Global Scientific JOURNALS

GSJ: Volume 12, Issue 3, March 2024, Online: ISSN 2320-9186
www.globalscientificjournal.com

Credit Risk and Profitability: A Case of Nepalese Commercial Banks

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Abstract

A bank's profitability is the most crucial factor for sustainability, which is affected by plethora of factors. This study has investigated if credit risk is one of the factors affecting profitability. Credit risk is measured by Non-performing Loan (NPL), Capital Adequacy Ratio (CAR), Credit to Deposit Rate (CDR) with control variables Bank size and Net Interest Margin (NIM), whereas, profitability measures undertaken are Return on Assets (ROA) and Return on Equity (ROE). This article uses secondary data of 14 commercial banks of Nepal from 2008 to 2021 A.D. The findings are based on random effect model. The result explains positive significant but negligible influence of NPL, which contradicts with previous researches. It could be due to improving credit collection and monitoring system and/or restructuring facilities. CAR and CDR have negative influence on ROA and ROE, however, CAR is insignificant to ROA. Besides, bank size has positive effect on profitability, but not significant for ROE, indicating that size of bank doesn't significantly influence return to shareholders. On the other hand, NIM influences profitability positively. Overall, it is concluded that credit risk has significant effect on profitability.

Keywords: *Bank, Credit, Credit Risk, Profitability, Risk management, Bankruptcy.*

I. Introduction

Financial institutions, especially banks are the depository institutions which function primarily as intermediary by collecting deposits from the public and lending money to the needy parties. Banks need to maintain their profitability for long-term sustainability. However, there are multiple factors affecting profitability. Lending the fund collected from the public is one of the major sources of banks' income meanwhile; this exposes them to the different array of risks (Boahene, Dasah & Agyei, 2012). Risk is an inevitable part of banking business, which cannot be uprooted, however, can be minimized through proper measurement and risk management strategy (Amidu & Hinson, 2006). Among the risks encountered by the banks, credit risk is the most prominent one (Maharjan, 2020) as it is relatively costlier which can lead to bankruptcy (Chijoriga, 1997).

In simple terms, credit risk refers to the failure by a counterparty or borrower to meet the credit obligation (principal and/or interest), which could result in financial loss and hence, negatively impact the bank's financial performance or soundness (Li & Zou, 2014; Bhattarai, 2016; Nepal Rastra Bank, 2018). Basel Committee on Banking Supervision (1999) has also pointed out that loans are the major sources of credit risk. As credit risk is inherited in Loans and advances, it is an integral part of banking business. In the first place, banks will not lend money to those parties who have possibility of payment failure or simply who cannot repay debt. Despite adopting various measures, there may be unprecedented number of borrowers who may default to pay, thus banks always hold the additional risk of profit variability (Onyiriuba, 2009).

The global financial crisis 2007/08, which caused a devastating economic situation worldwide, is an instance of extent of loss which occurs in case of poor credit risk management. This crisis pointed out that the practices being adopted for the risk management and capital are not adequate to protect the banks from huge unexpected loss (Hosna, Manzura & Juanjuan, 2009). This also proved the extent of loss from credit risk. When credit becomes default, it largely causes the financial loss because higher the unpaid loans, lower will be the returns (Gestel & Baesens, 2009). Generally, an increase in credit risk initially creates liquidity problem followed by bank run and bankruptcy. Thus, the

financial success of the bank depends on how well credit risk is managed (Giesecke, 2004). In other words, the failure of banks to track credit risk affects their financial performance (Boahene, et al., 2012).

Regarding the measurement of credit risk, Brownbridge (1998), pointed that effective quantitative models are essential to quantify key default risk indicators, identify cost of default risk, screen out bad loan applicants, and evaluate the reserve fund required for any loss. Furthermore, a prudent credit risk management promotes systemic stability and the efficient use of capital in the economy along with increasing profitability and sustainability of banks (Psillaki, Tsolas & Margaritis, 2010).

As per BASEL framework, a proper credit risk management requires a holistic procedure as it initiates from appropriate organizational structure, formulating credit risk strategies, policies, and procedures, setting credit limits and indicators, defining credit granting process, till credit risk monitoring and recovery. This holistic approach is crucial to ensure the financial soundness of the banks (Risk Management Guidelines, NRB).

Various studies are conducted to assess the impact of credit risk on bank's performance. Capital Adequacy Ratio (CAR) and Non-performing loan (NPL) are two the key indicators to measure credit risk and assess the financial system soundness (Bhawani & Bhanumurthy, 2012). Bhattarai (2016) had pointed Non-performing loan (NPL) and cost per loan assets as major credit risk measure. Tuladhar (2017) have included more credit risk variables: CAR, liquidity ratio (credit to deposit ratio CDR), NPL, bank size, coverage ratio, cash reserve ratio, leverage ratio, assets quality and number of female board member. These studies have concluded that controlling NPL with adequate capital fund to support any unfortunate event and maintaining appropriate credit ratio (which neither affects liquidity nor hinders optimum earning capacity) are crucial for ensuring better profitability.

Research Gap and Contribution

Nepalese banking industries do not have a long history of development. The establishment of the central bank, Nepal Rastra Bank, in 1956 formalized the Nepalese financial system. The banking growth remained stagnant until the government introduced privatization and economic liberalization in 1980s which paved the way for private banks. Since then, there was tremendous growth in the number of financial institutions: Total 220 financial institutions (Nepal Rastra Bank, 2022), however, the financial position of those institutions was not strong. Then, NRB focused on reducing the number of banks and strengthening their financial position.

In Nepal, the majority portion of financial system is dominated by commercial banks, so failure or instability of these banks can impede the sound financial system of the country and also affect the nation's economic growth (Bank, 2012-16). Bhattarai (2016) states that poor credit standards, lack of credit diversification, and unpredictable macroeconomic variables had enhanced credit risk in the past. In recent days, NRB has adopted various measures such as: increasing capital requirement, facilitating merger and acquisition, prudent micro and macro regulation, complete risk management guidelines, in order to eliminate unhealthy competition among banks, minimize the negative effects of lending and improve bank performance. More prudent regulations and directives are issued by NRB to strengthen the Nepalese financial system, so, those should be implemented strictly.

All these efforts from the central bank indicate that credit risk affects performance of commercial banks. So, this article is additional evidence to this notion. Similarly, there always lies the unprecedented number of default risk, so,

there is always a gap in the study in terms of time period and undertaken variables. The findings of this study will help the management understand nature and significance of credit risk influence on profitability.

II. Literature Review

There are lots of studies conducted till today related to the banking performance and banking risks. Credit risk possesses serious threat to the bank's profitability because majority income is received through credit. A bank's performance and failure are primarily thought to be influenced by credit risk, mostly because of the bank's restricted ability to absorb losses from poor loans (Al-Tamimi & Al-Mazoorei, 2007; Boffey & Robson, 1995).

In Nigeria, Ogboi and Unuafe (2013) investigated using data from 2004 to 2009 with credit risk variables: loan loss provisions, loans and advances, non-performing loan, capital adequacy ratio and ROA as profitability variable. The result suggests an inverse relationship between loans and advances and profitability (ROA), whereas positive relationship was observed between other credit risk variables and profitability.

Adeusi, Akeke, Adebisi and Oladunjoye (2014) undertook ROA & ROE as major profitability indicators and cost of bad and doubtful loans, non-performing loans, liquidity, equity-total assets ratio, equity-loan ratio and debt-equity ratio as credit risk variables with data from 2006 to 2009. This study found that cost of bad and doubtful loan has inverse and capital assets ratio has positive relationship with performance of Nigerian banks.

However, Li and Zou (2014) studied in 47 banks in European countries from 2007 to 2012 credit risk indicators: CAR and NPL, bank size as control variable and profitability: ROA & ROE. NPL has negative significant relation with profitability, whereas, no significant relation was found between CAR and profitability. This study also concluded that proper credit risk management enhances bank's profitability.

When Bhattarai (2016) examined 14 Nepalese commercial banks' data from 2010 to 2015 with credit risk variables: capital adequacy ratio, non performing loan ratio, cost per loan assets, cash reserve ratio, and bank size, and ROA as profitability ratio, the regression analysis showed that there is poor credit risk management in Nepal because capital adequacy ratio and cash reserve ratio have no impact on ROA, whereas, NPL affects negatively and cost per loan assets affects positively. Overall, significant relationship between credit risk and profitability was evident. Similar result, i.e. negative relation was evident between credit risk (capital adequacy ratio, NPL, loan loss provision) and profitability (net profit margin, ROA, ROE) along with the negative impact of macroeconomic variable, when taken as control variables (Rwayitare et al., 2016).

However, some studies have contradictory results. For instance: Alshatti (2015) studied in the banks of Jordan which found that NPL has positive significant effect on ROA & ROE, but found no effect of capital adequacy ratio, credit interest ratio with data of 13 commercial banks from 2005 to 2013. Similarly, Saeed and Zahid (2016) found a positive relationship credit risk (impairments and NPLs) and profitability (ROA & ROE) in United Kingdom. Hamza (2017) concluded no significant effect of NPL on ROE but significant effect of other credit risk (CAR, loan loss provision, loans and advances liquidity ratio and non-performing loan ratio) on profitability (ROA and ROE).

Tuladhar (2017) incorporated CAR, liquidity ratio (CDR), bank size, assets quality, leverage ratio, non-performing loan, cash reserve ratio, coverage ratio and number of female board member as credit risk management variables and ROA and ROE as profitability measure and concluded that credit risk management has significant impact on

profitability. Liquidity ratio, assets quality, and cash reserve ratio are insignificant and rests are significant. Positive relation was evident among coverage ratio, capital adequacy ratio, bank size and profitability, whereas, leverage ratio, NPL and female board member have negative effect. Ekicni and Poyraz (2019) also found negative impact of credit risk (NPL) on profitability (ROA & ROE) with 26 Turkish commercial banks' data dated 2005 to 2017. This article also suggested focusing on credit risk management techniques especially, in monitoring and controlling NPL.

In a study by Pradhan (2019), it was concluded that default of payment by the counterparty is the prime cause of credit risk. Humagain (2019) studied the relation between credit risk and growth of the commercial banks' assets. The study found that NPL is negative significant, CDR is positive, CAR is significant but loan loss provision has no significant association with the growth of Nepalese commercial banks. The author further suggests to manage NPL at lowest possible to mitigate its effect.

Maharjan (2020) had investigated about credit risk and profitability of five banks of Nepal from 2007/08 to 2016/17 with independent variables: capital adequacy ratio, non-performing loan, loans and advances to deposit ratio, loan loss provision ratio and profitability measures: ROA & ROE. This study concludes that NPL has inverse but insignificant impact on profitability however, CAR and loan loss provision have positive significant impact. In India, Jain and R (2021) found negative significant relationship between non-performing assets and ROE, but insignificant relation between CAR and ROE.

Kwashie, Baidoo & Ayesu (2022) studied impact of credit risk on financial performance (measured by ROA and economic value added) of 15 commercial banks in Ghana from 2013 to 2018. The article had undertaken NPL, CAR, loans and advances as credit risk variables and bank size, bank's age, GDP, inflation, monetary policy rate as control variables. The result found that NPL negative significant, CAR and loans and advances ratio have positive effect on bank's performance.

In recent times, Net Interest Income (NII) is considered as one of the major components of bank's income (Lartey, Antwi, & Boadi, 2013), so, poor assets quality has a negative impact on bank's profitability. Most of the studies have identified Net Interest Margin (NIM) as one of the major profitability indicators for banks; however, it is not same as profitability (Goldberg and Rai, 1996: Hassan and Bashir, 2003; Heffernan & Fu, 2008). Puspitasari, Sudiyatno, Hartoto & Widati (2021) found a positive significant effect on ROA, indicating that increase in NIM increases ROA. Similarly, as interest income is one of the major sources of income and also an empirical study by Lartey, et al. (2013) pointed that NIM has strong positive significant impact on ROA, where NIM has 82.6% explanation capacity on ROA. This gives a reason for suitability of using NIM as a variable affecting ROA. So, NIM is also taken as a control variable in this study.

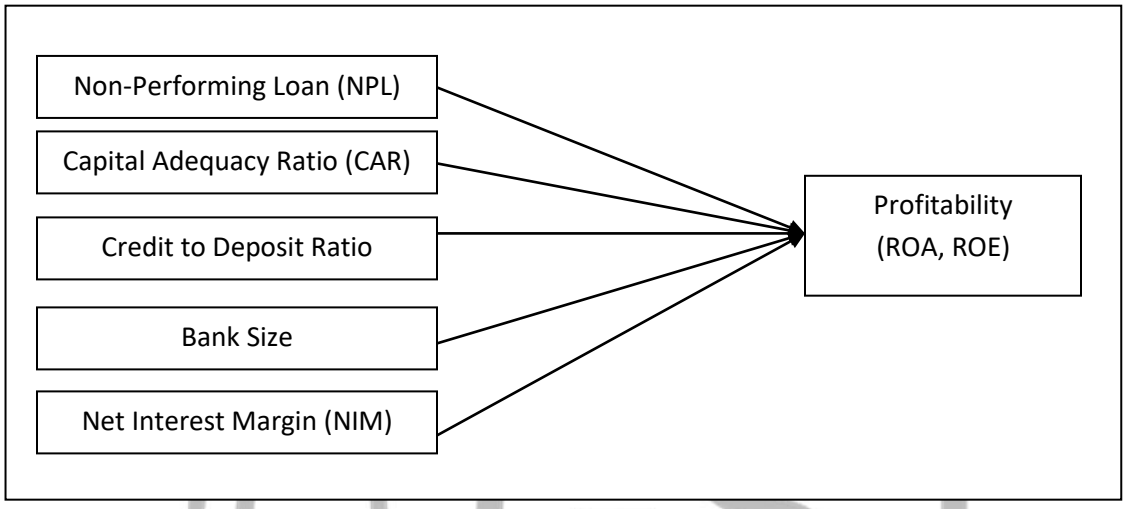
Overall, ROA and ROE are the standard measures of profitability which is affected by multiple factors. For credit risk, the most previously used variables were NPL and CAR and also loan ratio. Bank size is the prominent control variable used for profitability study.

III. Research Framework

Based on previous studies, this study incorporates ROA and ROE as major profitability measures. Similarly, major credit risk indicators are: Non-performing Loan (NPL), Capital Adequacy Ratio (CAR), Credit to Deposit ratio (CDR), and control variables: bank size and Net Interest Margin (NIM). So, the research framework for this study is as follows:

Figure: 1

Research Framework



Note: Lartey, et al. (2013); Tuladhar (2017)

Definition of Variables:

1. **Non-Performing Loan (NPL):** Here, NPL indicates NPL ratio**.** NPL is an indicator of assets quality. It is the unproductive assets of bank. NPL refers to the failure of counterparty to payback the borrowed principal and/or interest (Bhattarai, 2016). It is one of the major credit risk indicators because higher NPL means bank's credit lending or collection policy is not strong, which eventually affects profitability. The credit flow in the economy is regulated by the central bank through monetary policy. Generally, loans are sanctioned to clients with an expectation that principal and interest amount will be paid on time. If it happens so, it is called Performing Loan, otherwise its Non-performing loan (NPL).

   As per the Unified directives issued by NRB to banks and financial institutions, bank loans are broadly classified as Performing loan and Non-performing loan. Non-performing loans are further classified as follows:

   - Sub-standard loan: Loan which is overdue from 3 to 6 month is sub-standard loan. The banks shall provision 25% of loans and advances outstanding.
   - Doubtful loan: Loan which is overdue from 6 months to 1 year is doubtful loan. The banks shall provision 50%.
   - Loan loss: Loan which is overdue by 1 year is loan loss. The banks shall provision 100%. This loan shall be recovered right away because it may turn into bad loan, which directly affects the bank's performance.

Mathematically,

$$NPL\ ratio = \frac{Non - Performing\ Loan}{Total\ Loan}$$

Despite adopting strong credit lending and monitoring policy, there remains risk of overdue loan, so, it is prime credit risk indicator. Previous studies have concluded negative relationship between NPL and ROA (Bhattarai, 2016; Kwashie, et al., 2022; Tuladhar, 2017), whereas some studies have evident positive relation.

2. **Capital Adequacy Ratio (CAR):** CAR is the ratio between capital and risk-weighted assets (Poudel, 2012). Certain weight is assigned to the assets of the bank based on their risk exposure as given by the BASEL accord. This ratio ensures that the bank holds enough capital which could work as a cushion when any unexpected loss occurs and hence prevent from failure or encourage profitability (Tuladhar, 2017). This is a statutory requirement which must be maintained by all banks. Theoretically, CAR has direct influence in bank's performance (Dahal & Dahal, 2002), however, empirically Bhattarai (2016) found no significant relation between CAR and profitability.

   Mathematically,

$$CAR = \frac{Capital\ Fund}{Risk\ Weighted\ Assets}$$

3. **Credit to Deposit Ratio (CDR):** CDR is the ratio of loans and advances and deposit. This is a liquidity measure where low ratio indicates that banks are not lending much and hence losing opportunity to capitalize fund in the profitable areas, whereas, higher ratio indicate the risk of loss due to inability to meet the regular fund needs. There shall be trade-off between profitability and liquidity to create win-win situation where firms will earn enough profit to satisfy shareholders and meanwhile make depositors able to withdraw their money whenever they ask for it (Puspitasari, et al., 2021). Some article has found positive impact of CDR on profitability (Abdelrahim, 2013), and some articles have found negative impact (Adeusi et al., 2014; Ogboi & Unuafe, 2013).

   Mathematically:

$$CD = \frac{Total\ Credit}{Total\ Deposit}$$

4. **Bank Size:** Bank size is the natural logarithm of total assets and mostly used as control variable in bank performance study. Bank size is an important factor as large bank size indicates economies of scale as expansion of products and risk diversification is facilitated (Lehar, 2005). Studies have shown that there is positive impact of bank size on performance indicating that larger size has better performance (Bhattarai, 2016; Kwashie, et al., 2022) whereas, Abdelrahim (2013) concluded negative influence.

   Mathematically,

$$Bank\ size = Natural\ Logarithm\ of\ Total\ Assets$$

5. **Net Interest Margin (NIM):** NIM is the difference between interest income and interest expense relative to the interest earning assets. NIM is one of the profitability measures of bank. In a study by Lartey, et al., (2013), they found that NIM holds strong positive effect of ROA. Similar result was evident by Sunaryo (2020). Furthermore, Puspitasari et al. (2021) had highlighted that NIM plays a moderating role by strengthening the effect of CDR and loan ratio on ROA. This leads to consider NIM as a control variable since ignoring it may not provide true effect. No previous studies related to credit risk or profitability has used this variable.

Mathematically,

$$NIM = \frac{Interest\ Income - Income\ Expenses}{Total\ Earning\ Assets}$$

6. **Profitability Measure:** Making maximum possible profit using the available assets is one of the prime objectives of commercial banks (Duffie & Singleton, 2012). ROA, ROE and net profit margin are the important measures of profitability (Brealey, Myers, Allen and Mohanty, 2012). Return on Assets (ROA) is the ratio of net profit and total assets of the firm. In other words, it indicates the bank's ability to generate profit from utilizing its available assets. ROE is another profitability measure which measures the efficiency of management to generate net profit by utilizing shareholder's wealth. ROA and ROE are the most popular measures of profitability as they are free from financial leverage and the risk associated with the same (Tuladhar, 2017). So, both ROA & ROE are taken as profitability indicator in this study.

   Mathematically,

$$ROA = \frac{Net\ Profit}{Total\ Assets}$$

$$ROE = \frac{Net\ Profit}{Shareholders' equity}$$

IV. Methodology

1. Research Design

This study is descriptive and analytical research design because it collects data from the annual report of banks and database of Nepal Rastra Bank, and uses statistical tools for data analysis. In other words, this is also quantitative and positivistic research design.

2. Nature and Sources of Data

This article uses secondary data. Actually it is a panel data analysis because it involves cross-sectional data (15 commercial banks of Nepal) and time-series data (from 2065 to 2078 B.S). It means total 210 data is undertaken for the study. The data are retrieved from the published annual reports of the selected commercial banks. Since the merger and acquisition is encouraged by NRB, there are only 17 commercial banks till the date this article is written. As the banks have consolidated financial statement after merger and acquisition, including them may cause outlier, due to which the study period is confined to 2078 B.S.

3. Method of Data Analysis

There are major two methods of Panel data regression analysis:

- Pooled Ordinary Least Square (OLS)
- Generalized Least Square (GLS): Fixed Effect model or Random effect model.

Breush-Pagan test is conducted to identify if pooled OLS or GLS is suitable. In BP test, if p-value>0.05, we reject null hypothesis which means GLS is appropriate.

Further in between Fixed effect or Random effect model, Hausman test is conducted where p-value<0.05 supports random effect model. This article has used E-views 12 student version for data analysis.

The models for this study are:

$$ROA = \beta_0 + \beta_1 NPL_{it} + \beta_2 CAR_{it} + \beta_3 CDR_{it} + \beta_4 BANK\ SIZE_{it} + \beta_5 NIM_{it} + \varepsilon_{it} \ldots\ldots\ldots\ldots \text{(i)}$$

$$ROE = \beta_0 + \beta_1 NPL_{it} + \beta_2 CAR_{it} + \beta_3 CDR_{it} + \beta_4 BANK\ SIZE_{it} + \beta_5 NIM_{it} + \varepsilon_{it} \ldots\ldots\ldots\ldots\text{(ii)}$$

Where,

i= no. of commercial banks
t= no. of years
β_0= coefficient of parameters
ε = error terms

V. Results and Analysis

Table 1
Descriptive Statistics

Variables	Mean	Median	Standard Deviation	Minimum	Maximum
ROA	1.5484	1.505	0.6516	0.05	5.48
ROE	17.0294	15.695	8.3731	0.5	72.8
NPL	1.3037	0.945	1.4951	0	16.4
CAR	13.151	12.425	2.8502	9.61	33.96
CDR	80.4736	82.885	10.6596	38.7	96.69
BANK SIZE	24.6731	24.7466	0.8989	22.0685	26.57
NIM	3.0216	3.0214	0.6254	0.9354	4.80

Note: Output of E-views 8 from collected data

The above table represents the descriptive statistics of 15 commercial banks from 2065 (2008) to 2078 B.S. (2021) The average ROA is 1.5484% which means in average commercial banks of Nepal make profit 1.5484% of total assets, with minimum ROA 0.05% and maximum value of 5.48%, whereas average ROE is 17.0294% through 14 years period. The minimum ROE is 0.5% and maximum is 72.8%. The standard deviation of 8.37% suggests that the actual ROE value is 8.3731% far from mean value. NPL remained in between 0% and 16.4% with average value of 1.3037%. Similarly, the average CAR is 13.151% where, maximum CAR is 33.96% and minimum is 9.61%. The statutory CAR requirement is 11% excluding counter-cyclical buffer. In the same way average CDR is 80.4736% meaning 80.4736% of deposit is lent as credit, with median value 82.885%, maximum value 96.69% and minimum 38.7%. Bank size remained within 26.57% and 22.0685%, with mean 24.6731. Lastly, NIM is 3.0216% in average, with standard deviation 0.6254%, maximum and minimum values 4.80% and 0.9354% respectively.

Table 2
Pearson Correlation Matrix

	ROA	ROE	NPL	CAR	CDR	BANK SIZE	NIM
ROA	1.00	-	-	-	-	-	-
ROE	0.7607	1.00	-	-	-	-	-
NPL	0.2252	0.2932	1.00	-	-	-	-
CAR	-0.1091	-0.3056	-0.2256	1.00	-	-	-
CDR	-0.3018	-0.4035	-0.0053	0.0493	1.00	-	-
BANK SIZE	0.178	0.0135	-0.1562	-0.084	0.13822	1.00	-
NIM	0.6698	0.5315	0.0923	-0.1127	-0.1228	0.1339	1.00

Note: Output of E-views 8 from collected data

As from the above table 2, it can be concluded that CAR and CDR have negative relationship with ROA and ROE, which means an increase in these independent variables decreases profitability, whereas NPL has positive relationship indicating that increase in NPL also increases the profitability. Bank size has positive relation with ROA than ROE. Moreover, as per the rule of thumb, if correlation value is more than 0.80, there is problem of multicollinearity. Here, the independent variables have correlation coefficient less than 0.80, which means there is no multicollinearity.

Now, Breusch-Pagan test is done as lagrange multiplier tests to choose in between pooled OLS and GLS.

Table 3
Lagrange Multiplier Test

Breusch-Pagan test	Cross-section	Time	Both
t-value 1. ROA	40.43016	17.85257	58.28273
2. ROE	54.47250	6.13461	60.60711
p-value 1. ROA	0.000	0.000	0.000
2. ROE	0.000	0.000	0.000

Note: Output of E-views 8 from collected data

Since, cross-section and time section have p-value<0.05 for both dependent variables: ROA and ROE, null hypothesis is rejected which means GLS method is appropriate.

Table 4
Hausman Test

	Chi-Sq. Stat.	Chi-Sq. d.f.	P-value
Cross-section random			
1. ROA	2.3231	5	0.8029
2. ROE	3.5379	5	0.6177

Note: Output of E-views 8 from collected data

Here, p-value>0.05 for both independent variables, so, it suggests that random effect model is suitable for this study.

Table 5

Random Effect Model

Dependent Variable: ROA

Total Observation: 210

Variable	Coefficient	T-value	P-value
NPL	0.09400	4.1975	0.0000
CAR	-0.0003	-0.0225	0.9821
CDR	-0.1257	-3.2305	0.0014
BANK SIZE	0.1155	3.2585	0.0013
NIM	0.5779	11.165	0.0000
C	-2.1541	-2.5237	0.0124
R^2	0.5447		
Total observation	210		
Probability (p-value)	0.0000		

Note: Output of E-views 8 from collected data

Table 5 concludes that credit risk significantly affects the bank's profitability in Nepal. The major credit risk variable NPL has positive significant affect on profitability. This result is consistent with Alshatti (2014) but inconsistent with several relevant previous studies: Bhattarai (2016); Kwashie, et al. (2022); Tuladhar (2017); Kurawa and Garba (2014).

CDR, on the other hand, has negative significant impact on bank's performance. Same nature of relationship was evident by Tuladhar (2017); Adeusi et al. (2014); Ogboi and Unuafe (2013), however these studies had found insignificant impact of CDR on ROA.

Likewise, CAR also negatively affects the profitability; however, CAR is not significant contributor to ROA. This negative insignificant result is consistent with Tuladhar (2017), Ezike & Oke (2013), Maharjan (2020), inconsistent with Kwashie, et al. (2022), Bhattarai (2016).

Bank size and NIM are also significant positive contributors of ROA as their p-values are less than 5% level of significance. This result is consistent with Tuladhar (2017), Kwashie, et al. (2022) and signifies that larger size banks have better profitability because they have more products to offer and hence diversify risk. NIM result is consistent with Puspitasari et al. (2021) and Sunaryo (2020). It indicates that higher NIM means higher profitability, which also signifies banks' efficiency in earning interest greater than interest expenses relative to their earning assets.

Moreover, R^2 value of 0.5447 states that, the chosen credit risk variables hold 54.47% explanation capacity of any 1% variation in ROA. Similarly, overall p-value of 0.0000 indicates that random effect model is significant and also signifies that credit risk is one of the significant factors affecting ROA.

Table 6

Random Effect

Dependent Variable: ROE

Variable	Coefficient	T-value	P-value
NPL	1.5267	5.116	0.0000
CAR	-0.5777	-3.7107	0.0003
CDR	-0.30968	-5.9365	0.0000
BANK SIZE	0.2783	0.5871	0.5578
NIM	5.8290	8.4178	0.0000
C	23.0794	2.0216	0.0445
R^2	0.48		
Total observation	210		
Probability (p-value)	0.0000		

Note: Output of E-views 8 from collected data

In case of ROE, all major credit risk variables NPL, CAR and CDR have p-value <0.05 which signalize that the credit risk significantly affects ROE. However, the nature of influence is different: NPL has positive significant effect (result is inconsistent with Maharjan, 2020); CDR is negatively significant (consistent with Tuladhar, 2017 but inconsistent with Maharjan, 2020). However, this study finds significant influence. Bank size affects ROE positively but insignificantly pointing that shareholders' rate of return is not significantly affected by total assets. NIM also has significant positive influence in ROE. R^2 is 0.48, meaning, 48% of variation in ROE is explained by dependent variables.

VI. Conclusion

Examining the influence of credit risk on profitability in Nepalese commercial banks is the prime objective of this study. This article incorporates data of 15 commercial banks of Nepal from 2008 to 2021 A.D., total 210 balanced panel data. This study concludes that credit risk significantly affects the Nepalese banks' profitability. Major credit risk indicators NPL, CAR and CDR are significant contributor to profitability (both ROA and ROE) whereas; CAR has negative but no significant effect on ROA. This means the theoretical concept that large CAR means large capital base which allows the bank to expand their business, improve profitability (ROA), absorb capital loss and prevent bank run is not significant. Meanwhile, this also gives a hint of poor credit risk management practice in Nepalese banking industry. Furthermore, Credit to deposit ratio has negative significant influence on profitability which means increase in credit does not contribute to profitability, thus giving a hint of poor credit risk management.

NPL is one of the prime factors for bank failure. Mostly, higher NPL results in lower profitability, but this study shows positive but negligible effect of NPL on profitability, which contradicts with the previous studies. Some of the possible reasons for positive NPL are: improved credit risk assessment, monitoring and recovery system, restructuring facility by banks under the regulation of central bank. This signifies negligible improvement in credit risk management but still it should be managed properly to enhance profitability position.

This study is confined in terms of variables, number of banks and period of study. So, further research can be carried to fulfill this gap. Furthermore, the current situation of credit risk and its influence after merger is also a subject matter for further study.

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APPENDIX

Banks included

1. Nabil Bank Ltd.
2. Standard Chartered Bank Ltd.
3. Nepal State Bank of India Ltd.
4. Himalayan Bank Ltd.
5. Siddhartha Bank Ltd.
6. NMB Bank Ltd.
7. Everest Bank Ltd.
8. Kumari Bank Ltd.
9. Laxmi Bank Ltd.
10. Citizen Bank Ltd.
11. Machhapuchhre Bank Ltd.
12. NCC Bank Ltd.
13. NIC Asia Bank Ltd.
14. Global IME Bank Ltd.
15. Sanima Bank Ltd.