Determinants of Non-Performing Loans in Nepalese Commercial Bank: An Empirical Analysis

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Abstract

Non-performing loans (NPLs) are a persistent challenge for Nepalese financial institutions, adversely affecting economic growth and financial stability. This study examines how bank-specific and macroeconomic variables relate to NPLs within Nepal's financial sector. NPLs refer to credit facilities overdue in payment of interest or principal. Analyzing data from ten Nepalese commercial banks (2014–2023), the research employs descriptive and causal-comparative methods. Key variables include return on assets (ROA), capital adequacy ratio (CAR), credit-deposit (CD) ratio, bank size, gross domestic product (GDP), and inflation. The results reveal that ROA, CAR, and bank size significantly influence NPLs, whereas the CD ratio shows a positive but insignificant correlation. GDP presents a negative yet insignificant relationship with NPLs, while inflation displays a significant negative correlation. The findings highlight the interplay between bank-specific metrics and broader economic conditions. Addressing NPLs requires targeted actions by bank managers and shareholders to optimize financial performance and safeguard Nepal's economic resilience.

Introduction

Commercial banks serve as a key source of credit for both businesses and households in many countries (Rose & Hudgins, 2010). The strong performance of these institutions is crucial for a nation's economic growth, while poor performance can slow economic development and negatively impact regions worldwide. As noted by Ahmed (2010), non-performing assets (NPAs) are a vital indicator of a bank's financial health, making it essential to identify potential issues and monitor them closely for the sector's success. A banking crisis can occur if NPAs reach 10 percent of a country's GDP. The income loss from NPAs not only reduces banks' profits but also limits their ability to offer competitive lending rates (Khan & Bishnoi, 2001).

Al Masud & Hossain (2021) discovered that GDP growth, inflation, and interest rates have a significant impact on NPLs. Additionally, internal factors within banks, like capital adequacy and management efficiency, also play a crucial role. The findings emphasize the importance of maintaining macroeconomic stability and implementing sound banking practices to effectively manage NPLs.

Pachhaldangaya & Bista (2023) identified macroeconomic conditions, regulatory environment, and borrower behavior as key determinants. The research underscores the importance of stringent credit policies and continuous monitoring to curb the rise of NPLs (Pant, 2023). The study identifies the impact of macroeconomic factors on risk of credit, focusing on NPLs in Nepalese commercial banks. It finds that inflation, interest rates, and economic growth are significant determinants of NPLs. The research suggests that careful monitoring of these macroeconomic indicators can help in predicting and managing credit risk.

The impact of NPLs on the financial performance of Nepalese commercial banks, identifying key determinants such as loan growth, credit policies, and external economic conditions. The study reveals that poor credit management and adverse macroeconomic environments are closely associated with higher NPL ratios, leading to diminished profitability (Niroula et al., 2024).

Many studies find that healthy financial institutions support the economic growth of the nation (Dhungana, 2014; Levine, 1997; Rahman & Khan, 2024). Today, NPLs have become a big issue in many financial institutions. Banking efficiency, competitive power of the banks, banking system stability, and loan loss coverage ratio are inversely connected with NPLs (Ozili, 2019). It threats the health and sustainability of financial institutions in the long-run. This research has attempted to explore the determinants of NPLs in Nepalese commercial banks and is expected to be useful for policy implications in maintaining sound financial performance in the banking sector.

Literature Review

In the context of traditional private commercial banks, AI Masud and Hossain (2021) studied the variables influencing NPLs. The study identified important macroeconomic and bank-specific determinants of NPLs by applying the Generalized Method of Moments (GMM) to analyze data from 22 banks over a ten-year period. Only ROA, a measure of managerial effectiveness, demonstrated a statistically significant negative correlation with NPLs when compared to other bank-specific factors like size, the loan-to-deposit ratio, credit growth, and board independence. It was discovered that there was a positive correlation between NPLs and macroeconomic variables such as GDP growth rate, inflation, real interest rates, unemployment, and stock prices. According to the findings, banks should improve managerial effectiveness and supervision to raise the caliber of loans, and regulators should regularly carry out stress tests.

Chen et al. (2020) examined the effects of bank-specific factors and macroeconomic conditions on NPLs in Taiwan. Their study revealed that both internal factors, such as CAR, and external factors, such as economic growth, significantly affect NPL ratios. Banks incorporate both bank-specific and macroeconomic variables into their risk management strategies to better predict and manage NPLs. The research emphasizes the need for a holistic approach to credit risk management. Dhungana (2014) highlighted that since there is a long-run nexus between commercial banks and economic growth, adequate efforts have been required to maintain the sound and healthy financial institutions.

Pachhaldangaya and Bista (2023) investigated how different economic factors influence the financial risks faced by commercial banks in Nepal. They looked at two key indicators of credit risk: NPLs and loan loss provisions. Their analysis covered data from 20 banks between 2013/14 and 2020/21, examining factors like GDP, inflation, money supply growth, interest rates, exchange rates, and bank size. The study found that when the economy (GDP) and exchange rates improve, the amount of risky loans decreases. In contrast, when the money supply grows, banks tend to have more risky loans. Additionally, higher interest rates and larger bank sizes were associated with lower levels of credit risk. Essentially, the study suggests that a strong economy and well-managed monetary policies can help reduce financial risks for banks in Nepal.

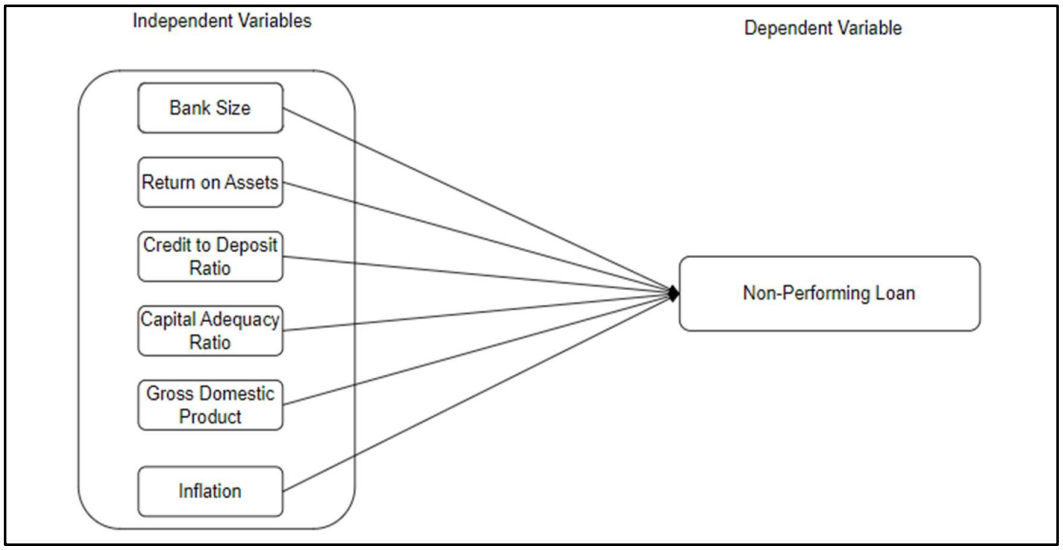
Pant (2023) explored the factors influencing NPLs in Nepalese commercial banks. The research focused on macroeconomic factors, managerial efficiency, and lending policy as independent variables, with NPLs as the dependent variable. The study found that macroeconomic factors, managerial efficiency, and lending policies have a significant impact on the NPLs of Nepalese commercial banks.

Niroula et al. (2024) investigated the impact of NPLs on the financial performance of commercial banks in Nepal. The findings revealed that bank size and inflation have a positive effect on ROA and return on equity (ROE). Conversely, the cash reserve ratio (CRR) and CAR negatively affect these performance metrics. Other variables, such as GDP and CAR, showed only a minimal impact on the banks' financial performance.

Based on the cited literatures, the following conceptual framework has been proposed for the study.

Figure 1

Conceptual Framework of the Study



Source: Literatures reviewed by authors.

Based on the above conceptual framework, the following hypotheses have been developed:

H1: There is a significant impact of gross domestic products on non-performing loans of commercial banks.

H2: There is a significant effect of inflation on non-performing loans of commercial banks.

H3: There is a significant impact of credit to deposit ratio on non-performing loans of commercial banks.

H4: There is a significant effect of bank size on non-performing loans of commercial banks.

H5: There is a significant impact of return on assets on non-performing loans of commercial banks.

H6: There is a significant effect of capital adequacy ratio on non-performing loans of commercial banks.

Research Methods

Nepal has a total of 20 commercial banks as of August 2024 (NRB, 2024). This approach categorizes the banks into three strata: privately-owned banks, joint venture banks, and public sector banks. A stratified sampling technique has been adopted to represent the entire population of commercial banks in Nepal. Consequently, the study focuses on a sample of ten commercial banks, selected to represent a diverse range of banking types, including public sector banks, joint venture banks, and privately-owned banks.

Out of the total of 20 commercial banks, four private banks, three joint venture banks, and three public banks were purposively selected. These banks were chosen using a purposive sampling technique, specifically targeting those with more than 10 years of operational experience. This two-step sampling process stratified sampling followed by purposive sampling ensures a diverse and representative sample for the study. This sample spans the period from 2014 to 2023, ensuring that the analysis encompasses various banking institutions and provides a comprehensive view of the factors affecting NPLs across different bank categories.

Table 1

Number of Commercial Banks Selected for the Study

S. N.	Name of Banks	Study Period	Observation
Private Banks			
1	NMB Bank Limited	2014-2023	10
2	Global IME Bank Limited	2014-2023	10
3	Kumari Bank Limited	2014-2023	10
4	Laxmi Sunrise Bank Limited	2014-2023	10
Joint Venture Banks			
5	Everest Bank Limited	2014-2023	10
6	Nepal SBI Bank Limited	2014-2023	10
7	Standard Chartered Bank Limited	2014-2023	10
Public Banks			
8	Rastriya Banijya Bank Limited	2014-2023	10
9	Nepal Bank Limited	2014-2023	10
10	Agriculture Development Bank Limited	2014-2023	10
Total			100

Study Results

Descriptive Statistics

Descriptive analysis has been used to describe the characteristics of selected variables. The descriptive statistics describe the maximum, minimum values, mean and standard deviation associated with variables under consideration. Table 2 shows the descriptive statistics of dependent variables (non-performing loans) and independent variables (annual gross domestic product, annual rate of inflation, credit to deposit ratio, bank size, return on asset and capital adequacy ratio).

Table 2

Descriptive Statistics of Dependent and Independent Variables

	N	Minimum	Maximum	Mean	Std. Deviation
GDP	10	-2.38	8.98	4.36	3.48
INF	10	3.6	9.93	6.17	2.09
CD Ratio	100	48.92	95.64	77.29	9.54
Bank Size	100	4.49	6.12	5.13	0.3
ROA	100	0.52	3.22	1.57	0.56
CAR	100	4.55	23.13	14.04	3.08
NPL (in %)	100	0.1	6.38	1.95	1.58

Source: Author's Calculation

From Table 2, the minimum value of non-performing loans is 0.1% and maximum value is 6.38%. The mean value of non-performing loans is 1.95% and the standard deviation is 1.58%. The minimum value of Annual Gross Domestic Product is - 2.38% and maximum value is 8.98%. The mean value of Annual Gross Domestic Product is 4.36% and the standard deviation is 3.48%. The minimum value of Annual Rate of Inflation is 3.6% and maximum value is 9.93%. The mean value of Annual Rate of Inflation is 6.17% and the standard deviation is 2.09%. The minimum value of Credit to Deposit Ratio is 48.92% and maximum value is 95.64%. The mean value of Credit to Deposit Ratio is 77.29% and the standard deviation is 9.54%. The minimum value of Bank size is 4.49% and maximum value is 6.22%. The mean value of Bank size is 5.13% and the standard deviation is 0.30%. The minimum value of Return on Asset is 0.52% and maximum value is 3.22%. The mean value of Return on Asset is 1.57% and the standard deviation is 0.56. The minimum value of Capital Adequacy Ratio is 4.55% and maximum value is 23.13%. The mean value of Capital Adequacy Ratio is 14.04% and the standard deviation is 3.08%.

Inferential Analysis

The inferential statistics have been presented in the form of correlation matrix and regression analysis in Table 3 to Table 6.

Table 3 presents the Pearson correlation analysis of non-performing loans with various independent variables, revealing important relationships. A weak positive correlation exists between NPL and the CDR at 0.064, which is not statistically significant. In contrast, the CAR shows a significant negative correlation with NPL at -0.230, indicating that as CAR increases, NPL tends to decrease. Bank Size correlates positively with NPL at 0.208, significant at the 0.05 level, suggesting larger banks may have higher NPLs. The correlation between NPL and ROA is minimal at 0.027 and not significant. Notably, NPL is negatively correlated with GDP (-0.262) and Inflation (-0.300), both significant at the 0.01 level, implying that improved economic growth and higher inflation are associated with lower NPLs, likely due to enhanced borrower repayment capacities.

Table 3
Correlation Matrix

	NPL	CDR	CAR	Bank Size	ROA	GDP	Inflation
NPL	1						
CDR	0.064	1					
CAR	-.230*	0.169	1				
Bank Size	.208*	0.118	0.192	1			
ROA	0.027	-0.088	.338**	-0.160	1		
GDP	-.262**	-0.031	-0.065	0.012	0.060	1	
Inflation	-.300**	-0.015	-0.116	0.015	0.038	.650**	1

Pearson correlation analysis between dependent and independent variables
**. Correlation is significant at the 0.05 level (2-tailed).*
***. Correlation is significant at the 0.01 level (2-tailed).*
Source: Author's Calculation

Further analysis of independent variables reveals a significant positive correlation between CAR and ROA at 0.338, indicating that higher CARs correspond with improved profitability. Additionally, GDP and Inflation are strongly correlated, with a significant positive coefficient of 0.650. Interestingly, no significant relationships are observed between CDR and the other variables, suggesting that CDR may not significantly influence NPL or other financial metrics considered in this study.

Table 4
Regression Model

Regression Statistics	
Multiple R	0.547
R Square	0.300
Adjusted R Square	0.254
Standard Error	1.360
Observations	100

Source: Author's Calculation

Table 4 presents the regression results of the Macroeconomic factors and Bank specific factors on non-performing loans of commercial banks. The Multiple R value of 0.547 indicates a moderate to strong relationship between the combined effects of these variables and NPL. The R Square value of 0.300 shows that approximately 30% of the variation in NPL can be explained by these factors, and the Adjusted R Square of 0.254 accounts for the number of predictors, reflecting a meaningful yet partial explanation of the variability in NPL.

Table 5

ANOVA of Variables in Regression Model

ANOVA	*Df*	*SS*	*MS*	*F*
Regression	6	73.850	12.308	6.65
Residual	93	172.247	1.852	
Total	99	246.098		

Source: Author's Calculation

The ANOVA Table 5 show an F-value of 6.65, suggesting that the model is statistically significant, with the regression sum of squares (SS) at 73.85 and the residual sum of squares at 172.25, indicating that the model explains a substantial portion of the variation in NPL compared to the unexplained portion.

Table 6

Regression Coefficients

	Coefficients	Standard Error	t Stat	P-value	Tolerance	VIF
Intercept	-6.122	2.657	-2.304	0.02	-	-
CD Ratios	0.018	0.014	1.285	0.20	0.944	1.059
CAR	-0.224	0.050	-4.459	0.00	0.776	1.289
Bank Size	1.723	0.484	3.554	0.00	0.900	1.111
ROA	0.713	0.269	2.647	0.01	0.808	1.238
GDP	-0.111	0.107	-1.042	0.30	0.576	1.738
Inflation	-0.230	0.092	-2.494	0.01	0.570	1.755

Source: Author's Calculation

The regression model for the above relationship is as follows:

NPL = -6.122 + 0.018 CDR - 0.224 CAR + 1.723 Bank Size + 0.713 ROA -0.111 GDP - 0.230 Inflation

The intercept of -6.122 serves as a theoretical baseline. The Credit to Deposit Ratio (CDR) has a minimal and statistically insignificant effect on NPL, with a coefficient of 0.018 and a P-value of 0.20. The Capital Adequacy Ratio (CAR), with a significant negative coefficient of -0.224 (P-value = 0.00), highlights that higher CAR levels reduce NPL, emphasizing the importance of strong capital buffers. Bank Size significantly increases NPL (coefficient 1.723, P-value = 0.00), indicating that larger banks tend to have higher NPLs. Additionally, Return on Assets (ROA) shows a positive impact, with a coefficient of 0.713 (P-value = 0.01), linking higher profitability to increased NPL. Gross Domestic Product (GDP), though negatively associated, has an

insignificant impact with a coefficient of -0.111 (P-value = 0.30). Inflation, on the other hand, significantly reduces NPL, as shown by its negative coefficient of -0.230 (P-value = 0.01).

The multicollinearity analysis reveals varying degrees of correlation among the independent variables. CDR, CAR, Bank Size, and ROA demonstrate low to moderate multicollinearity, with tolerance values above 0.7 and Variance Inflation Factor (VIF) values below 1.3. This indicates minimal overlap and reliable contributions to the model. However, GDP and Inflation show higher multicollinearity, with tolerance values near 0.57 and VIFs around 1.7, suggesting stronger correlations with other variables. While these levels are not critical, the higher multicollinearity for GDP and Inflation may affect the regression model's stability and warrants careful interpretation.

In conclusion, the model highlights the significant effects of CAR, Bank Size, ROA, and Inflation on NPL levels, with CAR and Inflation contributing to reductions, while Bank Size and ROA lead to increases. CDR and GDP exhibit weaker, insignificant impacts. Despite manageable multicollinearity overall, closer scrutiny of GDP and Inflation's interrelationships with other variables is necessary to enhance the robustness of the findings.

Table 7

Summary of Hypothesis

S.N.	Hypothesis	P-Value at 5%	Conclusion
1	H1	0.30	No sufficient evidence to reject the null hypothesis (0.30>0.05)
2	H2	0.01	Sufficient evidence to reject the null hypothesis (0.00<0.05)
3	H3	0.20	No sufficient evidence to reject the null hypothesis (0.20>0.05)
4	H4	0.00	Sufficient evidence to reject the null hypothesis (0.00<0.05)
5	H5	0.01	Sufficient evidence to reject the null hypothesis (0.01<0.05)
6	H6	0.00	Sufficient evidence to reject the null hypothesis (0.00<0.05)

Source: Author's Calculation

From Table 7, it is observed that the p-value of GDP at 0.05 level of significance is 0.30 which is greater than 0.05. The p-value of CD Ratios at 0.05 level of significance is 0.20 which is greater than 0.05. So, alternative hypothesis is rejected for both H1 and H3 that means there is no significant relationship between GDP and Non- performing loan as well as CD Ratios and Non-performing loans. The p-value of inflation at 0.05 level of significance is 0.01 which is less than 0.05. The p-value of Bank Size at 0.05 level of significance is 0.00 which is less than 0.05. The p-value of ROA at 0.05 level of significance is 0.01 which is less than 0.05. The p-value of CAR at 0.05 level of significance is 0.00 which is less than 0.05. Hence, alternative hypothesis is accepted for H2, H4, H5 and H6 that means there is significant relationship between Inflation, Bank size, ROA and CAR with non-performing loans.

Discussion

The study examined the impact of bank-specific and macroeconomic variables on non-performing loans in Nepalese commercial banks. Findings indicate that NPLs, CD), Bank Size, and CAR are increasing, while GDP, Inflation, and ROA are decreasing. Descriptive statistics show that NPLs range from 0.1% to 6.38%, averaging 1.95%, with the highest deviation in CDR (9.54%) and the lowest in Bank Size (0.30%). Regression analysis reveals that CAR significantly reduces NPLs, consistent with Boudriga et al. (2010), who found that well-capitalized banks are better equipped to manage credit risk. This aligns with Louzis et al. (2012) for Greek banks but contrasts with Rahman et al. (2021), who observed weaker regulatory impacts in Asian countries.

Bank Size and ROA positively affect NPLs, as supported by Podpiera and Weill (2008) and Ghosh (2015), who identified higher NPLs in larger banks with complex operations and higher profitability linked to riskier lending. Conversely, Inflation significantly reduces NPLs, aligning with Nkusu (2011), who suggested that inflation lowers real debt values, facilitating repayments. However, hyperinflation may increase NPLs in unstable economies (Messai & Jouini, 2013). GDP and CDR showed weak, insignificant relationships with NPLs, mirroring findings by Klein (2013) and Rahman et al. (2021), who noted minimal CDR impact on NPLs in European and Asian banks. Sound lending policies and optimum portfolio management strategy are associated with the lowering of NPL in financial institutions (Dhungana & Upadhyaya, 2011).

Overall, the study highlights CAR, Bank Size, ROA, and Inflation as significant determinants of NPLs in Nepalese commercial banks. It corroborates findings by Makri et al. (2014) and Nkusu (2011) regarding the influence of these factors but observes differences for GDP and CDR, which had limited impact in this context. While the study's results are broadly consistent with global research, they underscore the unique economic and regulatory environment of Nepal, necessitating further investigation to strengthen the management of NPLs.

Conclusion and Implications

The findings reveal that Capital Adequacy Ratios plays a pivotal role in mitigating NPL levels. Banks with higher CARs are better equipped to absorb losses, resulting in fewer NPLs. This reinforces the need for banks to maintain substantial capital reserves to safeguard against loan defaults. In contrast, Bank Size and ROA are positively correlated with NPLs. Larger banks and those with higher ROA might face increased default rates due to their more extensive and often riskier lending activities, emphasizing the importance of vigilant risk management.

Credit to Deposit Ratio was also examined, showing a complex but notable influence on NPLs. While a high CDR generally suggests that banks are extending more credit relative to their

deposits, which could increase the risk of defaults, its effect on NPLs was found to be less significant in this study. This observation implies that while CDR is a relevant factor, its impact on NPLs is intertwined with other variables and might not be as pronounced on its own. The study's Multiple R value of 0.5478 reflects a moderate yet significant relationship between these independent variables and NPLs, indicating that while each factor plays a role, their combined effect is substantial in explaining NPL variations.

Inflation emerges as a significant factor in reducing NPLs, suggesting that higher inflation may alleviate the repayment burden on borrowers, thus decreasing default rates. Conversely, GDP shows a weak and non-significant relationship with NPLs, highlighting that economic growth alone does not necessarily improve loan performance without accompanying banking reforms. These findings underscore the need for banks to not only monitor economic indicators but also enhance internal practices and capital management.

In summary, the research underscores the multifaceted nature of managing NPLs, with each of the six independent variables—CAR, Bank Size, ROA, Inflation, GDP, and CDR—playing a distinct role in influencing loan performance. Strengthening CAR, managing the risks associated with larger bank sizes and high ROA, and considering the nuanced effects of CDR and macroeconomic factors are crucial for effective NPL management. The study provides valuable insights for banks and policymakers, suggesting that a balanced approach integrating robust capital buffers, prudent lending practices, and an understanding of economic conditions is essential for reducing NPLs and enhancing banking stability in Nepal.

This study has a few limitations, and it is expected that future studies may incorporate it. Further studies may address the other bank specific variables like liquidity ratios, leverage, lending rates and other macroeconomic variables like interest rates, effective tax rates, foreign exchange rates.

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