

The Effect of Credit Risk on Financial Performance of Nepalese Commercial Banks

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Abstract

This study examines the impact of credit risk on the financial performance of commercial banks in Nepal. The sample selection for this study is based on a purposive sampling method. Out of the 20 commercial banks in Nepal, 13 were selected as the sample for analysis. This study examines the published, audited annual reports specifically the financial statements, income statements, and cash flow statements of these 13 commercial banks over a 10-year period, from 2014 to 2023. The total number of observations in this study is 130, and involving of three dependent variables ROA, ROE, and NPM and six independent variables i.e. NPLR, CAR, LR, LDR, CFR, and AWISR for analysis. This selection is aimed at effectively justifying and addressing the core objectives of the research. Further, this study used unbalance panel data for the period of 2014 to 2023. Breusch and Pagan Lagrangian multiplier test found that panel model is more appropriate and Hausman test concluded that random effect model is more appropriate for ROA, ROE and Fixed effect model is more appropriate for NPM in this study. The findings highlight that higher Non-Performing Loan Ratios (NPLR) significantly reduce profitability across these indicators, emphasizing the need for robust credit risk management. The Cost of Funds (CFR) also plays a critical role, with higher CFR lead to lower ROA, ROE, and NPM. In contrast, a higher Average Weighted Interest Spread Rate (AWISR) positively influences ROA and ROE, though its effect on NPM is less clear. Liquidity management, indicated by the Liquidity Ratio (LR), positively affects ROE and NPM but has a less significant impact on ROA. The Capital Adequacy Ratio (CAR) shows a positive effect on ROA but a mixed impact on ROE and NPM. Lastly, the Loan-to-Deposit Ratio (LDR) generally negatively impact on financial performance, particularly ROA and ROE, while its effect on NPM is negligible. The study concludes that Nepalese commercial banks should prioritize effective credit risk management, control funding costs, optimize interest rate strategies to enhance profitability and financial performance. This study provides deeper insights into improving the financial performance of Nepalese commercial banks.

Key Words: Credit risk, financial performance, Return of Assets, Return of Equity, Net Profit Margin, Nepalese Commercial Bank, Panel data.

INTRODUCTION

A well-organized, efficient, smoothly functioning financial system is an important component of a modern, highly specialized economy. The financial system provides a mechanism whereby a firm or house hold that is a net lender may conveniently make funds available to net borrowers who intend to spend more than their current income. The key word here is conveniently. The financial system is composed of financial markets and financial institutions. Net lenders can lend their funds directly to net borrowers in financial markets (Burton et al., 2010). Banks are key components of this sector, with numerous branches and subsidiaries operating both domestically and internationally. Commercial banks, in particular, are vital for resource allocation in most countries, serving the essential function of channeling funds from depositors to investors.

However, this is only sustainable if banks generate sufficient income to cover their operational costs. Thus, the sustainability of commercial banks is critical for them to fulfill their intermediary role. Commercial banks act as financial intermediaries by channeling savings from economic units with surpluses to those with deficits. They play a crucial role in mobilizing funds between depositors and borrowers within an economy. The effectiveness with which they perform this intermediary function is directly connected to the banks' profitability and the overall economic well-being of a nation. The profitability of banks is closely tied to the growth and development of the economy (Akims, 2022).

In Nepal, commercial banks hold a significant portion of the financial sector's total assets. Similar to banks in other countries, their primary function is extending credit which is a major source of profit. However, it is important to recognize that banks differ in various aspects, such as their objectives, products, and services. Additionally, banks encounter several risks in their daily operations. Domestic credit to private sector seems to be more appropriate considering short-run and long-run application. Thus, in context of low-income economy like Nepal, policies giving access to credit to private sector including small and medium enterprises, would enhance productivity of agriculture, manufacturing and industry to generate employment, increase household income, increase consumption and thus economic growth as a whole. The result also indicates that expansionary monetary and fiscal policy causing excess money supply contribute to the growth in the long-run but could be inimical to economic growth in the short-run although the coefficient is not significant (Chettri, 2022). Hamza (2017) identified some major indicators of credit risk including return on assets, return on equity, non-performing loan, loan and advances, total deposit of bank, loan loss provision, and shareholders' equity to measure the impact of credit risk management on bank performance. Bessis (2015) categorized some of the major risks that banks face as: credit risk, liquidity risk, interest rate risk, mismatch risk, market liquidity risk, market risk, and foreign exchange risk. Amongst these many risks faced by banks, credit risk plays a significant role on its financial performance as a large chunk of banks income is earned from the loans provided to their customers in the form of interest income (Funso et al., 2012). The commercial banks may need to review their credit rating methodologies to ensure that only worthy borrowers lend money to reduce the large number of non-performing loans. Lending should provide borrowers with some form of financial education, guidance, and advice on how to allocate borrowed funds (Benti & Sime Biru, 2023).

This study is focus on the effect of credit risk on financial performance of Nepalese commercial banks. For a bank to ensure long-term survival, it is crucial to identify the factors that drive profitability. By understanding these determinants, the bank can take proactive measures to enhance its profitability by effectively managing the key drivers. The performance of a bank is also critically important for various stakeholders, including owners, investors, debtors, creditors, depositors, bank managers, regulators, and the government. The bank's performance provides valuable guidance for stakeholders in their decision-making processes (Athanasoglou et al., 2006).

Credit risk defined as 'the potential that a contractual party will fail to meet its obligations in accordance with the agreed terms'. Credit risk is also variously referred to as default risk, performance risk or counterparty risk. These all fundamentally refer to the same thing: the impact of credit effects on a firm's transactions (Brown & Moles, 2014).

Credit risk is a major risk inherent in banking due to the nature of their operations, and a bank's financial success largely depends on how effectively it manages this risk compared to other types of risks it faces (Giesecke, 2003). Burton et al. (2015) define credit risk as the probability of debtor not paying the principal and/or the interest due on an outstanding debt. As stated earlier, loan interest is one of the major sources of income in commercial banks but also the primary source of credit risk to the banks (Bhattarai, 2016).

When a bank issues loans to their customers, they expect them to repay the principal and interest amount on an agreed time. However, if both the principal and interest payment are received on an agreed time with agreed terms, it is known as performing loan. If the loan payment is not received on time, it is known as a non-performing loan (NPL). NPL is normally classified into three categories namely: a substandard loan, doubtful loan and loss loan (Funso et al., 2012). A loan is classified as "pass" if it is current or unpaid for up to one month, requiring a minimum loan loss provision of 1.25 percent. If a loan remains unpaid for 1 to 3 months, it is categorized as "watch list," necessitating a minimum provision of 5 percent. Loans that are unpaid for 3 to 6 months are classified as "substandard," requiring a minimum loan loss provision of 25 percent. When a loan remains unpaid for 6 months to 1 year, it falls under the "doubtful" category, with a required provision of 50 percent. Loans that remain unpaid for more than 1 year are classified as "loss" and require a 100 percent loan loss provision (NRB, 2024).

Ikinya Okiru and Bichanga Miroga (2024) identified major sources of credit risk as limited institutional capacity, inappropriate credit policies, volatile interest rates, inappropriate laws, low capitals and liquidity levels, directed lending, massive licensing of banks, poor loan underwriting, poor management, negligence in credit assessment, poor lending practices, government interference and inadequate supervision by the central bank. In order to minimize credit risk arising from these sources, Kamara (2024) recommended the necessity for the financial system to: (i) have well-capitalized banks, (ii) provide service to a wide range of customers, (iii) share information regarding borrowers, (iv) have a stabilize interest rate, (v) increase bank deposits and credit to borrowers, and (vi) reduce non-performance loan.

Effective risk management is critical for mitigating potential financial and economic difficulties and is essential for the long-term success of banks. Properly managing credit risk not only enhances the profitability and viability of banking institutions but also contributes to systemic stability and ensures the efficient allocation of capital within the economy (Psillaki et al., 2010). This is very important to banks as it is an integral part of the banks' loan process. Credit risk management can be defined as identification, measurement, monitoring and control of credit risk arising from the possibility of default in loan payment (Coyle, 2000). While the banks do not have a clear signal as to what proportion of the borrowers will likely default, the uncertainty results to the variation in profitability among banks as well. The main aim of managing credit risk is to maximize bank's return adjusted for the risk while keeping an acceptable level of exposure (Ndoka & Islami, 2015). Senior management creates and develops policies and procedures for loan administration and gets the approval from the board of directors and are responsible for implementing it (Ndoka & Islami, 2015). Ideally, the senior management should ensure that implementation would involve clear communication of policies and procedures to all staff related to loan approval process in the hierarchy (Ndoka & Islami, 2015).

In conclusion, the financial system of a country plays a pivotal role in shaping banks' credit risk and its management. Strong credit risk management helps prevent significant setbacks and improves a bank's financial performance. Solid financial performance benefits shareholders, encouraging further investment and fostering economic growth. Conversely, poor banking performance can lead to bank failures and crises, which may negatively impact economic growth. Thus, this study tries to seek how credit risk specific determinants effect on the financial performance of bank. For this Purpose, three dependent variables (ROA, ROE, NPM) and six independent variables (NPLR, CAR, LR, LDR, CFR, AWISR) are used.

Statement of the Problems

Commercial banks play a critical role in the financial system by channeling funds from depositors to investors, thereby contributing to the economic growth and development of a country. However, their ability to perform this intermediary function effectively is contingent upon their financial performance, which is significantly influenced by various risks, particularly credit risk. In Nepal, commercial banks face substantial credit risk due to factors such as lax credit standards, inadequate risk management practices, and economic fluctuations (Chhetri, 2021). This might presence of NPLR, CAR, LR, LDR, AWISR, CFR is a major concern, as it can lead to financial instability within banks, affecting their profitability and, by extension, the overall economy.

Despite the importance of credit risk management, many commercial banks in Nepal continue to grapple with high levels of credit risk and other related challenges (NRB, 2022). This situation underscores the need for a thorough examination of how credit risk affects the financial performance of Nepalese commercial banks. Understanding the key drivers of profitability and the impact of credit risk management is crucial for enhancing the long-term sustainability of these banks. Therefore, this study seeks to investigate on titled “The Effect of Credit Risk on Financial Performance of Nepalese Commercial Banks”, with the aim of providing insights that can help banks improve their credit risk management practices and overall financial health.

Objective of the Study

The primary aim of this research is to examine the impact of credit risk management on the profitability of commercial banks in Nepal. Accordingly, the general objective of the study is to evaluate the role of risk management in the financial performance of Nepalese commercial banks. Specifically, the study seeks to:

1. To analyze the structure and pattern of credit risk indicators and financial performance indicators.
2. To identify the key credit risk indicators that affect in financial performance of Nepalese commercial banks.
3. To find out the relationship between credit risk and financial performance of bank.
4. To assess the impact of credit risk on financial performance of Nepalese commercial bank.

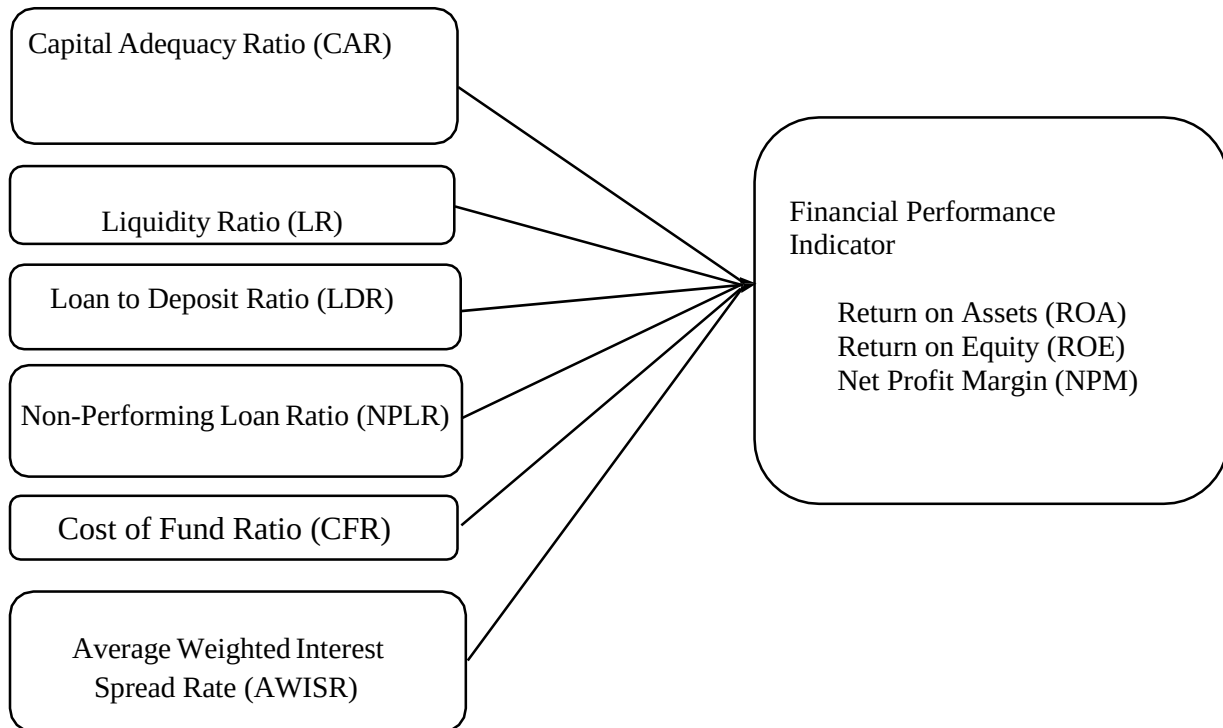
Conceptual Framework

Based on the literature review, the following key variables have been identified for this study. The financial performance indicators, serving as the dependent variables, include Return on Assets (ROA), Return on Equity (ROE), and Net Profit Margin (NPM). The independent variables, representing credit risk, consist of the Non-Performing Loan Ratio (NPLR), Capital Adequacy Ratio (CAR), Liquidity Ratio (LR), Loan-to-Deposit Ratio (LDR), Cost of Funds Ratio (CFR), and Average Weighted Interest Spread Rate (AWISR). The conceptual framework is illustrated in the diagram (Figure 1) below.

Figure 1. Conceptual Framework

Independent Variables

Dependent Variables



Research Design

This study adopted a combination of descriptive, correlation and causal-comparative research designs to provide a comprehensive understanding of the effect of credit risk on financial performance of Nepalese commercial banks. Where descriptive analysis provides the insights into the current trends, pattern and structure of credit risk and financial performance indicators, while correlation analysis examines the relationships between dependent and independent variables. The causal-comparative design explores the cause and effect relationships, identifying how changes in credit risk variables impact bank's financial performance.

Nature and Sources of Data

Secondary data is employed for this research analysis. The required data was obtained from the published audited annual reports of 13 commercial banks in Nepal, covering the period from 2014 to 2023. These banks include Citizen Bank International Ltd (CBL), Global IME Bank Ltd (GBL), Himalayan Bank Ltd (HBL), Everest Bank Ltd (EBL), Kumari Bank Ltd (KBL), Machhapuchhre Bank Ltd (MBL), Nabil Bank Ltd (NBL), Nic Asia Bank Ltd (NIC), NMB Bank Ltd (NMB), Prabhu Bank Ltd (PVU), Sanima Bank Ltd (SMB), Siddhartha Bank Ltd (SBL), and Nepal SBI Bank Ltd (SBI).

Description of the Sample and Population

The sample selection for this study is based on a purposive sampling method. Out of the 20 commercial banks in Nepal, 13 were selected as the sample for analysis. This study examines the published, audited annual reports

specifically the financial statements, income statements, and cash flow statements of these 13 commercial banks over a 10-year period, from 2014 to 2023. The total number of observations in this study is 130, and involving of three dependent variables ROA, ROE, and NPM and six independent variables i.e. NPLR, CAR, LR, LDR, CFR, and AWISR for analysis. This selection is aimed at effectively justifying and addressing the core objectives of the research.

Statistical Tools

Various statistical tools can be used to analyze the available financial data. These tools are used in research in order to draw the reliable conclusion through the analysis of financial data. Excel and STATA 12.0 is applied for the manage and analyze the raw data.

Model Specification

This study has used the financial performance indicator dependent variable Return on Assets (ROA), Return on Equity (ROE), Net Profit Margin (NPM) and Credit risk indicator independent variables: Non-Performing Loan Ratio (NPLR), Capital Adequacy Ratio (CAR), Liquidity Ratio (LR), Loan-to-Deposit Ratio (LDR), Cost of Fund Ratio (CFR), and Average Weighted Interest Spread Rate (AWISR). The basic model for multivariate regression analysis is specified as follows:

$$ROA_{it} = \alpha_0 + \alpha_1 CAR_{it} + \alpha_2 LR_{it} + \alpha_3 LDR_{it} + \alpha_4 NPLR_{it} + \alpha_5 CFR_{it} + \alpha_6 AWISR_{it} + \mu_{it} \dots\dots\dots 1$$

$$ROE_{it} = \alpha_0 + \alpha_1 CAR_{it} + \alpha_2 LR_{it} + \alpha_3 LDR_{it} + \alpha_4 NPLR_{it} + \alpha_5 CFR_{it} + \alpha_6 AWISR_{it} + \mu_{it} \dots\dots\dots 2$$

$$NPM_{it} = \alpha_0 + \alpha_1 CAR_{it} + \alpha_2 LR_{it} + \alpha_3 LDR_{it} + \alpha_4 NPLR_{it} + \alpha_5 CFR_{it} + \alpha_6 AWISR_{it} + \mu_{it} \dots\dots\dots 3$$

Where,

CAR_{it} = Capital Adequacy Ratio of bank i in the year t

LR_{it} = Liquidity Ratio of bank i in year t

LDR_{it} = Loan to Deposit Ratio of bank i in year t

$NPLR_{it}$ = Non-Performing Loan Ratio of bank i in year t

CFR_{it} = Cost of Fund Ratio of bank i in year t

$AWISR_{it}$ = Average Weighted Interest Spread Rate of bank i and year t

ROA_{it} = Return on Assets for bank i at time t

ROE_{it} = Return on Equity for bank i at time t NPM_{it} = Net Profit Margin for bank i at time t α_n = the intercept term

μ_{it} = Error term

Method of Analysis

The primary objective of this study is to examine the impact of credit risk on the financial performance of Nepalese commercial banks. To achieve this, balanced panel data from 13 commercial banks spanning the period from 2014 to 2023 was collected and analyzed using STATA 12.0 software. The analysis included descriptive statistics, correlation analysis, and multivariate regression analysis. Before conducting the multivariate regression analysis, it was verified whether the collected data was suitable for the Pooled Regression model or panel data analysis model. For this purpose, the Breusch and Pagan Lagrangian multiplier test for the Pooled Regression model or panel model, and the Hausman test for the Random Effect model or Fixed Effect model are applied.

Result and Discussion

Table 10. Descriptive Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
ROA	130	1.452	.532	-1.44	2.89
ROE	130	15.226	6.495	-26.88	31.4
NPM	130	22.813	12.508	-33.33	72.2
NPLR	130	1.569	2.458	0.01	24.29
CAR	130	13.362	2.77	8.68	29.43
LR	130	14.905	10.296	0.82	37.52
LDR	130	84.163	6.293	64.43	96.08
CFR	130	5.611	2.018	1.65	12.77
AWISR	130	4.104	0.569	2.75	5.69

This Table 10 presents the descriptive statistics for nine financial variables across 130 observations. The mean Return on Assets (ROA) is 1.452 percent, with a standard deviation of 0.532 percent, ranging from -1.44 percent to 2.89 percent. The mean Return on Equity (ROE) is

15.226 percent, with a wider spread as indicated by a standard deviation of 6.495 percent, ranging from -26.88 percent to 31.4 percent. The Net Profit Margin (NPM) has a mean of 22.813 percent, with a high standard deviation of 12.508 percent and values ranging from -33.33 percent to 72.2 percent. The Non-Performing Loan ratio (NPLR) averages 1.569 percent, with significant variation (standard deviation of 2.458 percent), spanning from 0.01 percent to 24.29 percent. The Capital Adequacy Ratio (CAR) has a mean of 13.362 percent, with a standard deviation of 2.77 percent, ranging from 8.68 percent to 29.43 percent. Liquidity Ratio (LR) shows a mean of 14.905 percent, with a considerable spread (standard deviation of 10.296 percent), ranging from 0.82 percent to 37.52 percent. The Loan-to-Deposit Ratio (LDR) has a mean of 84.163 percent, with a tighter distribution (standard deviation of 6.293 percent), ranging from 64.43 percent to 96.08 percent. Lastly, the Cost of Funds Ratio (CFR) averages 5.611 percent, with a standard deviation of 2.018 percent, and the Average Weighted Interest Spread Rate (AWISR) has a mean of 4.104 percent, with a relatively low variability (standard deviation of 0.569 percent).

Correlations Analysis

Table 11. Correlation Analysis among ROA, NPLR, LR, LDR, CFR, and AWISR

Variables	ROA	NPLR	CAR	LR	LDR	CFR	AWISR
ROA	1.000						
NPLR	-0.490	1.000					
CAR	-0.062	-0.232	1.000				
LR	0.062	-0.077	0.117	1.000			
LDR	-0.171	-0.287	0.235	-0.137	1.000		
CFR	-0.476	0.084	0.179	-0.223	0.446	1.000	
AWISR	0.156	0.211	-0.115	0.243	-0.264	-0.074	1.000

The correlation analysis in Table 11 reveals key relationships between Return on Assets (ROA) and various financial indicators. There is a moderate negative correlation of -0.4901 between ROA and Non-Performing Loans Ratio (NPLR), indicating that higher levels of bad loans are associated with lower ROA. Similarly, ROA shows a moderate

negative correlation of -0.476 with the Cost of Funds Ratio (CFR), suggesting that increasing costs reduce ROA. A weak negative relationship is observed between ROA and the Loan-to-Deposit Ratio (LDR), with a correlation of -0.171, implying that a higher ratio slightly decreases ROA. In contrast, ROA has a weak positive correlation of 0.156 with the Average Weighted Interest Spread Rate (AWISR), indicating a modest boost in ROA as interest rates rise. The correlations with the Capital Adequacy Ratio (CAR) is -0.062 and the Liquidity Ratio (LR) is 0.062 are very weak, showing minimal impact on ROA from these factors.

Table 12. Correlation Analysis among ROE, NPLR, LR, LDR, CFR, and AWISR

Variables	ROE	NPLR	CAR	LR	LDR	CFR	AWISR
ROE	1.000						
NPLR	-0.551	1.000					
CAR	-0.034	-0.232	1.000				
LR	0.299	-0.077	0.117	1.000			
LDR	-0.240	-0.287	0.235	-0.137	1.000		
CFR	-0.466	0.084	0.179	-0.223	0.446	1.000	
AWISR	0.169	0.211	-0.115	0.243	-0.264	-0.074	1.000

The correlation analysis in Table 12 shows that Return on Equity (ROE) has a strong negative correlation with Non-Performing Loans Ratio (NPLR) at -0.551 and a moderate negative correlation with the Cost of Funds Ratio (CFR) at -0.466, indicating that higher NPLR and CFR reduce ROE significantly. ROE also shows a weak negative correlation with the Loan-to-Deposit Ratio (LDR) at -0.240, implying that a higher LDR slightly decreases ROE, possibly due to increased financial risk or reduced liquidity. Additionally, there is a weak to moderate positive correlation with the Liquidity Ratio (LR) at 0.299, suggesting that improved liquidity management boosts return. ROE has a weak positive correlation with the Average Weighted Interest Spread Rate (AWISR) at 0.169, indicating a little bit boost in ROE as interest rates rise. while the Capital Adequacy Ratio (CAR) shows almost no impact with a very weak negative correlation of -0.034.

Table 13. Correlation Analysis among NPM, NPLR, LR, LDR, CFR, and AWISR

Variables	NPM	NPLR	CAR	LR	LDR	CFR	AWISR
NPM	1.000						
NPLR	-0.290	1.000					
CAR	-0.207	-0.232	1.000				
LR	0.329	-0.077	0.117	1.000			
LDR	-0.253	-0.287	0.235	-0.137	1.000		
CFR	-0.444	0.084	0.179	-0.223	0.446	1.000	
AWISR	0.128	0.211	-0.115	0.243	-0.264	-0.074	1.000

The correlation analysis in Table 13 shows that Net Profit Margin (NPM) is negatively impacted by both Non-Performing Loans Ratio (NPLR) and the Cost of Funds Ratio (CFR), with correlations of -0.290 and -0.444, respectively, indicating that higher NPLR and CFR reduce NPM. The Loan-to- Deposit Ratio (LDR) also has a weak negative effect on NPM, with a correlation of -0.253, suggesting that a higher LDR may slightly reduce NPM due to increased financial risk and liquidity constraints. On the positive side, the Liquidity Ratio (LR) has a weak to moderate positive correlation of 0.328 with NPM, indicating that better liquidity management enhances NPM by providing financial stability. The Average Weighted Interest Spread Rate (AWISR) shows a weak positive correlation of 0.128, suggesting that higher interest rates may slightly improve NPM by increasing interest income. However, the Capital Adequacy Ratio (CAR) weakly reduces NPM with a correlation of -0.207, implying that higher capital reserves might slightly reduce NPM, possibly due to the opportunity cost of holding more capital.

Model Estimation

Prior to estimating the regression model, this study employed the Breusch and Pagan Lagrangian

Multiplier test determines whether the data is suitable for a pooled or panel model and Hausman test for random and fixed effect model. The test results are calculated and displayed below.

Table 14. Breusch and Pagan Lagrangian Multiplier Test for ROA

	Var	sd=sqrt (Var)
ROA	0.283224	0.532188
E	0.111128	0.333358
U	0.048447	0.220107
Test: Var(u)=0	$\tilde{\chi}^2(01)=14.84$	Prob> $\tilde{\chi}^2$ =0.0001

Table 14 presents result of the Breusch and Pagan Lagrangian Multiplier test. As per result test statistic for the random effects Var(u)=0 yields a chi-square bar ($\tilde{\chi}^2$) value of 14.84 and a p-value (Prob> $\tilde{\chi}^2$) of 0.0001, indicating that a panel model is more appropriate than a pooled model (Breusch & Pagan, 1980). After confirming that a panel model is appropriate, the next step is to determine whether the random effects or fixed effects model is more suitable. To make this decision, the Hausman Test is performed, as shown in Table 15, for further analysis.

Table 15. Hausman Test in ROA

ROA	(b) Fixed Effect	(B) Random Effect	(b-B) Difference	Sqrt(dia(v _b -V _B)) S.E
NPL	-0.1466	-0.1297	-0.0169	0.0071
CAR	0.0144	0.0097	0.0047	0.0057
LR	0.0228	-0.0023	0.2519	0.0108
LDR	0.0009	-0.0079	0.0088	0.0040
CFR	-0.0948	-0.1024	0.0076	0.0058
AWISR	0.2585	0.2462	0.0123	0.0086
$\chi^2 (6)=8.16$		Prob> $\chi^2=0.2267$		

Table 15 presents the Hausman est results for Return on Assets (ROA). This test evaluates whether the Fixed Effects (FE) or Random Effects (RE) model is more appropriate for the given panel data. The chi-square $\chi^2(6)$ statistic for the Hausman test is 8.16, with a p-value (Prob> χ^2) of 0.2267. P-value is greater than the conventional threshold of 0.05, thus RE model is consistent cannot be rejected. Therefore, the RE model is more appropriate for data in this case (Hausman, 1978).

Table 16. Random Effect Regression for ROA

ROA	Coef.	St.Err.	t-value	p-value	Sig
NPLR	-0.1297	0.0154	-8.41	0.0000	***
CAR	0.0097	0.0145	0.67	0.5019	
LR	-0.0024	0.0062	-0.38	0.7028	
LDR	-0.0079	0.0065	-1.21	0.2259	
CFR	-0.1024	0.0192	-5.34	0.0000	***
AWISR	0.2462	0.0607	4.06	0.0005	***
Constant	1.7914	0.6467	2.77	0.0056	***
Overall r-squared		0.4867	Number of obs	130	
χ^2		127.5407	Prob > χ^2	0.0000	

*** $p < .01$, ** $p < .05$, * $p < .1$

Table 16 shows the regression results based on Random Effect model of panel data of 13 commercial banks with 130 observations for the period of 2014 to 2023. The overall model performance is notable, with an R-squared is 0.4868, indicating that the model explains approximately 48.67% of the variability in ROA. The chi-square (χ^2) statistic is 127.5407 with highly significant p-value (Prob > χ^2) of 0.000, suggesting that the model is statistically significant (Hsiao, 2014).

Table 17. Breusch and Pagan Lagrangian Multiplier Test for ROE

	Var	sd=sqrt (Var)
ROE	42.1884	6.4953
E	14.2536	3.7754
U	3.3495	1.8302
Test: Var(u)=0	$\tilde{\chi}^2(01)=13.04$	Prob> $\tilde{\chi}^2=0.0002$

Table 17 presents result of the Breusch and Pagan Lagrangian Multiplier test. As per result test statistic for the random effects Var(u)=0 yields a chi-square bar ($\tilde{\chi}^2$) value of 13.04 and a p-value (Prob> $\tilde{\chi}^2$) of 0.0002, indicating that the panel model should be selected instead of the pooled model (Breusch & Pagan, 1980). After confirming that a panel model is appropriate, the next step is to determine whether the random effects or fixed effects model is more suitable. To make this decision, the Hausman Test is performed, as shown in Table 18, for further analysis.

Table 18. Hausman Test in ROE

ROE	(b) Fixed Effect	(B) Random Effect	(b-B) Difference	Sqrt(dia(v_b-V_B)) S.E
NPLR	-2.0502	-1.8997	-0.1505	0.0912
CAR	-0.3203	-0.2663	-0.0540	0.0797
LR	0.0904	0.0743	0.0162	0.1282
LDR	-0.2633	-0.2597	-0.0036	0.0489
CFR	-1.0385	-0.9487	-0.0898	0.0792
AWISR	1.9949	2.0863	-0.0914	0.1488
	$\chi^2 (6)=9.86$	Prob> $\chi^2=0.1308$		

Table 18 shows the Hausman Test results for Return on Equity (ROE). This test evaluates whether the Fixed Effects (FE) or Random Effects (RE) model is more appropriate for the given panel data. The chi-square $\chi^2(6)$ statistic for the Hausman test is 9.86, with a p-value (Prob> χ^2) of 0.1308. P-value is greater than the conventional threshold of 0.05, thus RE model is consistent cannot be rejected. Therefore, the RE model is more appropriate for data in this case (Hausman, 1978).

Table 19. Random Effect Regression for ROE

ROE	Coef.	St.Err.	t-value	p-value	Sig
NPLR	-1.8996	0.1694	-11.22	0.0000	***
CAR	-0.2663	0.1575	-1.69	0.0908	*
LR	0.0743	0.0581	1.28	0.2008	
LDR	-0.2597	0.0719	-3.61	0.0003	***
CFR	-0.9487	0.2127	-4.46	0.0000	***
AWISR	2.0863	0.6780	3.08	0.0020	***
Constant	39.2731	7.0184	5.60	0.0000	***
Overall r-squared		0.5967	Number of obs	130	

χ^2	201.1090	Prob > χ^2	0.0000
*** $p < .01$, ** $p < .05$, * $p < .1$			

Table 19 shows the regression results based on random effect model for panel data of 13 commercial banks with 130 observations for the period of 2014 to 2023. The overall model performance is suitable, with an R-squared is 0.5967, indicating that the model explains approximately 59.67% of the variability in ROA. The chi-square (χ^2) statistic is 201.1090 with highly significant p-value (Prob > χ^2) of 0.000, suggesting that the model is statistically significant (Hsiao, 2014).

Table 20. Breusch and Pagan Lagrangian Multiplier Test for NPM

	Var	sd=sqrt (Var)
NPM	156.4420	12.5077
E	57.3812	7.5750
U	25.4020	5.0400
Test: Var(u)=0	$\tilde{\chi}^2(01)=33.75$	Prob> $\tilde{\chi}^2=0.0000$

Table 20 presents result of the Breusch and Pagan Lagrangian Multiplier test. As per result test statistic for the random effects Var(u)=0 yields a chi-square bar ($\tilde{\chi}^2$) value of 33.75 and a p-value (Prob> $\tilde{\chi}^2$) of 0.0000, indicating that a panel model with random effects is more appropriate than a pooled model (Breusch & Pagan, 1980). After confirming that a panel model is appropriate, the next step is to determine whether the random effects or fixed effects model is more suitable. To make this decision, the Hausman Test is performed, as shown in Table 21, for further analysis.

Table 21. Hausman test in NPM

NPM	(b) Fixed Effect	(B) Random Effect	(b-B) Difference	Sqrt(dia(v_b-V_B)) S.E
NPLR	-3.1989	-2.6461	-0.5528	0.1077
CAR	0.2426	-0.1286	0.3713	0.0601
LR	0.5674	0.2573	0.3109	0.2401
LDR	-0.0674	-0.2088	0.1414	0.0752
CFR	-2.8405	-2.538725	-0.3018	-
AWISR	2.2914	2.0367	0.2546	-
	$\chi^2(6)=87.43$	Prob> $\chi^2 =0.0000$		

Table 21 displays the Hausman Test results for Net Profit Margin (NPM). The chi-square $\chi^2(6)$

statistic for the Hausman test is 87.43, with a p-value (Prob> χ^2) of 0.000. P-value is less than the conventional threshold of 0.05, thus RE model is rejected. Therefore, the FE model is more appropriate for data in this case. (Hausman, 1978).

Table 22. Fixed Effect Model Regression for NPM

NPM	Coef.	St.Err.	t-value	p-value	Sig
NPLR	-3.1989	0.3859	-8.29	0.0000	***
CAR	0.2426	0.3540	0.69	0.4946	
LR	0.5674	0.2823	2.01	0.0468	**
LDR	-0.0674	0.1745	-0.39	0.6997	
CFR	-2.8405	0.4553	-6.24	0.0000	***
AWISR	2.2914	1.3927	1.65	0.1027	
Constant	28.3464	18.4131	1.54	0.1265	
R-squared		0.5614	Number of obs	130	
F-test		23.6845	Prob > F	0.0000	

*** $p < .01$, ** $p < .05$, * $p < .1$

The overall model performance is notable, with an R-squared value of 0.5614, indicating that approximately 56 percent of the variability in NPM is explained by the variables in the model. The F-test further supports the model's robustness, with a highly significant p-value (Prob > F) of 0.0000. This suggests that suggesting that the model is statistically significant (Hsiao, 2014)

Conclusion

This study is based on the study of effect of credit risk on financial performance of commercial bank in Nepal. The study aims to evaluate the impact of credit risk management on the profitability or financial performance of Nepalese commercial banks. Specifically, it seeks to identify key credit risk indicators affecting financial performance, analyzing the decades' structure, pattern and trends in these indicators, evaluate the effects of credit risk fluctuations on financial performance, and determine the relationship between credit risk and financial performance metrics.

The study acknowledges several limitations: it focuses exclusively on commercial banks in Nepal, covering data from the past decade (2014-2023). Some banks have merged, affecting the data, and the reliance on secondary data from annual reports may not always reflect the actual financial position of the banks. Additionally, the study includes only three dependent variables (ROA, ROE, NPM) and six independent variables (NPLR, CAR, LR, LDR, CFR, AWISR), and it examines data from only thirteen of the twenty Nepali commercial banks. The study uses secondary data sourced from the audited annual reports of 13 Nepalese commercial banks, covering the period from 2014 to 2023.

Descriptive statistics, including mean and standard deviation, provide a summary of the data. Pearson's correlation analysis measures the strength of linear relationships between variables. Panel data analysis is utilized to account for both cross-sectional and time-series dimensions, enhancing the accuracy and depth of the findings. Fixed and random effect models are applied to analyze the effects of variables that change over time and assess individual bank differences. The Hausman test is conducted to determine the most suitable model for the data analysis.

The correlation and regression analyses reveal that Non-Performing Loans (NPLR) and the Cost of Funds Ratio (CFR) consistently have a negative impact on the financial performance of banks, significantly reducing Return on Assets (ROA), Return on Equity (ROE), and Net Profit Margin (NPM). Higher Loan-to-Deposit Ratios (LDR) also negatively affect profitability, particularly ROA and ROE.

Conversely, the Average Weighted Interest Spread Rate (AWISR) positively influences ROA and ROE, though its effect on NPM is less pronounced. Liquidity management, measured by the Liquidity Ratio (LR), has a positive correlation with ROE and NPM, suggesting that better liquidity can enhance profitability, but its effect on ROA is

minimal. The Capital Adequacy Ratio (CAR) shows mixed results, with a positive influence on ROA but little to no impact on ROE and NPM.

In conclusion, it is crucial for commercial banks in Nepal and policymakers to prioritize effective credit risk management as a key driver of financial performance. With the Non-Performing Loan Ratio (NPLR) significantly impacting profitability, banks must enhance their risk assessment and mitigation strategies to reduce the burden of non-performing loans. Additionally, controlling the Cost of Funds (CFR) is vital to maintaining healthy profit margins, while leveraging the benefits of a favorable Average Weighted Interest Spread Rate (AWISR) can improve returns on assets and equity. Liquidity management should also be a focus, as maintaining optimal liquidity ratios positively influences equity returns and profit margins. Policymakers should ensure that capital adequacy requirements strike a balance between financial stability and profitability, avoiding excessive capital constraints that may hinder returns. Lastly, a careful approach to the Loan-to-Deposit Ratio (LDR) is necessary to prevent profitability erosion, emphasizing the importance of balanced growth in loan portfolios relative to deposits.

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Appendices

Principle indicators of 13 Nepalese commercial banks from 2014 to 2023

S.N	Bank	Year	ROA	ROE	NPM	NPLR	CAR	LR	LDR	CFR	AWISR
1	CBL	2014	1.71	18.09	17.81	3.4	12.99	0.82	82.87	5.37	4.99
2	CBL	2015	1.95	19.26	23.17	1.53	13.27	0.92	81.6	4.6	4.22
3	CBL	2016	2.24	20.36	27.31	1.38	12.4	0.89	85.59	4.38	3.96
4	CBL	2017	1.8	11.52	19.36	2.02	16.88	1.12	91.89	6.32	3.19
5	CBL	2018	1.72	11.2	15.41	1.48	13.84	1.16	92.75	8.15	3.84
6	CBL	2019	1.62	11.71	15.2	1.13	14.37	1.09	88.76	7.67	3.15
7	CBL	2020	1.08	8.93	11.28	1.55	15.14	1.12	89.56	6.9	4.03
8	CBL	2021	1.29	11.17	14.59	1.64	13.7	1.01	87.52	4.89	3.59
9	CBL	2022	1.11	10.21	11.47	2.22	12.69	1.01	89.08	6.44	4.25
10	CBL	2023	0.95	9.01	8.51	3.39	12.12	0.92	85.55	8.47	4
11	GBL	2014	1.62	19.57	41.05	2.55	12.38	31.11	82.27	4.74	5.34
12	GBL	2015	1.39	15.58	30.32	2.23	12.69	30.12	83.47	4.21	4.11
13	GBL	2016	1.58	19.33	35.03	1.89	12.35	35.14	81.47	3.06	4.52
14	GBL	2017	1.75	25.51	43.41	1.6	11.37	33.54	79.3	4.24	3.36
15	GBL	2018	1.67	23.64	41.24	0.77	11.47	25.34	84.7	7.26	4.86
16	GBL	2019	1.82	18.47	40.72	0.55	12.31	22.13	91.62	7.18	4.47
17	GBL	2020	1.06	12.88	28.44	1.74	12.48	24.58	88.25	6.99	4.43
18	GBL	2021	1.21	13.53	34.85	1.41	13.2	29.89	85.59	4.92	4.51
19	GBL	2022	1.38	13.93	38.03	1.28	12.67	23.55	94.99	6.59	4.26
20	GBL	2023	1.3	14.19	33.71	3.15	13.34	30.34	85.21	8.3	4.66
21	HBL	2014	1.3	16.85	26.65	1.96	11.23	37.52	71.82	3.48	4.54
22	HBL	2015	1.34	17.06	23.08	3.22	11.14	30.32	75.37	2.66	4.35
23	HBL	2016	1.94	24.53	42.89	1.23	10.84	28.74	79.12	1.79	4.59
24	HBL	2017	2.19	21.58	40.93	0.85	12.15	26.64	85.1	3.52	4.44
25	HBL	2018	1.67	14.17	26.15	1.4	12.46	23.05	88.31	5.61	4.7
26	HBL	2019	2.21	18.34	32.64	1.12	12.6	26.25	87.37	6.13	4.47
27	HBL	2020	1.79	15.4	28.06	1.01	14.89	31.39	82.31	5.77	3.77
28	HBL	2021	1.68	14.89	33.68	0.48	13.89	26.51	89.87	4.42	3.32
29	HBL	2022	1.09	10.76	19.69	1.59	11.75	23.48	92.14	6.59	4.02
30	HBL	2023	0.47	4.65	7.26	4.79	12.31	27.38	88.64	7.92	4.79
31	EBL	2014	2.25	17.14	26.63	0.97	11.31	16.91	75.06	3.61	5.69
32	EBL	2015	1.85	23.25	72.2	0.66	13.33	24.27	69.47	2.52	4.76
33	EBL	2016	1.59	17.79	29.75	0.38	12.66	16.61	76.24	1.93	4.89
34	EBL	2017	1.83	15.28	26.75	0.25	14.69	16.52	76.94	3.13	4.89
35	EBL	2018	1.97	16	22.77	0.2	14.2	17.75	75.98	4.45	4.72
36	EBL	2019	1.94	17.41	21.13	0.16	13.74	18.58	87.01	5.53	4.29
37	EBL	2020	1.42	13.53	16.25	0.22	13.38	14.43	83.52	5.93	3.59
38	EBL	2021	0.89	12.11	13.54	0.12	12.48	18.15	85.3	4.62	3.24
39	EBL	2022	1.13	10.77	14.29	0.12	11.89	6.5	90.77	5.79	4.06
40	EBL	2023	1.41	13.25	13.99	0.79	13.3	7.11	85.7	7.39	3.97

41	KBL	2014	1.1	18.69	29.29	4.03	11.81	13.62	82.7	5.67	3.71
42	KBL	2015	1.06	16.24	32.27	2.49	10.84	7.48	81	4.47	3.17
43	KBL	2016	1.69	26.53	47.29	1.15	11.69	8.74	79.34	4	3.59
44	KBL	2017	1.29	13.29	42.58	1.86	14.5	10.33	87.6	4.51	3.26
45	KBL	2018	1.26	14.54	38.9	1.05	13.36	6.85	89.55	6.85	3.12
46	KBL	2019	1.17	10.5	12.4	1.01	11.75	4.59	90.11	7.3	3.54
47	KBL	2020	0.76	6.71	10.08	1.39	15.35	3.78	92.19	5.64	4.07
48	KBL	2021	1.04	10.43	13.64	0.96	13.71	3.72	90.99	4.79	3.13
49	KBL	2022	1.22	12.28	12.74	1.11	12.63	3.78	86.58	6.63	4.07
50	KBL	2023	0.14	1.47	1.42	4.96	12.11	4.1	86.03	7.03	4.98
51	MBL	2014	1.12	31.4	13.66	1.78	10.63	26.28	79.56	4.63	4.97
52	MBL	2015	1.26	25.4	16.65	0.64	12.24	27.63	78.77	3.97	4.65
53	MBL	2016	1.51	27.15	21.96	0.55	12.36	24.52	84.59	3.13	4.59
54	MBL	2017	1.89	15	21.96	0.38	16.82	26.29	88.47	4.76	4.27
55	MBL	2018	1.47	13.22	14.81	0.44	15.36	25.26	89.78	6.93	4.75
56	MBL	2019	1.61	12.53	14.86	0.37	23.7	23.7	87	7.16	4.27
57	MBL	2020	1.02	14.71	9.99	0.52	23.83	23.83	88.56	7.02	4.36
58	MBL	2021	1.02	21.68	12.6	0.62	27.08	27.08	86.53	4.91	3.82
59	MBL	2022	0.94	15.45	9.96	1.04	21.4	21.4	86.32	6.74	4.33
60	MBL	2023	0.87	14.63	7.73	2.26	29.43	29.43	81.35	8.79	3.95
61	NBL	2014	2.89	27.97	33.65	2.23	11.24	11.32	74.55	2.69	5.03
62	NBL	2015	2.06	22.23	29.93	1.82	11.57	14.15	64.43	2.56	3.97
63	NBL	2016	2.32	25.61	37.3	1.14	11.73	6.77	70.49	1.65	3.74
64	NBL	2017	2.69	22.41	39.22	0.8	12.42	10.02	65.38	2.15	4.32
65	NBL	2018	2.61	20.94	31.12	0.55	13	10.05	82.66	4.04	4.48
66	NBL	2019	2.11	17.76	24.25	0.74	12.5	4.78	81.96	4.96	4.19
67	NBL	2020	1.58	13.61	18.55	0.98	13.07	11.2	79.72	5.39	3.51
68	NBL	2021	1.71	15.19	21.72	0.84	12.77	3.66	89.84	4.35	3.31
69	NBL	2022	1.2	9.78	16.15	1.62	13.09	4.13	92.49	5.77	2.75
70	NBL	2023	1.42	11.66	12.65	3.39	12.54	6.89	84.19	7.84	3.8
71	NIC	2014	1.71	15.93	37.14	0.68	14.05	28.68	82.93	5.99	4.46
72	NIC	2015	1.21	13.05	32.36	0.41	12.49	28.91	81.03	5.12	3.19
73	NIC	2016	1.51	16.5	40.83	0.11	12.44	23.79	85.62	4.41	3.36
74	NIC	2017	1.64	16.84	42.91	0.04	13.83	25.8	83.7	5.61	3.49
75	NIC	2018	0.97	12.09	24.91	0.09	12.24	24.45	86.3	6.53	3.6
76	NIC	2019	1.56	22.63	31.8	0.23	13.32	26.05	84.55	6.71	5.02
77	NIC	2020	1.32	19.26	29	0.27	13.5	27.09	85.75	6.21	4.18
78	NIC	2021	1.09	17.09	28.7	0.24	12.47	20.65	87.58	4.81	3.25
79	NIC	2022	1.2	18.43	30.5	0.07	13.38	20.3	89.85	7.41	3.41
80	NIC	2023	1.23	16.39	29.58	0.11	13.26	22.23	86.17	8.39	4.28
81	NMB	2014	1.41	15.41	16.34	0.55	10.75	13.72	76.73	4.49	4.11
82	NMB	2015	1.17	16.08	18.42	0.42	11.13	13.32	75.32	3.63	4.19
83	NMB	2016	1.54	17.01	20.9	1.81	10.98	10.81	84.07	3.08	4.31
84	NMB	2017	1.77	14.82	20.52	1.68	13.61	7.72	85.5	4.71	3.89
85	NMB	2018	1.64	11.24	18.09	0.88	15.75	6.68	90.46	6.76	3.45

86	NMB	2019	1.83	13.32	18.06	0.82	15.45	4.19	87.71	6.58	4.26
87	NMB	2020	1.09	8.94	11.94	2.68	15.08	5.93	86.31	6.3	4.05
88	NMB	2021	1.32	1.08	17.45	2.27	15.08	5.66	86.51	4.64	3.09
89	NMB	2022	1.35	12.95	15.25	1.45	13.59	5.33	85.55	6.26	4.05
90	NMB	2023	1.19	11.65	11.74	2.75	13.33	5.63	82.36	8.01	3.99
91	PVU	2014	-1.44	-26.88	-33.33	24.29	8.68	19.27	69.23	5.73	4.46
92	PVU	2015	2.19	27.57	53.79	7.33	10.61	15.69	70.43	3.02	4.84
93	PVU	2016	1.64	17	44.26	8.83	12.29	12.13	79.11	2.66	5.09
94	PVU	2017	1.76	19.29	47.78	4.55	11.18	12.13	76.19	3.64	5.09
95	PVU	2018	0.86	7.69	25.69	3.98	11.85	6.83	81.04	5.58	4.72
96	PVU	2019	1.29	12.45	31.77	3.36	11.16	4.39	87.94	11.6	4.7
97	PVU	2020	0.71	7.76	20.11	3.15	11.18	3.15	78.26	11.04	3.57
98	PVU	2021	0.8	10.06	11.7	1.68	13.08	1.68	83.95	9.05	3.65
99	PVU	2022	0.82	9.93	10.06	1.86	12.86	1.86	81.38	11.71	4.32
100	PVU	2023	0.08	0.89	0.87	4.98	11.87	4.98	81	12.77	4.86
101	SMB	2014	1.46	15.09	18.67	0.017	12.54	26.68	82.9	4.66	4.01
102	SMB	2015	1.55	18.19	26.63	0.07	11.08	22.32	83.97	3.94	3.83
103	SMB	2016	1.78	22.69	26.63	0.019	12.36	24.24	88.1	3.1	4.63
104	SMB	2017	1.86	14.39	22.84	0.01	15.57	26.08	89.03	4.79	4.26
105	SMB	2018	1.85	15.74	18.55	0.03	12.41	24.72	87.43	6.4	4.2
106	SMB	2019	2.01	23.2	18.86	0.08	13.19	22.87	90.42	6.96	4.35
107	SMB	2020	1.41	16.09	14.04	0.45	13	24.01	85.1	6.58	3.47
108	SMB	2021	1.44	18.57	19.13	0.12	13.57	22.15	94.1	4.49	3.37
109	SMB	2022	1.09	14.13	12.79	0.33	13.66	27.07	89.18	6.16	3.86
110	SMB	2023	1.21	15.54	11.34	1.31	14.42	30.01	83.8	8.26	4
111	SBL	2014	2.5	14.03	19.72	2.75	11.39	17.22	79.02	5.28	4.65
112	SBL	2015	2.06	20.29	19.83	1.8	11.1	8.63	83.04	4.63	3.86
113	SBL	2016	2.22	19.01	26.28	1.47	11.25	6	87.02	3.62	4.16
114	SBL	2017	1.53	14.89	18.61	1.3	12.74	8.86	88.4	5.57	3.49
115	SBL	2018	1.59	15.34	16.7	1.09	12.12	6.37	86.08	7.33	3.53
116	SBL	2019	1.49	15.71	15.49	0.75	12.7	4.56	89.65	7.32	3.72
117	SBL	2020	1.26	13.81	12.48	1.38	13.17	5.03	89.04	7.28	4.81
118	SBL	2021	1.25	15.68	15.77	1	13.36	3.54	90.6	5.54	3.7
119	SBL	2022	1.1	13.82	12.53	1.07	13	3.23	96.08	6.73	4.37
120	SBL	2023	1.11	13.5	10.59	2.01	12.47	4.06	84.94	8.49	3.99
121	SBI	2014	1.52	22.85	19.97	0.26	13.28	9.32	65.54	4.02	3.45
122	SBI	2015	1.64	17.08	21.36	0.19	14.03	10.92	78.39	3.37	3.85
123	SBI	2016	1.59	17.46	25.56	0.14	13.49	8.33	72.9	2.22	4
124	SBI	2017	1.57	14.87	22.38	0.1	15.71	10.04	78.07	3.4	3.68
125	SBI	2018	1.97	15.81	19.87	0.2	15.15	7.18	89.6	5.6	4.99
126	SBI	2019	1.94	16.2	18.33	0.2	14.12	6.65	90.52	6.49	4.43
127	SBI	2020	1.17	10.44	12.33	0.23	15.55	8.89	85.5	6.4	3.87
128	SBI	2021	0.7	6.26	9.3	0.23	13.86	3.22	95.58	5.13	3.18
129	SBI	2022	1.07	9.57	17.07	0.15	13.25	3.05	92.37	6.08	4.36
130	SBI	2023	1.06	10.77	14.32	2.43	12.58	4.06	81.42	7.38	3.99