher in government-owned banks with a high level of variability compared to domestic private banks and joint venture banks. The study concluded that capital adequacy (CAR), operating efficiency (OCR) and remittance (Remit) have a significant negative impact on NPLs whereas, credit mobilization (CDR) has a significant positive impact on NPLs. It also revealed that the presence of joint venture and domestic private sector banks significantly decreased the size of non-performing loans compared to the presence of government-owned banks in the banking industry. Moreover, ROA, the rate of inflation, and lending interest rates have a positive but insignificant effect on NPLs. Similarly, the GDP growth rate has a negative but insignificant effect on NPLs.

Keywords: Bank types, bank-specific factors, determinants of NPLs, macroeconomic factors,

non-performing loans (NPLs)

INTRODUCTION

The financial sector is the backbone of the economy. The whole scenario of a country's economic activities and development can be ascertained by the condition of the banking sector. The economy is directly influenced by the bank's performance, and on top of that "A" class banks and financial institutions in Nepal are the main bank categories that play a crucial role in the economy.

Monetary crises are highly marked by the ascent of non-performing loans (NPLs) in banking loans. After the global crises, NPLs are mainly under the eyes of government and banking management since they are considered the failure and crises of the banking system (Ghosh, 2015). This phenomenon is most crucial to countries that highly rely on banks as monetary intermediaries that assign funds throughout the country's economy. In a bank-centred economic system, banks play a key part in the sustainability of the banking system and are known as the primary source of funding, as the capital markets of these countries are still emerging (Moradi et al., 2016). Alton and Hazen (2001) stated that loans become non-performing loans (NPLs) if the principal amount and its interest are not yet paid on the maturity date and are not anticipated in future dates. The main reasons for high NPLs are weak credit procedures, low capable credit specialists, high markup spreads, low credit principles, and lack of monitoring policy of the borrowers. NPLs are major indicators to measure credit risk that affects the banking system of the country. Handley (2010) stresses that NPLs can be used as an indicator of banking crises as they affect the economic growth of the nation by decreasing credit development (Ivanovic, 2016). A low level of NPLs shows a strong monetary system of the country while high NPLs indicate a weak financial position. The increasing level of NPLs will first affect the commercial banks in the long run then it will affect the financial position of the economy in the country (Souza & Feijo, 2011). The increasing drift of NPLs will affect banking efficiency resulting in banking crises (Vouldis & Louzis, 2018). The NPLs will block the interest revenue, reduce investment opportunities as well and develop liquidity crises in the financial system, which results in bankruptcy problems and a weak economic system. Thus, it is necessary to identify the factors that affect NPLs to decrease the level of NPLs for financial stability and economic goals (Stijepovic, 2014). Michael (2006) stated that NPLs affect the overall routine of the banking sector, thus threatening the bankruptcy of the banking sector. A high level of NPLs directly affects the overall financial performance of the

banks (Berger & DeYoung, 1997). Fofack (2005) stated that the leading cause of economic crises in African countries is due to the high level of NPLs in banks.

This paper is an attempt to evaluate the effect of bank-specific and macroeconomic factors on NPLs under the different ownership structures of banks in the context of Nepal.

Researchers have identified various factors that affect the NPLs, including income diversification, profitability, capitalization, liquidity, and operating efficiency as bank-specific factors and GDP growth rate, lending interest rate, inflation, stock index, remittance, foreign exchange rate, etc. as macroeconomic factors. However, the relationship between NPLs and these factors is not clear. Some researchers concluded positive relationships, while others rejected their results. Another fact in the context of Nepal, there are three types of ownership structures in commercial banks, government-owned, domestic private sector banks, and joint venture banks. Each sector has significant variations in its way of operation and financial performance. If we consider all types of commercial banks simultaneously then they may exaggerate or contaminate the results. Therefore, investigating the effect of each ownership type seems to be vital to get the right facts and figures. That is why this study has attempted to investigate the effect of selected bank-specific factors, bank-type, and macroeconomic factors that have a theoretically close relationship with non-performing loans in the context of Nepal.

An empirical investigation was conducted in SAARC countries using annual data for the period of 2008-20019 to examine the association between NPLs and macroeconomic factors. The study findings confirmed a significant inverse relationship of NPLs with GDP and inflation rate (Anita et al., 2022). Msomi (2022) examines the macroeconomic and bank-specific factors affecting non-performing loans in commercial banks. Using 47 listed commercial banks from six countries, namely 19 banks from Nigeria, 14 banks from Benin, 3 banks from Burkina Faso, 3 banks from Gambia, 3 banks from Guinea, and 5 banks from Liberia for the period 2008 to 2019, fixed and random effect model was used. It was found from the estimation that the liquidity ratio, capital adequacy ratio, and inflation rate significantly affect non-performing loans.

Singh, Basuki, and Setiawan (2021) conducted research intending to find out the effect of Non-Performing Loans (NPLs) on Nepalese conventional banks using the data for the period of 2015 to 2019. The results of this research show that ROA, Bank Size, GDP, and Inflation have a significant effect on NPLs but CAR does not have a significant effect on the NPLs of banks. The study showed a significant positive effect of GDP on NPLs.

Khan, Siddique, and Sarwar (2020) conducted a study to scrutinize the determinants

of NPLs observing a case of the banking sector in Pakistan over the period from 2005 to 2017. The sample consists of the banking sector (i.e., commercial banks) listed on the Pakistan Stock Exchange. The banking factors, including profitability, operating efficiency, capital adequacy, and income diversification, were evaluated. The estimations were done by regression model using random and fixed effects through STATA software. Results show that the operating efficiency and profitability indicators have a negative association with NPLs but were statistically significant, while capital adequacy and income diversification have a negative association with NPLs but were statistically insignificant.

An analysis performed by Kjosevski et al. (2019) for the whole banking sector for the period 2003Q4 to 2014Q4, by applying the Autoregressive Distributed Lag Modelling Approach (ARDL), the co-integration model implementing quarterly time series. The results of the research indicate that the profitability of banks, the growth of loans to enterprises and to households respectively, as well as the growth of GDP, all have a negative impact, while banks' solvency and unemployment have a positive impact on the rise of non-performing loans in both models. In addition, regarding enterprises, they found that the exchange rate has a positive and statistically significant impact on the level of NPLs, while inflation has a negative and statistically significant impact on the increase in non-performing loans to households.

Kumar and Kishore (2019) stated that concerning banking factors, the NPLs, and CAR have a negative association in the banking sector. Koju et al. (2018) conducted a study on the banking sector of Nepal and concluded that CAR has a negative relationship with NPLs. The findings of Nishani Ekanayake (2018) revealed that ROA as a proxy for bank efficiency has a significant negative influence, while non-interest income as a proxy for income diversity is positively correlated with non-performing loans. Both real gross domestic products and Lending Interest Rates were highly significant in both bank types. On contrary with the literature, growth in bank branches is negatively correlated. Public banks do not account for a higher level of non-performing loans compared to their private counterpart.

Wood and Skinner (2018) examine the bank-specific and macroeconomic determinants of non-performing loans of commercial banks in Barbados over the period 1991-2015. The empirical results indicate that the bank-specific factors: return on equity, return on assets, capital adequacy ratio and loan-to-deposit ratio are significant determinants of non-performing loans, while the macroeconomic variables exerting significant influence are GDP growth, unemployment and interest rate.

The non-performing loans (NPLs) of financial institutions have been considered as a

significant issue in the context of Nepal for the last few decades. The paper aims to identify the impact of macroeconomic variables (GDP, inflation, and real effective exchange rate) and bank-specific variables (size, change in loan, real lending interest rate of interest, and share of loan to total assets) on the non-performing loan of the commercial banks in Nepal. The secondary data were collected for 26 commercial banks covering the period of 2002-2012 with 227 observations. The study found that macroeconomic variables such as the real effective exchange rate have a significant negative impact on non-performing loans The impact of the GDP growth rate was found to be insignificant in this study. One-year lagged inflation rate has a significant positive impact on non-performing loans. The banks which charge relatively higher real interest rates have higher non-performing loans. The ownership dummy has a positive coefficient and is significant at a one percent level showing that if the bank is government-owned the non-performing loan would be higher than that of the private sector banks. As well, more lending in the previous years and current year reduces the non-performing loan since the coefficient of change in loan in current and previous years have a negative coefficient and is significant at a one percent level (Bhattarai, 2015)

Ekanayake and Azeez (2015) investigate the determinant factors of ex-post credit risk considering non-performing loans (NPLs) as a proxy variable in Sri Lanka's commercial banking sector and is carried out with a sample of nine licensed commercial banks for the period from 1999 to 2012. The study finds that the level of NPLs can be attributed to both macroeconomic conditions and banks' specific factors. It reveals that NPLs tends to increase with deteriorating bank's efficiency. The study concluded that NPLs have a positive correlation with the size of the bank and efficiency of the bank as well and there is also a positive correlation between loan to asset ratio and NPLs. Meanwhile, banks with high levels of credit growth are associated with a reduced level of non-performing loans. Larger banks incur fewer loan defaults compared to smaller banks. About macroeconomic variables, NPLs vary negatively with the growth rate of GDP and Inflation and positively with the prime Lending Interest Rate.

Ahmad (2015) stated that there is a positive association between ROA and NPLs while Makri et al. (2014) showed that there is a negative affiliation between ROA and NPLs which is consistent with the finding of Boudriga et al. (2010).

Prasanna et al. (2014) investigated using a panel dataset of 31 Indian banks with yearly data that spans the period from 2000 to 2012 were analyzed. The study examined the impact of macroeconomic variables and bank-specific characteristics upon the non-performing advances (NPA) of the banks. Among macroeconomic variables GDP, construction expenditure,

growth rate in per capita income, and foreign exchange reserves whereas, stock market index and volatility have a statistically significant inverse relationship with NPA ratios. Another study on the Indian banking sector was conducted by Swamy (2012) who investigated the macroeconomic and indigenous determinants of non-performing loans using panel data for the period 1997 to 2009. The results indicated that the loan-to-deposit ratio and ROA have strong positive effects on non-performing loans, bank size has a strong negative effect, while real GDP growth rate, inflation, capital adequacy, bank lending, and savings growth have insignificant impact on non-performing loans.

The effect of bank capital on NPLs is in the opposite direction. On one side, the incentive and encouraging managers of low-capitalized banks tend to get involved in high-risk investments and give loans that are issued without proper credit rating and monitoring (Keeton, 1999).

Berger and DeYoung (1997) concluded that banks with a high level of income are less involved in risky investments that can lead to loan nonpayment in the future, thus concluding that there is a negative association between NPLs and bank profitability. They also concluded that a decrease in the cost efficiency of commercial banks in the United States would affect the increase in future loan defaults. This is faced by those managers who are unable to control operating expenses and loan portfolio management. However, in another study, when the efficient banks are studied, an increase in cost efficiency is followed by a slog of loan defaults giving the skimping hypothesis (an increase in loan defaults happened when banks decided to spend less amount on underwriting and have a close look on loans in the short run and bear the risk of having loan performance problems in near future).

The rise in loan default occurs showing the negative relationship between bank capital and NPLs. On the other side, banks with a high level of capital tend to give loans easily as they know that due to these loans banks are not going to be bankrupt and fail; therefore, banks are highly engaged with these kinds of risky credit activities suggesting a positive association between capital and NPLs (Rajan, 1994).

DATA AND METHODS

An empirical investigation was performed among three types of commercial banks operating under the three ownership structures in Nepal viz. government-owned, joint venture and domestic private sector banks to examine the association and effect of stated bank-specific and macroeconomic variables on NPLs. In this study, 11 years of panel data for the period of

2011/12 to 2021/22 were used with a total of 176 observations. In this, study three government-owned banks out of three, six joint venture banks out of seven and seven domestic private sector banks out of 17 were included as sample units (NRB, 2020/21).

The data of bank-specific variables were extracted from annual reports published by the sampled banks, and the macroeconomic variables such as GDP, inflation rate, the lending interest rate were collected from the reports of Nepal Rastra Bank. To identify the effect of bank types on NPLs, three bank dummy variables were created; D1_J for joint venture banks, D2_D for domestic private banks and D3_G for government-owned banks. While running the regression model government-owned banks were taken as reference group in the model. To examine the association of bank-specific variables and macroeconomic variables with NPLs, a Karl Pearson correlation coefficient was computed and to assess the impact of the bank-specific factors and macroeconomic factors on NPLs, the study applied the Pool OLS regression model including bank-dummy variables. Microsoft Excel and Stata software version 14.0 were used to process and extract the results.

Operational Definition of the Variables and Hypotheses

To analyze the impact of bank-specific and macroeconomic variables on NPLs, this study considers four bank-specific variables and four macroeconomic variables. All the variables of this study were selected based on empirical literature that has depicted a significant impact on NPLs.

Dependent Variables

Non-performing loans (NPLs). Non-performing loans (NPLs) refer to the default loan that the borrowers are unable to pay interest and principal amount within a specified period generally due greater than 90 days (IMF, 2005). Alton and Hazen (2001) stated that loans become NPLs if the full payment of the principal amount and interest is not done on the due date and is no longer expected on future dates. In this study, the NPLs were measured as the ratio of NPLs to total loans. A higher value of the ratio means lower credit quality and vice versa.

Bank-specific Explanatory Variables

Capital Adequacy: The capital adequacy ratio (CAR) measures the soundness level of the banks. It represents the ability of the organization to stand in case of abnormal losses and also shows the strength and stability of the organization in times of crisis. Banks should maintain a minimum CAR for their sustainability. The CAR is measured as total capital funds to total

risk-weighted exposure.

It measures a bank's solvency and ability to absorb risk. It is used to protect depositors and promote stability and efficiency in the financial system. Namakwa and Boakye (2015) studied the various banking factors that affected the NPLs in Ghana and concluded that bank capital has a positive impact on NPLs. Theoretically, the impact of CAR on non-performing loans is uncertain. On the one hand, banks with high levels of CAR may pursue opportunities more aggressively, which means increased risk-taking leading to riskier credit portfolios (Demirguc-Kunt & Huizinga, 1999). Thus, CAR is expected to have a positive impact on non-performing loans. Conversely, via the moral hazard argument, banks with low capital may be inclined to engage in risky lending, thus resulting in increased non-performing loans. This behaviour is more likely when deposit insurance schemes are in place (Wood & Skinner, 2018). Kumar and Kishore (2019) stated that concerning banking factors, the NPLs and CAR have a negative association in the banking sector. Koju et al. (2018) conducted a study on the banking sector of Nepal and concluded that CAR has a negative relationship with NPLs. Based on the literature, the following relationship is expected.

H1: Capital adequacy is negatively related to NPLs

Operating Efficiency: Operating efficiency can be defined as the cost function that assumes that banks' income boosts, or the other way around, it is not only about increasing income, but also about reducing cost at all levels of output (Daley and Matthews, 2009). Rachman et al. (2018) stated that operating efficiency does not influence NPLs. The relationship between operational inefficiency and NPLs is ambiguous according to the following arguments. According to the 'skimping hypothesis' of Berger and DeYoung (1997), cost-efficient banks will have higher future NPLs but according to the 'bad management' hypothesis, cost-inefficient banks will have higher future NPLs. Banks spending less to monitor lending risks is considered more cost-efficient, but the possibility of increasing NPLs in future (Ozili 2019). Similarly, Benthem (2017) research indicates an inverse relation between operating efficiency and NPLs. Based on the literature, the following relationship is expected.

H2: Operating efficiency is positively/negatively related to NPLs

Profitability: Return on assets (ROA) is used to measure the profitability of the banks and is measured as the net income to total assets (Rajan, 1994). Rachman et al. (2018) examined various banking factors that affected the NPLs in Indonesia and concluded that the high profitability of banks has lower NPLs, a similar study conducted by Kumar and Kishore (2019) revealed that ROA has an insignificant association with NPLs. However Dimitrios et al.

(2016) investigated various determinants of NPLs in the euro banking system and concluded that ROA has a significant impact on NPLs. Boudriga et al. (2010) confirmed from their study that there is a negative association between ROA and NPLs. High ROA shows that the financial position of the banks is stable, and they are not interested in investing in risky loans because of less pressure to generate income. The relationship between bank ROA and NPLs is ambiguous according to the following arguments. Highly profitable banks have fewer incentives to lend to risky borrowers so there is a negative relationship between bank profitability and NPLs (Berger and DeYoung, 1997). On the other hand, Bonin and Huang (2002) describe that credit policy is not only determined by the earnings of banks, but is also effected by reputation of management and forces to follow liberal credit policy, which shows a positive relation between profitability with NPLs. based on the literature, the following relationship is expected.

H3: Return on assets is positively/negatively related to NPLs

Credit Mobilization: The credit-to-deposit ratio (CDR) is a commonly used statistic for assessing a bank's liquidity and it reflects the utilization of funds of the bank. An increase in this ratio is indicative of the bank deploying more funds to loans. Such a situation reflects a less liquid position for the bank. The literature suggests that the loan-to-deposit ratio has a positive effect on the level of non-performing loans (Wood & Skinner, 2018). Hu et al. (2006) emphasized the risk profile of banks. They have mentioned that banks with greater credit-to-deposit ratios could have more NPLs. However, based on the empirical studies of Jameel (2014) and Anjom and Karim (2016), the credit-to-deposit has a negative relationship with the NPLs. Based on the literature, the following relationship is expected.

H4: Credit mobilization is positively related to NPLs

Macroeconomic Explanatory Variables

Inflation (INF): According to the existing literature, inflation is also one of the determinants of NPLs (Ghosh, 2015) Inflation is referred to as a price spiral for goods and services for a specified period in a particular economy. Since inflation depreciates the original value of money, hence, high inflation leads to a high cost of borrowing, and therefore, the borrower's obligation increases, which results in an increased default risk (Poudel, 2013). Inflation can potentially have a negative effect on NPLs since mounting inflation will improve borrowers' capacity to pay for loans by lessening the actual value of unpaid debt (Fajar & Umanto, 2017). Warue (2013) also concluded that inflation has a negative impact on government commercial banks.

However, the sign of the relationship between inflation and NPLs is ambiguous because

of the following arguments. Provided the nominal interest rate remains the same, an increase in inflation reduces the value of debt and hence makes repayment easy for the borrowers. So, according to this argument, a negative relationship is expected between inflation and NPLs (Shu, 2002). However, if the nominal interest rate increases with an increase in inflation, it makes debt repayment difficult. So, according to this argument, inflation and NPLs are positively related (Rinaldi & Sanchis-Arellano, 2006). Based on the literature, the following relationship is expected.

H5: The inflation rate is positively related to NPLs

Gross Domestic Product Growth: Documented in the literature there is a negative impact of gross domestic product (GDP) growth on non-performing loans. GDP growth reflects a positive economic environment which is beneficial for both businesses and households. In favorable economic conditions, the incomes of households and businesses grow, and borrowers have sufficient funds to service their debts. This in turn contributes to lower non-performing loans. Conversely, when there is a slowdown in the economy the level of non-performing loans is expected to increase (Wood & Skinner, 2018). Louzis et al. (2012) argued that GDP growth has a significant negative effect on NPLs. This is because, growth in GDP creates employment opportunities, which increases the income level of borrowers and consequently reduces NPLs. Based on the literature, the following relationship is expected.

H6: GDP growth is negatively related to NPLs

Lending Interest Rate: Interest rate is one of the crucial determinants of NPLs. A rise in interest rates shows an increase in the volume of borrowers' debt and makes debt servicing more expensive and difficult, as a result, NPLs expended (Boss et al. 2009). During periods of high interest rates, the rate of default borrowers is anticipated to increase and, hence, non-performing loans. Thus, interest rates are anticipated to have a positive impact on non-performing loans (Wood & Skinner, 2018). Based on the literature, the following relationship is expected.

H7: Lending Interest Rate is positively related to NPLs

Remittance (Remit): The total compensation of employees, workers, and migrants transferred to their home country in the name of their recipients is called remittance. Remittance is one of the major sources of income for households and firms in Nepal since it has about 22 percent contribution in GDP (NRB, 2022). Remittances increase households' incomes and improve financial intermediation which can improve growth prospects for the country overall. A decline in this indicator will lead to a decline in households' incomes, and in consequence,

they face a lower capability in repayment of previously contracted loans, which contributes to a higher share of NPLs to total loans.

The remittance impacts the economic growth of a country positively (Fayissa, Nsiah, & Tadasse, 2008). A higher remittance leads to higher growth of the economy, which lowers problem loans and brings financial stability (Ebeke, Loko, & Viseth, 2014). Based on the literature, the following relationship is expected.

H8: Remittance flow is negatively related to NPLs.

Bank Type (**Dummy Variable**): The ownership structure of banks in Nepal can be viewed in three ways: government-owned banks (GOB), joint venture banks (JVB), and domestic private sector banks (DPB). The financial institutions controlled by the government authorities are known as public banks or government-owned banks. The performances of these banks are discussed with the help of three different views: social, political, and agency views. Public banks work for the economic and social welfare of society (Cotugno et al. 2013). They want to maximize the welfare of the whole society. These banks also try to achieve their political goals by providing jobs and advancing loans to enterprises (Shleifer and Vishny 1994; Ahmed et al. 2020a). The agency views attached to social views and government-owned banks are also helpful in maximizing social welfare along with economic development but may be involved in a misallocation of resources (Beck et al.2015). Hu et al. (2006) found that public sector banks have higher NPLs as compared to private sector banks in Taiwan. It is a time to reduce government ownership in the banking sector as it proves to be costly in terms of NPLs and government-owned banks are more influenced by political factors. Higher government ownership proves to be costly, and it may result in higher banking inefficiency (Shakeel et al., 2021). Based on the literature, the following relationship is expected.

H9: Government-owned banks are positively related with NPLs

A summary of variables and expected signs of coefficients of explanatory variables are shown in Table 1.

Table 1

Summary of Variables and Expected Signs of Coefficients

Variable Explanation	Notation	Data Source(s)	Expected Effect
Capital adequacy, is the ratio of bank capital funds to risk-weighted assets	CAR_{it}	Annual reports of sampled banks	(-)
Operating efficiency, is the ratio of total operating costs to total assets	OCR_{it}	Annual reports of sampled banks	(+)(-)

Profitability, is the ratio of net profit to total assets	ROA_{it}	Annual reports of sampled banks	(+)(-)
Credit mobilization, the ratio of credit to deposits	CDR_{it}	Annual reports of sampled banks	(+)
Rate of inflation based on the 12-month average of a consumer price index (CPI)	INF_t	Monetary Policy Report of NRB	(+)(-)
GDP growth rate based on constant price	GDP_t	Annual Report of Nepal Rastra Bank	(+)(-)
Weighted average lending interest rate of commercial banks	LIR_t	Monetary Policy Report of NRB	(+)
Natural log of annual remittance received	Remit	Economic Survey, Ministry of Finance	(-)
Dummy variable for joint venture banks, where JVB banks equal 1 otherwise 0	D1_J	The researcher	(-)
Dummy variable for domestic private banks, where DPB banks equal 1 otherwise 0	D2_D	The researcher	(-)
Dummy variable for government-owned banks, where GOB banks equal 1 otherwise 0	D3_G	The researcher	(+)

Regression Model Specification

Breusch-Pagan test was conducted to know whether there is a panel effect or not on the panel data. The null hypothesis for the test is "there are no individual-specific effects or heteroscedasticity in the panel data model". The p-value of the Breusch-Pagan test resulted in more than 0.05, so the null hypothesis could not be rejected. It means there is no panel effect in the data. This suggested using Pooled OLS regression model. The model is:

$$NPL_{it} = \beta_0 + \beta_1 CAR_{it} + \beta_2 OCR_{it} + \beta_3 ROA_{it} + \beta_4 CDR_{it} + \beta_5 INNF_t + \beta_6 GDP_t + \beta_7 LIR_t + \beta_8 Remit_t + \beta_9 D1\_J + \beta_9 D2\_D + \varepsilon$$

RESULTS AND DISCUSSIONS

Descriptive Statistics

The descriptive result of dependent variable and explanatory variables for the period of 11 years (fiscal year 2011/12 to 2021/22) with a total 176 observations have been illustrated

in Table 2. The results revealed that government-owned banks have the highest level of NPLs with a mean of 4.18 percent and joint venture banks have the lowest NPLs with a mean of 0.98 percent. These results implied that government-owned banks have a high level of credit risk or poor assets quality management and joint venture banks have good assets quality management. CAR among the three categories of banks, joint venture banks have the highest with a mean of 13.5 percent and the government-owned banks have the lowest with a mean of 11.96 percent. These results implied that joint venture banks have a strong capital base to protect depositors, investors and creditors but government-owned banks have a weak capital base however, it is an adequate level of capital as per the standard of Basel-II accord of Nepal Rastra Bank. The OCR is the highest in government-owned banks with a mean of 5.72 percent and the lowest in domestic private banks with a mean of 2.41 percent. These results implied that government-owned banks are more cost-inefficient and domestic private banks are more cost efficient. The ROA is the highest in joint venture banks with a mean of 1.79 percent and the lowest in domestic private banks with a mean of 1.41 percent. These results implied that joint venture banks are more profitable (or earnings capacity) compared to government-owned banks and domestic private banks respectively. The CDR is the highest in domestic private banks with a mean of 84.31 percent and the lowest in joint venture banks with a mean of 77.51 percent. These results implied that domestic private sector banks are more capable in mobilizing their deposits compared to government-owned banks and joint venture banks respectively.

Table 2

Descriptive Statistics of Study Variables

		Mean				Standard Deviation			
	Variables	JVB	DPB	GOB	Overall	JVB	DPB	GOB	Overall
Bank Specific	NPLs (%)	0.94	1.58	4.18	1.83	0.80	0.93	1.65	1.57
	CAR (%)	13.5	12.71	11.96	12.87	2.42	1.29	7.23	3.58
	OCR (%)	3.53	2.41	5.72	3.45	1.95	2.13	1.66	2.31
	ROA (%)	1.79	1.41	1.67	1.60	0.58	0.42	0.78	0.58
	CDR (%)	77.51	84.31	77.79	80.53	12.11	6.36	16.39	11.50
	N	66	77	33	176	77	33	176	176
Macro-economic	INF (%)				6.71				2.23
	GDP (%)				4.25				2.94
	LIR (%)				10.79				1.44
	Remit (log)				6.47				0.29
	N				11				11

Among the bank-specific explanatory variables, the value of standard deviation revealed that NPLs was more stable in joint venture banks, CAR was more stable in domestic private banks, OCR was more stable in government-owned banks, ROA was more stable in the domestic private bank, and CDR was more stable in the domestic private bank with a standard deviation of 0.80, 1.29, 1.66, 0.42, and 6.36 percent respectively. However, NPLs, CAR, ROA, and CDR were more volatile in the government-owned banks with the highest standard deviation of 1.65, 7.23, 0.78, and 16.39 percent respectively.

Regarding to selected macroeconomic variables, the mean values of INF, GDP, LIR and Remit were 6.71, 4.25, 10.79 and 6.47 respectively; and the value of standard deviation revealed that Remit was more stable and GDP was more volatile during the study period.

Examination of Bivariate Relationship

To examine the bivariate relationship of NPLs with bank-specific and macroeconomic variables, a Karl Pearson correlation coefficient was computed. Table 3 and 4 exhibits the results of the correlation coefficient and their significance at .01 and .05 levels. Regarding bank-specific, the results revealed a statistically significant negative relationship between NPLs with CAR and D1_J at the 0.01 level. These results implied that NPLs decrease with the increase in the capital base of the bank and the presence of joint venture banks in the banking industry. Likewise, there is a statistically significant positive relationship between NPLs with OCR and D3_G at the 0.01 level. These results implied that NPLs increase with the increase in operating efficiency and involvement of government-owned banks in the industry. However, the relationships of NPLs were negative with ROA, CDR and D2_D and statistically not significant at the 0.05 level (see Table 3).

Table 3

Correlation Coefficient of NPLs with Bank-Specific Variable

	CAR	OCR	ROA	CDR	D1_J	D2_D	D3_G
NPLs	-.347**	.241**	-0.046	-0.135	-.439**	-0.139	.721**

* p < .05, **p < 0.01 (2-tailed).

Likewise, table 4 illustrates the results of the correlation coefficient between NPLs and macroeconomic variables. The results revealed a statistically significant positive relationship between NPLs with INF and LIR at the 0.01 and 0.05 levels. These results implied that the NPLs of the banks increase with the increase in inflation and lending interest rates in the economy. Similarly, there was a statistically significant negative relationship between NPLs and Remit at the 0.01 level. It implied that with the increase in the remittance, the non-performing loans

decreased. However, the relationship between NPLs and GDP was negative and statistically not significant at the 0.05 level.

Table 4

Correlation Coefficient of NPLs with Macroeconomic Variables

	INF	GDP	LIR	Remit
NPLs	.267**	-0.017	.148*	-.326**

* p < .05, **p < 0.01 (2-tailed).

Impact Analysis of Study Variables on NPLs

Table 4 exhibits the results of the pooled OLS regression model with dummy variables. The variance inflation factor (VIF) for all explanatory variables is less than 10, indicating no problem of multi-collinearity as recommended by Marquaridt (1970), and Kennedy (2008). The adjusted R-square value of the model revealed that 68.7 % variance in NPLs of the banks is explained by the stated bank-specific, macroeconomic and dummy variables. Likewise, F (10, 165) = 39.321 and *p-value* = .000 indicating the goodness of fit of the model. The maximum value of Cook's distance was less than the threshold value indicating there were no substantial influential cases in the regression model.

Table 4

Results of Regression Analysis

Variables	Unstandardized		t-statistic	Sig.	VIF
	Beta Coefficients	Std. Error			
Constant	13.774**	4.32	3.191	.002	-
CAR	-.081**	.023	-3.460	.001	1.569
OCR	-.116**	.036	-3.245	.001	1.539
ROA	.060	.134	.449	.654	1.390
CDR	.022**	.007	2.919	.004	1.720
INF	.009	.067	.127	.899	5.127
GDP	-.050	.033	-1.496	.137	2.176
LIR	.085	.068	1.236	.218	2.196
Remit	-1.629**	.542	-3.006	.003	5.556
D_J	-3.369**	.206	-16.370	.000	2.255
D_D	-3.050**	.231	-13.224	.000	2.975

Adjusted R^2	0.687	SEE	0.880
F (10, 165)	39.321	Sig.(*p-value*)	0.000
Cook's Distance (max)	0.568	Threshold value	1.0

* p < 0.05, ** p < 0.01

The beta coefficient of CAR is negative (-.081), and the p-value is .001 at a 99% confidence level. It implied a statistically significant negative impact of CAR on NPLs. This finding confirms the findings of Kumar and Kishore (2019) and Koju et al. (2018) and is consistent with the moral hazard argument of Wood and Skinner (2018). The argument states that banks with low capital may be inclined to engage in risky lending, thus resulting in increased non-performance loans. However, this finding is reversed with the finding of Amuakwa and Boakye (2015), and Demirguc-Kunt and Huizinga (1999) in the context of Nepal.

The beta coefficient of OCR is negative (-0.116), and the p-value is 0.001 at a 99% confidence level. It implied a statistically significant negative impact of OCR on NPLs. This finding implied that when banks become more cost-efficient and spend less to monitor lending risk, the possibility of NPLs increases (Ozili, 2019). These results consistent with the findings of Benthem (2017) and agree with the 'skimping hypotheses' of Berger and DeYoung (1997).

The positive beta coefficient of CDR (i.e. 0.022) and p-value equal to .004 at a 99% confidence level imply that CDR has a significant positive impact on NPLs. This finding implied that an increase in the credit-to-deposit ratio cause to increase in the size of non-performing loans. These results consistent with the findings of Wood and Skinner (2018), and Hu et al (2006).

The beta coefficient for Remit is negative (-1.629), with a p-value of 0.003, indicating statistical significance at a 99% confidence level. These results suggest that remittances have a significant negative impact on NPLs. Specifically, as the volume of remittance flow in the country increases, the proportion of non-performing loans decreases. This finding aligns with the conclusions of Ebeke, Loko, and Viseth (2014).

The beta coefficients for the two bank dummy variables, D1_J and D2_D, are -3.369 and -3.050, both with p-values less than 0.01. These results indicate a significant negative impact of D1_J and D2_D on non-performing loans in the banking industry. In other words, the results imply that with an increase in the presence of joint venture banks and domestic private sector banks compared to government-owned banks, the non-performing loans decrease in the industry. Furthermore, the coefficient value of D1_J, -3.369 implies that with the increase in one unit of joint venture bank in the industry compared to government owned bank the non-performing loan will decrease by 3.369 points and similar to D2_D. These findings support the conclusions of Hu et al (2006) and Shakeel et at (2021).

ROA, INF, and LIR have a positive beta coefficient indicating positive influence on

NPLs but a p-value greater than 0.05 indicating the impacts are not statistically significant at a 95% confidence level in the context of the Nepalese banking industry. The association of ROA and NPL supported by the findings of Kumar and Kishore (2019) and Bonin and Huang (2002) but unable to support the conclusions of Rachman et al (2018), Booudriga et al (2010), Berger and DeYoung (1997). The association of INF and NPLs is supported by the conclusions of Poudel (2013), and Rinaldi and Sanchis-Arellano (2006) but unable to support the conclusions of Shu (2002), Fajar and Umanto (2017), Warue (2013). Likewise, the association of LIR and NPL supported by the conclusions of Boss et al (2009), and Wood and Skinner (2018).

The beta coefficient of GDP is negative (-0.05) and the p-value is .137, this implies that GDP growth rates have a negative impact on non-performing loans but not statistically significant at a 95% confidence level. Though the result is statistically insignificant the association between GDP and NPL supported by the findings of Wood and Skinner (2018), and Louzis et al (2012).

CONCLUSIONS

The purpose of the study was to investigate the association and impact of bank-specific factors, bank-type and macroeconomic factors on non-performing loans in the context of Nepalese commercial banks. In the Nepalese banking industry, there are three types of banks as per their ownership structures, joint venture banks, domestic private sector banks and government-owned banks. The results depicted that government-owned banks have a high level of non-performing loans followed by domestic private sector banks and joint venture banks. The presence of government-owned banks has a significant positive impact on non-performing loans but a significant negative impact in the presence of joint venture banks and domestic private sector banks. This implied that government-owned banks might be either influenced by social, political and agency factors or lack of good credit risk management practices. This suggests the policymakers of the Nepal government to consider the facts and take corrective actions in the future.

Another important factor that has been taken into account in this study is the remittance flow in the country. Remittance is one of the important sources of income for households and firms in Nepal. It has also been demonstrated by the result that remittances have a significant impact on reducing non-performing loans. However, it is also an indicator of a risky economy because if remittance inflows decrease due to some internal or external factors, then it may create troubles for the banking sector of Nepal and the economy as a whole.

Besides that, the results showed that the capital base of the banking sectors (i.e. CAR) and operating efficiency (i.e. OCR) have a significant negative impact on non-performing loans. These results suggest that banks should increase their capital base and operating efficiency to reduce non-performing loans.

However, profitability (ROA), inflation (INF) and lending interest rates (LIR) have a positive influence on non-performing loans but they are not statistically significant. Similarly, gross domestic growth rates (GDP) have a negative influence on non-performing loans but it is also statistically insignificant. Therefore, the study does not allow us to say more about these particular factors with confidence.

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