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Research Article

Comparative Analysis of Credit Risk Management Practices: A Study of Domestic and Joint Venture Commercial Banks in Nepal

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ABSTRACT

The capital adequacy ratio, credit to deposit ratio, bank size, leverage ratio, loan loss provision, and non-performing loans were assessed for determining the relationships within domestic and joint venture commercial banks in Nepal. Using secondary data from 10 commercial banks spanning 2006/09 to 2019/20, totaling 140 observations, the study employs descriptive and regression analyses. Data sources include NRB's Banking and Financial Statistics, annual supervision reports, and selected banks' annual reports. HBL has the highest average non-performing loan (2.56%), while NIC Asia has the lowest (0.23%). SCBL exhibits the highest average capital adequacy ratio (15.92%), and SBL leads in credit to deposit ratio (86.85%). EBL tops in bank size (Rs 85,327 million), and MBL in leverage ratio (19.39%). HBL records the highest loan loss provision ratio (1.49%), with NBL at the lowest (0.32%). Descriptive statistics reveal the mean non-performing loan for domestic banks (1.12%), joint venture banks (1.22%), and overall banks (1.17%). The correlation analysis indicates negative correlations between capital adequacy ratio, bank size, credit to deposit ratio, leverage ratio, and loan loss provision with non-performing loans. Regression results underscore the significance of leverage ratio and loan loss provision in impacting non-performing loans for overall banks, while domestic banks find significance only in loan loss provision. Joint venture banks show significance in leverage ratio and loan loss provision.

Keywords: *Credit risk, Commercial banks, Nepalese banking sector, Leverage ratio, Loan loss provision, Capital adequacy ratio, Descriptive analysis, Regression analysis.*

Introduction

This research delves into the multifaceted landscape of credit risk management in commercial banking, a sector pivotal to economic development. Commercial banks, serving as financial intermediaries, play a vital role in fostering economic growth by facilitating resource allocation through various financial services, with lending being their primary revenue-generating activity (Grima & Thalassinos, 2020). However, this crucial function exposes banks to a myriad of risks, with credit risk standing out as the foremost concern (Atakelt & Veni, 2015).

Commercial banks are instrumental in shaping a country's economic landscape, contributing to its development by providing financial products

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and services. Their primary responsibility is to receive deposits and extend credit for consumption or investment purposes, playing a pivotal role in economic development. Yet, the inherent risk associated with lending, especially credit risk, necessitates robust risk management systems (Campbell, 2007). Credit risk, defined as the potential loss due to debtors' nonpayment of loans, poses a significant threat to banks' stability and growth in the globalized and liberalized environment (Campbell, 2007).

Credit risk management is a critical facet of banking operations, encompassing the identification, measurement, monitoring, and control of default risks in loan repayments (Early, 1996; Coyle, 2000). This paper explores the implications of credit risk on the financial stability of commercial banks, particularly in the context of Nepal. Laker (2007) emphasizes the need for well-capitalized banks, information sharing, and stable interest rates to mitigate credit risk effectively. Despite its centrality to banking operations, the level of contribution of credit risk management to overall profits in Nepalese commercial banks remains unexplored.

Problem Statement

Nepalese commercial banks face a significant challenge in credit risk management, as evidenced by a high proportion of Non-Performing Loans (NPLs). Poor lending practices, inadequate collateral, and insufficient portfolio analysis contribute to the alarming NPL rate, reaching an average of 46.98% of Total Gross Loans by the end of Ashad in 2077. Credit risk, constituting one of the core risks in banking, demands effective management for the long-term success of banking organizations (Westhuizen, 2014). This paper aims to analyze the credit risk management practices of domestic and joint venture commercial banks in Nepal, shedding light on their contribution to profitability and systemic stability. Through a comparative study, we seek to identify the varying strategies adopted by these banks in response to credit risk, considering factors such as ownership, credit policies, regulatory environments, and management caliber. By doing so, this research aims to enhance our understanding of the role credit risk management plays in shaping the financial performance and resilience of Nepalese commercial banks, contributing valuable insights to the broader discourse on risk management in the banking sector.

Research Objective

The primary objective of this study is to analyze the structure and pattern of key financial indicators such as capital adequacy ratio, credit to deposit ratio, bank size, leverage ratio, loan loss provision, and non-performing loans for determining the relationships within domestic and joint venture commercial banks in Nepal.

Literature Review

The exploration of credit risk and its determinants in commercial banks has garnered substantial attention globally, shedding light on critical factors influencing financial stability. These studies offer valuable insights into diverse banking landscapes, contributing significantly to the financial literature.

Global Literature Survey

Morina (2020) conducted a thorough analysis of credit risk determinants in Kosovo's commercial banks, emphasizing the relationship between credit risk determinants and non-performing loans (NPLs). By employing regression analysis on a seven-year time series dataset (2012-2018), the study underscores the substantial impact of interest rates on loans and bank profitability (ROA) as crucial contributors to credit risk.

Malim (2017) delved into the Tanzanian banking sector, investigating the influence of capital adequacy, profitability, and loan growth on non-performing loans over a decade (2005-2014). The study's findings, utilizing secondary data from the Bank of Tanzania, revealed nuances in the impact of capital adequacy and profitability on non-performing loans, emphasizing the critical role of loan growth.

Onaolapo (2012) explored credit risk management efficiency in Nigeria's commercial banking sector, highlighting the interplay between the efficiency of credit risk management, bank performance, and operational effectiveness. The study revealed insights into the intricate relationships between deposit exposure, operational efficiency, and overall banking performance.

Fredric et al. (2013) evaluated the effects of Credit Risk Management Practices on Lending Portfolio among Savings and Credit Cooperatives in Kenya. This study, focusing on 59 sampled Sacco's in Nakuru County, demonstrated the significant impact of various risk management practices on lending portfolios, providing practical implications for cooperative institutions.

Kolapo et al. (2012) analyzed credit risk and commercial banks' performance in Nigeria over eleven years (2000-2010). Utilizing panel model analysis, the study uncovered a cross-sectional invariant effect of credit risk on bank performance, underscoring the need for enhanced credit analysis and loan administration.

Kithinji (2010) focused on the effect of credit risk management on the profitability of commercial banks in Kenya. By analyzing data from 2004 to 2008, the study challenged conventional wisdom, revealing that the bulk of profits of commercial banks were not significantly influenced by credit and non-performing loans. This challenges traditional notions and emphasizes the importance of considering multiple variables impacting profits.

Credit Risk Assessment in Nepalese Commercial Banks

Poudel (2018) conducted a comprehensive study on credit risk assessment in Nepalese commercial banks, utilizing panel data analysis. The research aimed to identify key indicators of credit risk among 15 banks over the period 2002/03 to 2014/15. The study employed a one-way Fixed Effect Model (EFM) and considered liquidity, capital adequacy, bank size, interest spread, interbank interest rate, and inflation as independent variables influencing credit risk. Findings indicated a significant positive impact of liquidity on credit risk, while capital adequacy ratio and interest spread exhibited significant negative impacts.

Impact of Credit Risk Management on Financial Performance

Bhattarai (2016) delved into the impact of credit risk management on the financial performance of Nepalese commercial banks, using a CAMELS model. The study analyzed balance panel data from 10 out of 20 banks over the period 2001 to 2016. Parameters such as capital adequacy ratio (CAR), non-performing loan ratio (NPLR), and management quality ratio (MQR) were examined as independent variables affecting financial performance (ROA). The study revealed significant relationships, with CAR, NPLR, and MQR influencing financial performance positively, while credit to deposit ratio (CDR) and risk sensitivity (RS) showed no significant impact.

Credit Risk Identification Techniques in Nepalese Banks

Kattel (2017) focused on the techniques employed by Nepalese commercial banks for credit risk identification. Through a survey of nine banks, the study aimed to understand bankers' perceptions regarding the importance of various techniques and tools in effectively identifying borrower-related risks. The findings revealed significant differences in tools and techniques used among State-Owned banks, Private banks, and Joint Venture banks.

Impact of Credit Risk Management on Financial Performance

Poudel (2012) examined the impact of credit risk management on the financial performance of Nepalese commercial banks. Using financial reports from 31 banks over the period 2001-2011, the study employed descriptive, correlation, and regression analyses. Parameters under study included default rate, cost per loan assets, and capital adequacy ratio. The study found an inverse impact on financial performance, with the default rate emerging as the most significant predictor.

Determinants of Credit Risk in Nepalese Banking Sector

Manandhar et al. (2015) investigated the determinants of credit risk in the Nepalese banking sector. Using data from 17 banks over the period 2008 to 2013, the study employed descriptive, correlation, and causal comparative research designs. Macro-economic variables such as GDP growth rate, inflation rate, interbank rate, and banking industry-specific variables like non-performing loans and capital adequacy ratio were considered. The findings suggested that current credit risk in commercial banks is notably influenced by the previous year's non-performing loans and capital adequacy.

Credit Risk Management Practices in Commercial Banks

Pradhan and Shah (2019) analyzed credit risk management practices in Nepalese commercial banks, focusing on their impact on loan repayment. The study used a survey-based approach and correlation analysis to understand the relationship between credit risk management practices, credit risk mitigation measures, obstacles, and loan repayment. The findings revealed a positive relationship between credit risk management practices and credit risk mitigation measures with loan repayment, while obstacles faced by borrowers did not show a significant relationship.

These studies collectively provide a rich tapestry of global perspectives on credit risk, offering nuanced insights into the determinants that influence financial stability and performance in various banking environments. As banks worldwide grapple with the challenges of maintaining robust risk management practices, these findings become imperative for shaping effective strategies, fostering resilience, and ensuring sustained profitability in an ever-evolving financial landscape. these studies provide a comprehensive understanding of credit risk in Nepalese commercial banks, covering assessment techniques, management practices, and their implications for financial performance. The findings contribute valuable insights for researchers and practitioners in developing effective credit risk management strategies.

Methodology

Research Design

The study adopts a descriptive research design to address credit risk management issues within Nepalese commercial banks. This design facilitates fact-finding and comprehensive exploration of variables impacting credit risk management. The research relies on secondary data, considering all 27 commercial banks operating in Nepal until mid-April 2020. From this pool, a sample of 10 banks is selected, generating 140 observations spanning the fiscal years 2006/2007 through 2019/2020. The 14-year time frame enables an in-depth analysis of credit risk management practices among domestic and joint venture commercial banks.

The study utilizes secondary data collected from the annual and Basel reports of the selected sample banks. Employing a quantitative research method, the research formulates hypotheses based on existing literature. Independent variables include Capital Adequacy Ratio (CAR), Loan-Loss Provision Ratio (LLP), Bank Size (BS), Leverage Ratio (LR), and Credit-Deposit Ratio (CDR), while the dependent variable is Non-Performing Loan Ratio (NPLR). Statistical tools such as SPSS, E-views, and Microsoft Excel are employed for data analysis. Descriptive statistics, correlation, regression, and hypothesis testing contribute to the interpretation and presentation of findings.

Description of the Sample

The study focuses on domestic and joint venture commercial banks in Nepal, comprising a sample of 10 banks. The data cover a 14-year period (2006/2007 to 2019/2020), resulting in 140 observations. The table below outlines the selected sample banks, their years of observation, and the corresponding number of observations:

Table 1: List of Sample Banks

S.N	Domestic Banks	Year	No. of Observations
1.	Kumari Bank Limited	2006/07-2019/20	14
2.	Laxmi Bank Limited	2006/07-2019/20	14
3.	Machhapuchhre Bank Limited	2006/07-2019/20	14
4.	Siddhartha Bank Limited	2006/07-2019/20	14
5.	NIC Asia Bank Limited	2006/07-2019/20	14
Joint Venture Banks			
6.	Nabil bank Limited	2006/07-2019/20	14
7.	Himalayan Bank Limited	2006/07-2019/20	14
8.	Standard Chartered Bank Limited	2006/07-2019/20	14
9.	Nepal SBI Bank Limited	2006/07-2019/20	14
10.	Everest Bank Limited	2006/07-2019/20	14
Total Observations			**140**

Data Collection Procedure

A time series study covering 14 years (2006/2007 to 2019/2020) is conducted, collecting secondary data from 10 commercial banks in Nepal. The study focuses on variables such as Capital Adequacy Ratio, Credit-Deposit Ratio, Bank Size, Loan-Loss Provision Ratio, Leverage Ratio, and Non-Performing Loan. Data is gathered from the Annual Reports of the selected banks.

Methods of Data Analysis

Data analysis involves arranging, processing, and interpreting information. Statistical tools such as SPSS, E-views, and Microsoft Excel are employed. Descriptive statistics, graphical tools, mean, median, standard deviation, regression, and correlation aid in drawing inferences with help of given Model

Model 1: The impact of independent variables (Capital Adequacy Ratio, Loan-Loss Provision Ratio, Bank Size, Leverage Ratio & Credit-Deposit Ratio) on dependent variable (Non-performing loan) is shown in the below model.

$$NPLR = \beta_0+\beta_1X_1+\beta_2X_2+\beta_3X_3+\beta_4X_4+\beta_5X_5+\varepsilon \ldots(1)$$

Where,

β_0 = Regression constant with NPLR

β_i = Coefficient of the independent variable with NPLR

X_1 = Capital Adequacy Ratio

X_2 = Loan-Loss Provision Ratio

X_3 = Bank Size

X_4 = Leverage Ratio

X_5 = Credit-Deposit Ratio

ε = Error term

Table 2: Description of Variables

S.N	Variables	Description	Measurement
1.	CAR	Capital adequacy ratio (%)	(Tier one capital + Tier two capital)/ Total risk weighted assets
2.	LLP	Loan loss provision	Loan loss provision/ Total loan
3.	BS	Bank size	Total Assets
4.	LR	Leverage ratio	Total Debt / Total SHE.
5	CDR	Credit-deposit ratio	Total Credit / Total Deposit
6.	NPLR	Non-performing loan ratio	Non-Performing loans / Total Loans

Structure and Pattern of Credit Risk Management Variables

This section analyzes the structure and pattern of credit risk management for selected Nepalese commercial banks from 2006/07 to 2019/2020. Table 3 illustrates the non-performing loan (NPL) structure and pattern for the mentioned period.

Table: 3: Structure and Pattern of Non-performing Loan Ratio (In Percentage)

Banks	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	Mean	Std.dev
KBL	0.73	1.32	0.44	0.5	1.12	2.21	2.89	4.03	2.49	1.15	1.86	1.05	1.01	1.39	1.59	0.98
SBL	0.34	0.69	0.45	0.53	0.79	1.52	2.39	2.75	1.8	4.36	1.3	1.09	0.75	1.38	1.44	1.07
MBL	1.16	1.04	2.32	2.33	4.17	2.84	2.84	1.78	0.64	0.55	0.38	0.44	0.37	0.52	1.53	1.16
LBL	0.35	0.13	0.08	0.12	0.9	0.62	1.51	1.15	1.3	0.8	0.93	1.29	1.11	1.04	0.81	0.46
NIC ASIA	0.06	0.11	0.23	0.18	0.06	0.12	0.66	0.68	0.41	0.11	0.04	0.01	0.23	0.27	0.23	0.21
NBL	1.12	0.74	0.8	1.47	1.77	2.33	2.13	2.23	1.82	1.14	0.79	0.55	0.74	0.98	1.33	0.60
SCBL	2.13	0.92	0.66	0.61	0.62	0.78	0.77	0.48	0.34	0.32	0.19	0.18	0.15	0.44	0.61	0.48
NSBL	4.56	3.83	2.02	1.48	1.1	0.54	0.37	0.26	0.19	0.14	0.1	0.2	0.2	0.23	1.09	1.39
HBL	6.6	3.61	2.16	3.52	4.22	2.09	2.89	1.96	3.22	1.23	0.85	1.41	1.12	1.01	2.56	1.53
EBL	0.8	0.68	0.48	0.44	0.34	0.84	0.62	0.97	0.66	0.38	0.25	0.2	0.16	0.22	0.50	0.25
Mean	1.79	1.31	0.96	1.12	1.51	1.39	1.71	1.63	1.29	1.02	0.67	0.64	0.58	0.75		
Std.dev	2.03	1.26	0.81	1.04	1.41	0.88	0.99	1.11	0.97	1.18	0.56	0.49	0.39	0.44		

Source: Annual Reports of Respective Banks

From table 3 shows that HBL has the highest average NPL (2.56%), followed by KBL (1.59%), MBL (1.53%), SBL (1.44%), NBL (1.33%), NSBL (1.09%), LBL (0.81%), SCBL (0.61%), EBL (0.50%), and NIC Asia (0.23%).

The NPL ratio varies within individual banks, increasing or decreasing over the years. For example, KBL's NPL ratio increased from 0.73% in 2006 to 1.39% in 2019. Conversely, MBL's ratio decreased from 1.16% in 2006 to 0.52% in 2019.

The standard deviation (S.D) reveals that NIC Asia has the lowest variation in NPL, followed by EBL, LBL, SCBL, KBL, SBL, MBL, NSBL, and HBL. The analysis also highlights specific years where certain banks experienced the highest NPL, providing insights into the dynamics within the industry.

Structure and Pattern of Capital Adequacy Ratio

- The structure and pattern of the capital adequacy ratio (CAR) for Nepalese commercial banks from 2006 to 2019 is calculated as (Tier one capital + Tier two capital) / Total risk-weighted assets.
- The average CAR is highest for SCBL (15.92%), followed by NSBL (13.30%), NIC Asia (12.83%), MBL (12.78%), KBL (12.64%), EBL (12.15%), LBL (12.03%), SBL (11.98%), HBL (11.79%), and NBL (11.65%).
- The CAR varies within individual banks, showing increases or decreases over the years.

For instance, KBL's CAR increased from 11.22% in 2006 to 15.4% in 2019. Conversely, SBL's CAR decreased from 17.16% in 2015 to 13.2% in 2019.

- The standard deviation (S.D) indicates the variation in CAR, with NIC Asia having the lowest variability, followed by NBL, LBL, HBL, KBL, NSBL, EBL, KBL, SBL, and MBL. The analysis also identifies specific years where certain banks had the highest CAR, providing insights into the industry dynamics.

Structure and Pattern of Credit to Deposit Ratio

- The structure and pattern of the credit to deposit ratio (CDR) for Nepalese commercial banks from 2006 to 2019 is calculated as Total credit / Total assets.
- The average CDR is highest for SBL (86.85%), followed by KBL (85.84%), LBL (84.52%), NIC Asia (84.39%), MBL (83.09%), EBL (77.01%), HBL (75.58%), NBL (75.31%), SCBL (72.53%), and NSBL (71.02%).
- The CDR varies within individual banks, showing increases or decreases over the years. For example, KBL's CDR increased from 84.15% in 2006 to 86.02% in 2019. Conversely, SCBL's CDR decreased from 76.83% in 2006 to 72.29% in 2019.
- The standard deviation (S.D) indicates the variation in CDR, with NSBL having the lowest variability, followed by EBL, SBL, MBL, KBL, LBL, NIC Asia, NBL, HBL, and SCBL.
- The analysis also identifies specific years where certain banks had the highest CDR, providing insights into the industry dynamics.

Structure and Pattern of Loan to Deposit Ratio

- The structure and pattern of the loan to deposit ratio (LDR) for Nepalese commercial banks from 2006 to 2019 is calculated as Total loans / Total deposits.
- The average LDR is highest for SBL (88.25%), followed by KBL (87.53%), LBL (86.04%), NIC Asia (85.92%), MBL (85.51%), EBL (80.24%), HBL (78.79%), NBL (77.69%), NSBL (75.53%), and SCBL (73.42%).
- The LDR varies within individual banks, showing increases or decreases over the years. For instance, KBL's LDR increased from 85.01% in 2006 to 88.04% in 2019. Conversely, SCBL's LDR decreased from 80.12% in 2006 to 73.61% in 2019.
- The standard deviation (S.D) indicates the variation in LDR, with NSBL having the lowest variability, followed by EBL, MBL, KBL, NIC Asia, LBL, SBL, NBL, HBL, and SCBL.
- The analysis also identifies specific years where certain banks had the highest LDR, providing insights into the industry dynamics.

Structure and Pattern of Loan to Asset Ratio

- The structure and pattern of the loan to asset ratio (LAR) for Nepalese commercial banks from 2006 to 2019 is calculated as Total loans / Total assets.
- The average LAR is highest for SBL (67.49%), followed by KBL (66.86%), LBL (64.92%), NIC Asia (64.57%), MBL (64.37%), EBL (61.72%), HBL (60.71%), NBL (59.64%), SCBL (58.22%), and NSBL (56.19%).
- The LAR varies within individual banks, showing increases or decreases over the years. For example, KBL's LAR increased from 64.12% in 2006 to 68.52% in 2019. Conversely, SCBL's LAR decreased from 63.42% in 2006 to 57.21% in 2019.
- The standard deviation (S.D) indicates the variation in LAR, with NSBL having the lowest variability, followed by EBL, MBL, NBL, KBL, HBL, SBL, NIC Asia, LBL, and SCBL.

Trend Analysis

In this analysis spanning from 2006 to 2019 A.D., the trends of key variables are presented through line graphs, facilitating a comprehensive understanding of each variable's trajectory over time.

Average LLP of Selected Commercial Banks

Both domestic and joint venture banks demonstrated a decreasing trend in average LLP, with domestic banks experiencing a temporary increase in 2012-13. Overall, the declining trend was more pronounced in joint venture banks from 2014-15.

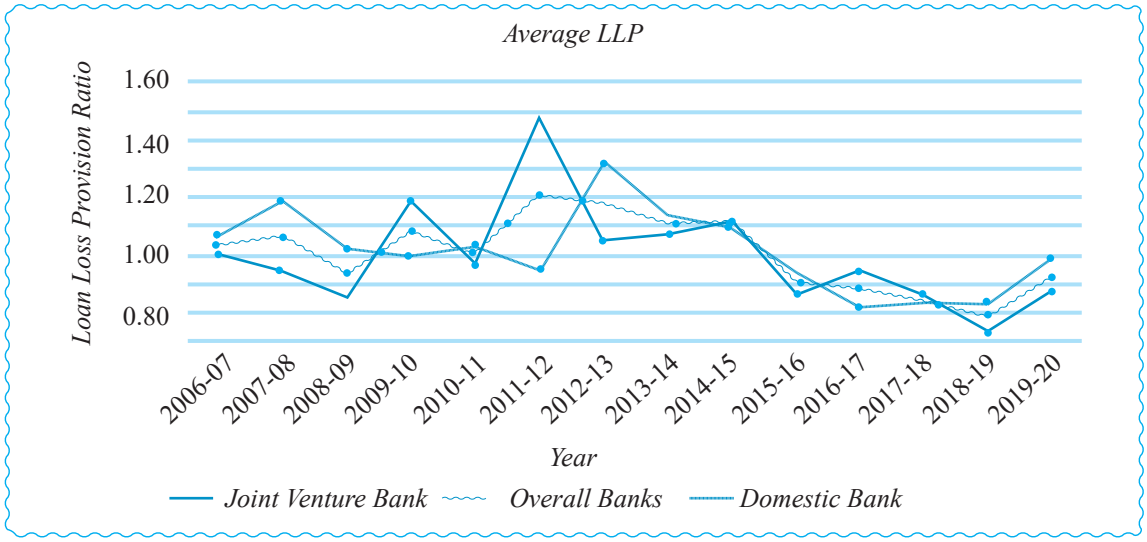

Figure 1: Average LLP of Selected Commercial Banks

Average CAR of Selected Commercial Banks

The average CAR of domestic banks displayed an increasing trend, starting at 11.93% in 2006-07, peaking at 14.29% in 2017-18. Joint venture banks exhibited fluctuations, decreasing initially and then rising to 15.08% in 2019-20. Overall, both domestic and joint venture banks showed an increasing trend, with joint ventures displaying a faster increase post-2014-15.

Average Bank Size of Selected Commercial Banks

The average bank size for domestic banks increased steadily, reaching Rs 168 billion in 2019-20. Joint venture banks also experienced growth, reaching Rs 166 billion, but domestic banks exhibited a faster increase from 2012-13 onwards. Overall, both domestic and joint venture banks demonstrated an upward trajectory in average bank size.

Average CDR of Selected Commercial Banks

The average CDR of domestic banks showed an increasing trend, reaching 89.41% in 2019-20. Joint venture banks displayed a similar trend, with a slower increase. Overall, both types of banks exhibited an upward trajectory, with domestic banks leading the trend from 2014-15.

Average LR of Selected Commercial Banks

Domestic banks showed fluctuations in the leverage ratio, initially increasing, declining, and then rising again. Joint venture banks exhibited a decreasing trend, while overall banks experienced a decline from 2015-16 onwards.

Average NPL of Selected Commercial Banks

The average NPL ratio for domestic banks exhibited an overall decreasing trend, with a slight increase in the last two years. Joint venture banks also displayed a decreasing trend, with a marginal increase in 2019-20. Overall, the NPL ratio for both types of banks showed a decline from 2013-14.

In summary, this presentation unveils distinctive trends in key financial indicators for domestic and joint venture banks. The analysis emphasizes the varying paces of change in these indicators, providing valuable insights for stakeholders in the banking sector.

Data Description

Table 4: Descriptive Statistics of Overall Banks

Variables	Minimum	Maximum	Mean	Std. Dev
CAR	10.04	22.99	12.70	1.99
Size	8	251	67	51
CDR	38.7	95.46	77.54	12.34
LR	4.68	48.69	11.50	4.80
LLP	-0.19	4.47	0.59	0.68
NPL	0.01	6.6	1.17	1.13

The result shows the descriptive statistics of dependent and independent variables for the selected joint ventures commercial banks Capital adequacy ratio varies from 10.04 to 22.99 percentage leading to the average of 12.70 percentage and standard deviation of 1.99 percentage. Bank size ratio varies from Rs 8 (billion) to Rs 251 (billion) leading to the average of Rs 67 (billion) and standard deviation of Rs 51 (billion). Credit to deposit ratio varies from 38.70 to 95.46 percent leading to the average of 77.54 percentage and standard deviation of 12.34 percentage. Leverage ratio varies from 4.68 to 48.69 times leading to the average of 11.50 times and standard deviation of 4.80 times. Loan loss provision varies from -0.19 to 4.47 percentage leading to the average of 0.59 percentage and standard deviation of 0.68 percentage. Further Non-performing loan varies from 0.01 to 6.6 percentage leading to the average of 1.17 percentage and standard deviation of 1.13 percentage.

Association between the Different Variable of Study with the Domestic and Joint Venture Banks

This table provides a quick comparison of the correlation coefficients for each pair of variables in both Domestic and Joint Venture Banks, helping to understand the relationships between these financial indicators:

Table: 5: Relationships between Joint Venture Banks and Overall Banks

Variable	Joint Venture Banks	Overall Banks
Capital Adequacy Ratio (CAR)		
Size	0.229268 (Positive)	0.287862 (Positive)
Credit to Deposit Ratio	-0.15843 (Negative)	-0.13228 (Negative)
Leverage Ratio	-0.56537 (Negative)	-0.32387 (Negative)
Loan Loss Provision	-0.29127 (Negative)	(Negative)
Non-Performing Loan	-0.38285 (Negative)	(Negative)
Size		
Credit to Deposit Ratio	0.447279 (Positive)	0.154885 (Positive)
Leverage Ratio	-0.47257 (Negative)	(Negative)
Loan Loss Provision		(Negative)
Non-Performing Loan		(Negative)
Credit to Deposit Ratio		
Leverage Ratio	-0.34996 (Negative)	-0.14895 (Negative)
Loan Loss Provision	0.074039 (Positive)	(Negative)
Non-Performing Loan		(Positive)

Variable	Joint Venture Banks	Overall Banks
Leverage Ratio		
Loan Loss Provision	0.078057 (Positive)	0.244482 (Positive)
Non-Performing Loan	0.456848 (Positive)	(Positive)
Loan Loss Provision		
Non-Performing Loan	0.446017 (Positive)	0.470072 (Positive, Strong)

These results provide straightforward insights into the relationships among key financial variables for Domestic banks. The strengths of these correlations vary, highlighting the intricate dynamics within the examined variables. These findings contribute to a clearer understanding of the factors influencing overall banks' performance.

The correlation analysis provides nuanced insights into the relationships between different financial variables in joint venture banks. The strengths of these correlations vary, highlighting the complexity of interactions within the examined variables. These findings contribute to a deeper understanding of the dynamics influencing joint venture banks' performance.

Relationship between the Capital adequacy ratio, Bank size, Credit to deposit ratio, Leverage ratio and loan loss provision variable non-performing loan

Linear regression analysis was conducted to identify relationship between the independent variable (Capital adequacy ratio, Bank size, Credit to deposit ratio, Leverage ratio and loan loss provision) and dependent variable non-performing loan. The advantage of conducting linear regression analysis included the ability to evaluate multiple independent variables that simultaneously affect the dependent variables. It provides us with more information about the slope of the relationship.

Hausman Test

In order to choose the fixed or random effect model a formal test so called Hausman test is used which is based on the null hypothesis in favor of random effect model estimator. If p value is higher than 0.05 (i.e. it is insignificant) random effect is preferable whereas if p value is lower than 0.05 (i.e. it is significant) fixed effect is preferable (Gujrati, 2004). Hausman test is a statistical hypothesis test in econometrics named after James Durbin, De-Min Wu, and Jerry A. Hausman. The test evaluates the consistency of an estimator when compared to an alternative, less efficient estimator which is already known to be consistent. It helps one evaluate if a statistical model corresponds to the data. The Hausman test can be used to differentiate between fixed effects model and random effects model in panel analysis. The hypothesis for Hausman test is:

H1: Random effect model is appropriate

H2: Fixed effect model is appropriate

For Dependent Variable NPL

Correlated Random Effects-Hausman Test

Equation: Untitled

Table 6: Test cross-section Random Effects of Overall Banks

Test Summary	Chi-sq. Statistic	Chi-sq. d.f.	Prob.
Cross-section random	11.658393	5	0.0398

Table 7: Model Summary of Overall Banks with NPL

Model	R Square	Adjusted R Square	Prob (F-statistics)
1	0.470706	0.411425	0.000000

Coefficient Estimates are Significant at 5% Level

Table 8 shows the regression coefficient of non-performing loan. The R square and adjusted R square value of 0.47 and 0.41 respectively is an indication that 41 percent of variation on non-performing loan of Nepalese Commercial banks are explained by independent variables included in the model. However, the remaining 59 percent changes on non-performing loan of Nepalese Commercial Banks is caused by other factors.

Table 8: Results of Panel Data Regression

Variable	Coefficient	Std. Error	t-statistic	Prob.
CAR	0.089294	0.058355	1.530195	0.1285
SIZE	-0.003531	0.001796	-1.965711	0.0515
CDR	-0.006002	0.011437	-0.524745	0.6007
LR	0.068021	0.022610	3.008506	0.0032
LLP	0.481243	0.138473	3.475347	0.0007
C	-0.331592	1.161317	-0.285531	0.7757

The results shows that there is no significant relationship of capital adequacy ratio on non-performing loan because the probability is higher than 5 percent. Bank size has no significant relationship to non-performing loan. The result shows that there is no significant relationship between credit to deposit ratio on non-performing loan. Similarly there is significant relationship between leverage ratio to non-performing loan. The significant positive coefficients reveal that leverage ratio has positive impact on credit risk. There is relationship between loan loss provision to non-performing loan. The significant positive coefficients reveals that leverage ratio has positive impact on credit risk i.e. non-performing loan. Bank size, capital adequacy ratio and credit to deposit ratio statistically insignificant at 5% level of significance it indicates that they have not a specific impact on credit risk.

Table 9: Model Summary on the Basic of Types of Commercial Banks with NPL

Type	Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
Domestic	1	.532a	0.283	0.227	0.89073
Joint venture	1	.648b	0.421	0.375	0.98482

For domestic banks table 9 shows that the value of R square for dependent variable NPL is 0.283. This indicates the proportion of variance in the NPL which can be explained by independent variables (CAR, CDR, SIZE, LR and LLP). Thus 28.3 percent of total variation dependent variable has been explained by the selected five independent variables. In other words 71.7 percent of the variations in the dependent variable are not explained by the independent variables in the model.

Adjusted R square is 0.227 i.e. 22.7 percent of variation in NPL is explained by the (CAR, CDR, SIZE, LR and LLP) after adjusting by degree of freedom. The reliability of the regression equation is explained by the standard error of estimate for dependent variable NPL which is 0.89073 shown in the model summary table. It mean that there is 89.07 percent dispersion of values from the regression line for dependent variables NPL.

As for joint venture banks, Table 9 shows that the value of R square for dependent variable NPL is 0.421. This indicates the proportion of variance in the NPL which can be explained by the independent variables (CAR, CDR, SIZE, LR and LLP). Thus 42.1 percent of total variation dependent variable has been explained by the selected independent variables. In other words, 57.9 percent of the

variations in the dependent variable are not explained by the independent variables in the model.

Adjusted R square is 0.375 i.e. 37.5 percent of variation in NPL is explained by the (CAR, CDR, SIZE, LR and LLP) after adjusting by degree of freedom. The reliability of the regression equation is explained by the standard error of estimate for dependent variable NPL which is 0.98482 shown in the model summary table. It mean that there is 98.48 percent dispersion of values from the regression line for dependent variables NPL.

Table 10: ANOVA Table with dependent variable NPL

Type	Model		Sum of Squares	df	Mean Square	F	Sig.
Domestic	1	Regression	20.0345	5	4.009	5.053	.001
		Residual	50.778	64	0.793		
		Total	70.882	69			
Joint Venture	1	Regression	45.045	5	9.009	9.289	.000c
		Residual	62.072	64	0.970		
		Total	107.117	69			
		Residual	62.072	64	0.970		
		Total	107.117	69			

ANOVA was used to establish the appropriateness of the regression model in giving reliable results. The regression model is deemed appropriate when the confidence level is 95% and above.

ANOVA table is used to analyze whether the overall model is significant and if model can be applied to the research. The result of table 10 shows that p-value of domestic bank is less than α i.e. 0.01<0.05 so, the model is significant at 5% level of significance. So multiple linear model can be used to analyze the data. For joint venture banks the table shows that p-value is less than α i.e. 0.000<0.05 so, the model is significant at 5% level of significance.

The findings align with Malimi (2017), Rahman et al. (2017), Abdelrahim (2013), and Ghosh (2005), supporting arguments about the lack of significant impact of capital adequacy on non-performing loans. Poudel (2012) find a significant relationship between loan loss provision and non-performing loan, consistent with this study.

However, there are contradictions with Poudel (2012), Morina (2020), and Rahman (2017) regarding the relationship between capital adequacy ratio, bank size, credit to deposit ratio, and non-performing loan.

This study contributes valuable insights into the credit risk management of Nepalese commercial banks, emphasizing the importance of variables like leverage ratio and loan loss provision in influencing non-performing loans. However, discrepancies with previous studies highlight the complexity of these relationships and the need for further research in this context. Further digging study should be conducted in green banking practices, factors and profitability by comparing domestic and joint venture banks (Mishra & Aithal, 2023: Mishra & Aithal, 2022: Mishra, Kandel & Aithal, 2021)

Conclusion

This study undertakes an exploration of the significance of various independent variables, including capital adequacy ratio, credit to deposit ratio, bank size, leverage ratio, and loan loss provision, in the context of Nepalese commercial banks' credit risk management. The findings are drawn from secondary data collected from ten commercial banks spanning the years 2006 to 2019. The analysis employs descriptive statistics, trend analysis, and the least square method to investigate the impact of credit risk management on commercial banks.

The trend analysis discloses notable patterns over the study period. Non-performing loans (NPL) exhibit an increasing trend for domestic banks, a decreasing trend for joint venture banks, and an overall decreasing trend. Capital adequacy ratio (CAR) demonstrates an increasing trend for all types of banks, indicating that banks with a higher CAR experience enhanced profitability and reliability. Credit to deposit ratio (CDR) and bank size exhibit increasing trends, suggesting effective fund utilization and diversification possibilities for larger banks. Leverage ratio (LR) is on an increasing trend for domestic banks, while it decreases for joint venture and overall banks, signifying a potential reduction in risk for the latter. Loan loss provision (LLP) shows a decreasing trend across all banks, implying a lower ability to absorb potential losses.

The results indicate that, for overall banks, both leverage ratio and loan loss provision significantly impact non-performing loans, highlighting their crucial role in credit risk management. Conversely, capital adequacy ratio, credit to deposit ratio, and bank size show no significant impact on non-performing loans. The positive coefficients of leverage ratio and loan loss provision suggest a positive influence on credit risk, emphasizing the importance of these factors for banks seeking to enhance profitability and manage credit risk effectively.

Upon closer examination, it becomes evident that, for domestic banks, loan loss provision plays a significant role in non-performing loans, whereas capital adequacy ratio, credit to deposit ratio, bank size, and leverage ratio show no significant impact. Joint venture banks, on the other hand, witness a significant impact of leverage ratio and loan loss provision on non-performing loans, while capital adequacy ratio, credit to deposit ratio, and bank size remain insignificant in their influence on credit risk.

This study underscores the pivotal role of leverage ratio and loan loss provision in managing credit risk for Nepalese commercial banks. These findings can guide banks in refining their strategies to enhance profitability and minimize credit risk, ultimately contributing to the stability and resilience of the banking sector.

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References

Atakelt, H., & Veni, P. (2015). Credit Risk Management Tools Practiced in Ethiopian Commercial Banks. *International Journal of Social Science and Interdisciplinary Research*, 4(5), 1-13.

Bhattarai, Y. (2016). The effect of credit risk on the performance of Nepalese commercials banks. *NRB Economic Review*, 28(1), 41-62.

Campbell, A. (2007). Bank insolvency and the problem of nonperforming loans. *Journal of Banking Regulations*. 9(1) 25- 45.

Coyle, B. (2000). *Framework for Credit Risk Management; Chartered Institute of Bankers*. United kingdom: Chartered Institute of Bankers, 4(1), 47-56.

Fredrick, K., Robert, M., & Otuya, R. (2013). Effect Of Credit Risk Management Pratices On Lending Portfolio Among Savings And Credit Cooperatives In Kenya. *European Jounal Of Business And Management*, 5(9), 93-105.

Ghosh, S. (2005). Does leverage influence banks non-performing loans? *Evidence from India*, 12(15), 913-918.

Grima, S., & Thalassinos, I. (2020). *Financial Derivatives: A Blessing or a Curse?* Emerald Publishing Co., London Uk, ISBN: 9781789732467.

Kattel, I. (2017). Study of Credit Risk Identification Techniques Followed by Commercial Banks in Nepal. *Journal of advanced Academic Research*, 2(2), 1- 7.

Kithinji, A. (2010). Credit Risk Management Profitabiity of Commercial Banks in Kenya. School of Business, *University of Nairobi, Nairobi*, 1-42.

Laker, A. (2007). Go to Every Laker Home Game for College Credit. Los Angeles: The Loss Angles Lakers Community Relations department.

Malimi, K. (2017). The influence of Capital Adequacy, Profitability, and Loan Growth on Non-Performing Loans a Case of Tanzanian Banking Sector. *International Journal Of Economics, Business and Management Studies, Pacharapa Naka*, 4(1),38-49.

Manandhar, A., Kafle, A., Basnet, A., Khanal, B., & Panta, B. (2015). Determinants Of Credit Risk In Nepalese Commercial banks. *Nepalese Journal of Finance*, 2(1), 1-8.

Mishra, A. K., & Aithal, P. S. (2022). An Imperative on Green Financing in the Perspective of Nepal. *International Journal of Applied Engineering and Management Letters (IJAEML)*, 6(2), 242-253. https://doi.org/10.5281/zenodo.7221741

Mishra, A. K., & Aithal, P. S. (2023). Assessing the Association of Factors Influencing Green Banking Practices. *International Journal of Applied Engineering and Management Letters (IJAEML)*, 7(3), 36-54. https://doi.org/10.5281/zenodo.8234076

Mishra, A. K., Kandel, D. R., & Aithal, P. S. (2021). Profitability in Commercial Bank – A Case from Nepal. *International Journal of Case Studies in Business, IT, and Education (IJCSBE)*, 5(1), 61-77. http://doi.org/10.5281/zenodo.4752052

Morina, D. (2020). Determinants of Credit Risk in Commercial Banks of Kosovo. *International Journal of Economic and Business Administration*,13(2), 79 - 190.

Onaolapo, A. (2012). Analysis Of Credit Risk Management Efficiency In Nigeria Commercial Banking Sector, (2004-2009). *Far East Journal Of Marketing And Management*, 2(1), 39-51.

Poudel, R. (2012). The Impact Of Credit Risk Management On Financial Performance of Commercial banks In Neapl. *International Journal Of Arts And Commerce*, 1(5), 39-51.

Pradhan, S., & Shah, A. (2019). Credit Risk Management of Commercial Banks in Nepal. *Journal of Business and Social Science*, 4(1), 27-37.

Rahman, M., Asaduzzaman, M., & Hossin, M. (2017). Impact of Financial Ratios on Non-performing Loans of Publicly Traded Commercial Banks in Bangladesh. *International Journal of Finance*, 8(1), 181-188.

Westhuizen, G. (2014). Bank Efficency And Financial Ratios: Rating The Performance Of The Four. *The Journal of Applied Business Research*, 30(1), 90-104.