Research Article – Accounting

Assessment of credit risk in Nepali commercial banks

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Abstract

The main objective of the study is to identify the major indicators of credit risk among the Nepali commercial banks. The study is conducted using the sample of 15 commercial banks operated in Nepali economy. One way Fixed Effect Model (FEM) of panel data analysis is used as a major tool of analysis. All the data for the study were obtained from the database of Nepal Rastra Bank for bank specific variables and database of World Bank for macroeconomic variables for the year 2002/03 to 2014/15. The credit risk among the commercial banks in Nepal was regressed on bank specific variables such as liquidity, capital adequacy ratio, bank size, and interest spread. Similarly, the effects of macro-economic variables such as GDP growth, rate of inflation and interbank interest rate were also examined along with bank specific variables in identifying credit risk in Nepali commercial banks. The study reveals that liquidity has the significant positive impact on credit risk in Nepali commercial banks. In contrast, capital adequacy ratio and interest spread have the significant negative impact on credit risk. The analysis further confirmed that bank size and interest spread both have no any clear direction of impact on credit risk. Moving towards the GDP growth, credit risk in Nepali commercial banks is negatively fluctuates with GDP growth, however, the statistics show the coefficients are insignificant at 5% level. Contrarily, Inter-bank interest rate has insignificant negative impact on credit risk in Nepali commercial banks.

Keywords: Credit Risk, Liquidity, Capital Adequacy, Bank Size, Interest Spread, Interbank Interest Rate

Introduction

Credit creation is one of the most important and challenging products of every commercial bank. Such credits can be in the forms of long term or short-term basis. No matter the volume and periods of such credits, the ultimate source of bank credit is public deposits. Such public depositsresult in the forms of creative deposits by the means of credit creation to generate income as interest. The overall process is animportant asset of commercial banks thatnot only multiplies the income of the individual banks, but also contributes to the growth of the economy. However, in certain circumstances, such assets may not perform in generating income and repay in due time as expected, known as credit risk.Mallick et.al. (2010; as cited in Kasana and Naveed, 2016) argued that if the assets do not generate any income, the bank's ability would be in question and in this case asset of banks become weak and these types of banks normally lose their faiths and confidence of the customers. Ultimately, unrecoverable amounts of loans are written off as nonperforming loan as measure of credit risk.

The risks that are most applicable to banks are credit risk, liquidity risk, and solvency risk (Appa, 1996). Credit risk is the most significant risk faced by banks and the success depends on accurate measurement and efficient management of credit risk larger than any other risk (Giesecke, 2004). In simple terms Campbell (2007) argued that, credit risk is the risk of loss due to debtor's non-payment of a loan or other lines of credit (either the principal or interestor both). Banks bear risk on behalf of deposit or especially in globalization and liberalization environment. Hence, appropriate and effective risk management systems become vital to manage all banking risks, ensuring stability and growth of the banks as financial intermediaries. Therefore, risk management is the human activity, which integrates recognition of risk, risk assessment, developing strategies to manage it, and mitigation of risk using managerial resources (Appa, 1996).

Recently, many empirical studies have been conducted to examine the determinants of credit risk in different context and setting. Literatures of credit risk have been categorized in two majoraspects via bank specific and macro-economic factors. Bercoff, Giovanni, and Grimard (2002) examined that credit risk (non-performing loans) are affected by both bank-specific factors and macro-economic factors in US commercial banks. Ahmed, Akhtar, and Usman (2011) confirmed that the credit risk is positively affected by size, capital adequacy and debt equity ratios. Similarly, Loizis, Vouldis, and Metaxas (2010) found that real GDP growth rate, ROA, and ROE had negative whereas lending, unemployment and inflation rate had positive significant while loan to deposit (liquidity) and capital adequacy ratio had insignificant effect on credit risk in Greek commercial banks.Moreover, Skarica (2013) found that GDP growth rate, unemployment rate and inflation had negative and significant impact on credit risk among Central and Eastern European countries. Similarly, Saba, Kouser and Muhammad (2012) found that lending rate are negative while inflation and real GDP per capital are positive and significant effect on credit risk.

Krueger and Tornell (1999) stated that the credit crunch in Mexico after the 1995 crisis was partially attributed to bad loans and banks were burdened with credits of negative real value, thereby reducing the capacity of the banks to provide new fund for new projects. Jiménez and Saurina (2005)

examined that non-performing loans are determined by GDP growth, high real-interest rates, and soft credit terms in Spaish commercial banks. Gunsel (2008) examined the positive influence of inflation to credit risk in Cyprus and Euro Zone countries. However, Aver (2008), Bofondi and Ropele(2011) examined insignificant impact of inflation on credit risk in Solvenian, Italian and GIPSI (Greece, Ireland, Portugal, Spain and Italy) commercial banks.

In the light of the empirical discussions, it is confirmed that credit risk is influenced by the different context, periods, and the economic status of the country. More specifically, bank specific and macro-economic variables are the most important determinant of credit risk. Therefore, it is important to examine how far the different bank specific as well as the macro-economic variables are affecting the credit risk in Nepali commercial banks. Thus, this paper contributes to the credit risk literature by providing empirical evidence that enables to assess the major determinants of credit risk among Nepali commercial banks. The overall study is based on 195 observations from the sample of 15 commercial banks operated in Nepal for13 years from 2002/03 to 2014/15.

One way fixed effect model of panel data analysis is usedas a major tool of analysis to identify the factors that affect the credit risk in commercial banks in Nepal. Credit risk has been regressed individually and jointly with the different explanatory variables. The results confirm that liquidity has significant positive impact on credit risk in Nepali commercial banks. In contrast, capital adequacy ratio and interest spread have the significant negative impact on credit risk. The study further confirms that bank size and interest spread both have no any clear direction of impact on credit risk. Regarding GDP growth, credit risk in Nepali commercial banks negatively fluctuates with GDP growth. Contrarily, interbank interest rate has insignificant negative impact in credit risk in Nepali commercial banks.

The remaining sections of the study are; section two summarizes the findings of major studies relating to credit risk in commercial banks. Sectionthree describes the overall research methodology used in the study. Similarly, section four deals with the results derived from the analysis. Finally, section five presents conclusions of the study.

Literature Review

In this section of the study, findings from the recent studies, which examines the commercial bank credit risk, have been reviewed. Castro (2013) analyzed the link between the macroeconomic developments and the banking credit risk in European countries (Greece, Ireland, Portugal, Spain and Italy (GIPSI)). The study employed dynamic panel data approaches for GIPSI countries over the period 1997q1-2011q3 and concluded that the macroeconomic environment significantly affects the bank credit risk. The credit risk increases when GDP growth and the share and housing price indices decrease and rises when the unemployment rate, interest rate, and credit growth increase; it is also positively affected by an appreciation of the real exchange rate. Djiogap and Ngomsi (2012) investigated the determinants of bank long-term loan using fixed effect model to examine impact of bank size, GDP growth and capital adequacy ratio on NPLs and found negative significant impact of CAR on the different levels of NPL. Moreover, the finding justifies as more diversified banks and

well capitalized banks are better able to withstand potential credit. However, inflation variable is statistically insignificant in explaining the total business loans ratios of banks.

Furlong and Keely (1989, 1990) and Dothan and Williams (1980) confirmed that the prudential regulation of capital leads banks to reduce their potential of bank risk-taking. In the same way, Jacques and Nigro (1997) confirmed that the introduction of capital based on risk has led to higher capital ratios and a lower risk portfolio of banks. Contrarily, Shrieves and Dahl (1992) have studied the impact of regulation of equity capital on the bank risk-taking decisions in the context of 1800 U.S. banks over the period 1983 to1987 using the simultaneous equation model. The results confirmed that a positive association between changes in equity capital and the level of risk, particularly for overcapitalized banks. Ngetich (2011) examined the effects of interest rate spread on the level of non-performing assets in commercial banks in Kenya. The study confirmed that there is a strong relationship between interest spread and nonperforming loan. The author further confirmed that interest spread affects nonperforming loans in banks because it increased the cost loaded on principle amount calling for stern regulatory framework in credit risk management.

Nkusu (2011) analyzed the linkage between nonperforming loans and macroeconomic performance and revealed that a poor macroeconomic performance (slower GDP growth) could be associated with increasing non-performing loans in advanced economies. Shingjergji (2013) conducted study on the impact of bank specific factors on nonperforming loan in Albanian banking system using the panel data from 2002 to 2012. Firm specific parameters such as capital adequacy ratio, loan to asset ratio, net interest margin, and return on equity were considered as a determinant factor of nonperforming loan. The result confirmed that capital adequacy ratio has insignificant negative impact on NPL whereas; net interest margin has positive and significant relation on NPL. The study further confirmed that increase in capital adequacy ratio will cause a reduction of the NPL ratio. Metin and Ali (2015) studied the relationship between macroeconomic indicators, bank-level factors and non-performing loan ratio using the linear regression models in Turkey during 2007 -2013. The results showed that inefficiency ratio of all banks negatively affect NPL ratio while capital adequacy ratio positively affect NPL ratio.

In the context of 11 developing countries, Hassan and Hussain (2004) found the negative relationship between capital ratio and portfolio risk. Rime (2001) examined the relationship between regulatory capital and risk-taking by banks in Switzerland. The study confirmed that the regulatory pressure has induced Swiss banks to increase their capital levels while keeping stable levels of risk-taking. Nor and Mohamed (2007 as cited in Zribi and Boujelbene, 2011) presented a comparative study of all factors contributing to the credit risks of commercial banks in a multi-country setting: Australia, France, Japan and the U.S. represent developed economy banking systems while emerging ones are represented by India, Korea, Malaysia, Mexico and Thailand. The results found that the regulatory capital is an important factor influencing the credit risk of any banking system that offers a range of services. Furthermore, credit risk in emerging economy banks is

Table 1: Name and sample banks for the study

SN	Name of the selected banks	Period Covers	Observations
1	Nepal Bank Limited	2002/03 – 2014/15	13
2	RastriyaBanijya Bank	2002/03 – 2014/15	13
3	Nabil Bank Limited	2002/03 – 2014/15	13
4	Nepal Investment Bank Limited	2002/03 – 2014/15	13
5	Standard Charted Bank Nepal Limited	2002/03 – 2014/15	13
6	Himalayan Bank Limited	2002/03 – 2014/15	13
7	Nepal SBI Bank Limited	2002/03 – 2014/15	13
8	Nepal Bangladesh Bank Limited	2002/03 – 2014/15	13
9	Everest Bank Limited	2002/03 – 2014/15	13
10	Nepal Credit and Commerce Bank Limited	2002/03 – 2014/15	13
11	NIC Asia Bank Limited	2002/03 – 2014/15	13
12	Machhapuchre Bank Limited	2002/03 – 2014/15	13
13	Kumari Bank Limited	2002/03 – 2014/15	13
14	Laxmi Bank Limited	2002/03 – 2014/15	13
15	Siddhartha Bank Limited	2002/03 – 2014/15	13

higher than that in developed economies and that risk is formed by a larger number of bank-specific factors in emerging economies compared to their counterparts in developed economies.

Hyun and Zhang (2012) analyzed the impact of macroeconomic and bank specific factors on nonperforming loans in US commercial banks from the data set of 2002 to 2010. The study confirmed that solvency ratio and GDP growth rate have the negative impact on nonperforming loan in US commercial banks. Aemiro and Rafisa (2014) studied the relationship between credit risk and bank specific determinants in Ethiopia and found that credit growth and banks size have negative impact on credit risk. Furthermore, operating inefficiency have positive impact on credit risk and that government banks were riskier than private bank. However, capital adequacy and bank liquidity have no strong impact on the credit risk. Daniel and Wandera (2013) examined the effects of credit information sharing on the nonperforming loans of commercial banks of Kenya. The studywas conducted using the data from 2007 to 2012. The study revealed that lending rate has significant positive effect on NPL.

Kasana and Naveed (2016) conducted a study with the purpose of to investigate the determinants of credit risk of commercial banks in Pakistan using OLS regression and panel data analysis from the data set of 26 commercial banks covering data period from 2007-2013. The results showed that capital adequacy ratio had highly significant positive correlate with credit risk, while operating inefficiency, growth in GDP had significant relation with credit. Furthermore, size have been significant but negative impact on credit risk in commercial banks of Pakistan. Growth in interest rate has no impact on credit risk in commercial bank of Pakistan. Swamy (2012) examined the macroeconomic and indigenous determinants of NPL from data set of Indian banks using panel data set from 1997 to 2009 and found that bank size has the strong negative effect on NPL whereas, real GDP growth rate, inflation, capital adequacy and bank lending rate have insignificant effect on nonperforming loans in Indian banks.

Methodology

The research design used in this study is descriptive and causal comparative research design, which is used to deal with the issues relating to credit risk associated with the commercial banks operated in Nepal.

The overall study is based on the secondary sources of data. All the commercial banks operated in Nepali economy were considered as the total population. Total 29 commercial banks are operating until 31st January, 2018. Out of them, 15 commercial banks were selected as sample, which consists more than 50 percent of total population. Hence, total 195 observations from 15 commercial banks for 13 years from 2002/03 to 2014/15 were used for the analysis. Table 1 shows the name of the sample commercial banks selected for the study along with the study periods and number of observations.

The study covers 13 years' period from mid-July, 2003 to mid-July, 2015 (2002/03 – 2014/15). Data of bank specific variables and inter - bank interest rate (IBIR) were collected from the annual publication bullet of Nepal Rastra Bank (NRB), whereas, data relating to macroeconomic variables such as GDP growth (GDPG) and inflation were collected from the database of world bank. All the commercial banks operated in Nepali economy were considered as the total population. Total 29 commercial banks are operating till 31st January, 2018. Out of them, 15 commercial banks were selected as sample, which consists more than 50 percent of total population. Hence, total 195 observations from 15 commercial banks for 13 years from 2002/03 to 2014/15 were used for the analysis. Table 1 shows the name of the sample commercial banks selected for the study along with the study periods and number of observations.

One way fixed effect model of panel data analysis is used as a major tool for data analysis to identify the major indicator of credit risk in commercial banks operated in Nepali economy. The model used for the analysis is;

$$Y_{i,t} = \beta_1 + \beta' X_{i,t} + \varepsilon_{i,t} \qquad\qquad ……………...…....(1.a)$$

Where, Y_{it} represents the dependent variable i.e. credit risk of commercial banks for bank *i* at time *t*. β_1 is constant term assumed to be constant over the time for all the banks. *B'* represents the coefficients of independent variables. X_{it} represents the vector of independent variables and ε_{it} is stochastic error termassumed to be normally distributed with zero mean and constant variance.

The model can also be presented in detail as follows;

$$C\_Risk_{it}=\beta_1+\beta_2 Liquidity_{it}+\beta_3 CAR_{it}+\beta_4 Size_{it}+\beta_5 IS_{it}+\beta_6 GDPG_{it}+\beta_7 INF_{it}+\beta_8 IBIR_{it}+\varepsilon_{it} \qquad .... (1.b)$$

The definitions of the variables used in this study have been explained as follows;

C_Risk (Credit Risk)

Credit risk is the ratio between nonperforming loan and total loan. Symbolically;

C_Risk = Non Performing Loan / Total Loan

Credit risk represents the chance of losing investment or routine receivable instalments. If a borrower fails to make a schedule payment on a mortgage or on any credit facility provided by bank, the collection costs and/or borrowing cost will increase. When the large portion of banks investment is engaged as non performing, banks capacity to invest on new profitable ventures and repayment to the depositors may affect negatively. Michael, Vasanthi and Selvaraju (2006) confirmed NPL in loan portfolio affect operational efficiency which in turn affects profitability, and solvency position of banks. Therefore, it is important to examine credit risk as a research variable for the study.

Liquidity

Liquidity is the proxy of liquidity ratio. Liquidity for a bank means the ability to meet its financial obligations when they come due. Liquidity is the ratio between liquid assets and total deposit plus short term borrowing. Symbolically;

Liquidity = Liquid Assets/(Total Deposit+Short-term borrowing) ….......(3)

Hyun and Zhang (2012) conformed that solvency ratio and has the significant negative impact on nonperforming loan in US commercial banks.Thus, the hypothesis for the study is proposed as;

H1: Liquidity has the significant negative impact on credit risk.

CAR (Capital Adequacy Ratio)

Capital adequacy shows the strength of bank capital against the vagaries of economic and financial environment (Gautam, 2016). Thus, it is the pre-requisites of protection against the financial distress. It is the ratio between capital-fund to risk weighted assets is termed as capital adequacy ratio. Symbolically;

CAR = Capital fund / Risk weighted assets ………..(4)

Djiogap and Ngomsi (2012) found significant negative impact of capital adequacy ratio on the different levels of nonperforming loans. Similarly, Hassan and Hussain (2004) found the negative relationship between capital ratio and portfolio risk. Therefore, based on the evidences, the hypothesis for the study can be proposed as;

H2: Capital adequacy ratio has the significant negative impact on credit risk.

Size (Bank Size)

Size is used as the proxy of bank size. The total assets from the balance sheet is considered as the bank size. Aemiro and Rafisa (2014) studied the relationship between credit risk and bank specific determinants in Ethiopia and found that credit growth and banks size have negative impact on credit risk. Similarly, Kasana and Naveed (2016) found size has significant negative impact on credit risk in commercial banks of Pakistan. Hence, there is negative impact of size on credit risk is proposed.

H3: Size has the significant negative impact on credit risk.

IS (Interest Spread)

'IS' is interest rate spread between average interest received and average interest paid. Castro (2013) identified that the credit risk increases when the interest rate and credit growth increase. Moreover, Daniel and Wandera (2013) revealed that lending rate has significant positive effect on nonperforming loan. Similarly, Shingjergji (2013) examined that the net interest margin has positive and significant relationship to nonperforming loan. Therefore, the research hypothesis for the study is as follows;

H4: Interest spread has the significant positive impact on credit risk.

GDPG (GDP Growth)

One of the major determinants of the macro economic indicator is gross domestic product (GDP) growth. Castro (2013) identified that the credit risk increases when GDP growth and the share and housing price indices decrease. In addition, Djiogap and Ngomsi (2012) investigated GDP growth has significant negative impact on the different levels of nonperforming loan. Nkusu (2011) analyzed the linkage between nonperforming loans and macroeconomic performance and revealed that a poor macroeconomic performance (slower GDP growth) could be associated with increasing non-performing loans in advanced economies. Therefore, the hypothesis purposed for the study is;

H5: GDP growth has the significant negative impact on credit risk.

INF (Inflation)

The inflation rate is the percent increase or decrease of prices during a specified period. Rate of inflation used for the study is as measured by the consumer price index reflects the annual percentage change in the cost to the average consumer of acquiring a basket of goods and services.Loizis, Vouldis, and Metaxas (2010) inflation has significant positive effect on nonperforming loan. Similarly, Farhan *et al.* (2012) found that, interest rate, energy crisis, unemployment, inflation and exchange rate has a significant positive relationship with the non-performing loans. Therefore, a significant positive impact of inflation on credit risk is proposed for the study.

H6: Inflation has a significant positive impact on credit risk.

IBIR (Inter Bank Interest Rate)

Interbank interest rate is the rate of interest charged on short term borrowing among banks. Sometimes this kinds of interest rate may specify by the central bank of the country, whereas, sometimes it depends on the availability of the liquidity in the market.Bajracharya (2015) confirmed that IBIR has the significant positive impact on credit risk in Nepali commercial banks. Therefore, the research

Table 2: Descriptive Statistics of the Variables

Table 2 presents the descriptive statistics of variables for the bank specific and macroeconomic variables associated with all 15 banks for the period 2002/03 to 2014/15. C_Riskis ratio of non- performing loan to total loan. Liquidity is the proxy of liquid asset to deposit plus short term borrowing. CAR is capital adequacy ratio.Size represents the total assets.IS is interest spread between average interest received and average interest paid. GDPG is GDP growth rate. INF is annual inflation rate. IBIR is the interbank rate.

	N	Minimum	Maximum	Mean	Std. Deviation
C_Risk (%)	195	0.00	60.47	5.88	11.10
Liquidity (%)	195	5.03	41.11	15.98	6.41
CAR (%)	195	-50.30	41.85	7.81	14.14
Size (NRs. in billion)	195	0.88	150.57	38.54	29.15
IS (%)	195	0.40	7.75	4.16	1.02
GDPG (%)	195	2.73	6.10	4.26	0.98
INF (%)	195	2.84	11.08	7.87	2.14
IBIR (%)	195	0.16	8.22	3.08	2.38

Table 3: Bivariate Pearson Correlation Coefficients

Table 3 presents thebivariate Pearson correlation coefficients among the bank specific and macroeconomic variables associated with all 15 banks for the period 2002/03 to 2014/15. C_Risk is ratio of non- performing loan to total loan. Liquidity is the proxy of liquid asset to deposit plus short term borrowing. CAR is capital adequacy ratio. Size represents the total assets. IS is interest spread between average interest received and average interest paid. GDPG is GDP growth rate. INF is annual inflation rate. IBIR is the interbank rate.

	C_Risk	Liquidity	CAR	Size	IS	GDPG	INF	IBIR
C_Risk	1							
Liquidity	.078	1						
CAR	-.763**	-.044	1					
Size	.161*	.109	-.412**	1				
IS	-.087	.221**	-.166*	.256**	1			
GDPG	-.076	.117	-.024	-.003	.059	1		
INF	-.271**	-.045	.039	.282**	.096	.286**	1	
IBIR	.032	-.209**	-.016	-.221**	-.089	-.192**	.241**	1

**. Correlation is significant at the 0.01 level (2-tailed). *. Correlation is significant at the 0.05 level (2-tailed).

hypothesis for the study is;

H7: IBIR has the significant positive impact on credit risk.

Results

In this section of the study, the results from the secondary data for the credit risk in Nepali commercial banks have been presented. Different statistical and econometric models such as descriptive statistics, correlation matrix and panel data analysis were used as the major tools for the analysis.

Descriptive Statistics of the Variables

The descriptive statistics of the variables used in the study for the bank specific variables as well as macroeconomic variableshave been presented and analyzed in this section of the study. The descriptive statistics used in the study consists of mean, standard deviation, number of observations, minimum and maximum values.

Table 2 shows the descriptive statistics of the variables used in the study for the period 2003 to 2015. The average credit risk in Nepali commercial banks is 5.88% which is ranges from 0 to 60.47% with standard deviation 11.1%. Similarly, liquidity ratio is ranges from 5.03% to 41.11% with mean 15.98% and standard deviation 6.41%.

Furthermore, capital adequacy ratio ranges from -50.30% to 41.85% having mean 7.81% and standard deviation 14.14%. The average value of size in Nepali commercial banks is observed Nepali Rs. 38.54 billion with minimum Rs. 0.88 billion and maximum Rs. 150.57 billion. In the same way, the average interest spread obtained by Nepali commercial banks 4.16% with minimum and maximum of 0.4% and 7.75% respectively.

Regarding macro-economic variables, GDP growth ranges from 2.73% to 6.10% having mean 4.26% and standard deviation 2.14%. Similarly, mean rate of inflation is 7.87% where minimum inflation rate is 2.84% and maximum 11.08%. The result further shows that inter-bank interest rate is ranges from 0.16% to 8.22% with mean 3.08% and standard deviation 2.38%.

Correlation Analysis

In this section of analysis, the bivariate correlation coefficient between different pairs of research variableshave been analyzed. The Pearson correlation coefficients were calculated to examine the nature and direction of the relationship between the dependent variable (Credit Risk) and the independent variables (liquidity, capital adequacy ratio, bank size, interest spread,GDP growth, inflation and inter-bank interest rate).

Table 4: Regression Results on Credit Risk Using One Way Fixed Effect Model

Table 4 shows the regression results of bank specific and macroeconomic variables on credit risk using fixed effect model by taking the natural log of the variablesassociated with all 15 banks for the period 2002/03 to 2014/15.C_Risk is ratio of non-performing loan to total loan. Liquidity is the proxy of liquid asset to deposit plus short term borrowing. CAR is capital adequacy ratio. Size represents the total assets. IS is interest spread between average interest received and average interest paid. GDPG is GDP growth rate. INF is annual inflation rate. IBIR is the interbank rate. The reported values are intercepts and slop coefficients of respective explanatory values with standard errors in the parentheses. The reported value also includes the values of coefficient of determination (Adj. R^2), F-test (F), and Durbin-Watson (DW). The double asterisk (**) sign indicates that the results are significant at 5% level of significance.

$$C\_Risk_{(it)} = \beta_1 + \beta_2 Liquidity_{it} + \beta_3 CAR_{it} + \beta_4 Size_{it} + \beta_5 IS_{it} + \beta_6 GDPG_{it} + \beta_7 INF_{it} + \beta_8 IBIR_{it} + \varepsilon_{it}$$

	const	Liquidity	CAR	Size	IS	GDPG	INF	IBIR	|Adj. R^2|	F	DW
1	-0.23 (0.52)	0.38** (0.19)							0.02	0.70	1.62
2	3.51** (0.63)		-1.23** (0.26)						0.07	1.85	1.83
3	0.66** (0.21)			0.04 (0.06)					0.04	0.55	1.66
4	0.89* (0.53)				-0.06 (0.39)				0.04	0.54	1.63
5	1.45** (0.39)					-0.45 (0.27)			0.03	0.62	1.65
6	3.32** (0.63)						-1.24** (0.31)		0.07	1.93	1.73
7	0.79** (0.04)							0.02 (0.06)	0.04	0.54	1.63
8	-0.25 (0.56)	0.38** (0.19)		0.01 (0.06)					0.03	0.65	1.62
9	4.02** (0.81)		-1.25** (0.26)	-0.33 (0.3)					0.07	1.80	1.82
10	1.3** (0.47)			0.05 (0.06)		-0.45 (0.27)			0.04	0.58	1.68
11	3.27** (0.88)				0.04 (0.37)		-1.25** (0.30)		0.06	1.80	1.73
12	-0.27 (0.71)	0.44** (0.21)			-0.11 (0.37)			0.06 (0.07)	0.03	0.65	1.61
13	6.60** (0.85)	0.3* (0.17)	-1.43** (0.22)	-0.23 (0.12)	-0.34 (0.23)	-0.61 (0.35)	-0.66** (0.26)	0.01 (0.08)	0.18	2.78	1.76

The result shows that the correlation coefficient of liquidity with credit risk is positive (0.078). The positive correlation indicates that liquidity has positive relationship with credit risk. The positive relationship further confirms that higher the liquidity, higher would be the credit risk. Similarly, the correlation coefficients of size (0.61*) and interbank interest rate (0.032) are positive with credit risk. The positive coefficients further reveal that bank size and interbank interest rate both have positive relationship with credit risk in Nepali commercial banks. Which means, higher the bank size and interbank interest rate, higher would be the credit risk.

Contrarily, the result shows that there is negative relationship of capital adequacy ratio (-0.763**) with credit risk. The negative relationship of capital adequacy ratio with credit risk further confirms that higher the capital adequacy ratio, lower would be the credit risk. Similarly, interest spread has also negative relationship (-0.087) with credit risk. The negative relationship of interest spread indicates that an increase in interest spread leads to decrease in credit risk. Likewise, the correlation coefficients of GDP growth (-0.076) and Inflation (-0.271**) are negative. The negative correlation coefficients indicate that there are negative impact of GDP growth and Inflation on credit risk. It means, higher the GDP growth and inflation, lower would be the credit risk in Nepali commercial banks.

Regression Results

The regression results of bank specific variables and macro-economic variables oncredit risk have been analyzed and presented in table 4. In order to check the robustness on the explanatory power of the variables, one way Fixed Effect Model (FEM) of panel data analysis were used where credit risk has been regressed individually and jointly with different combinations of independent variables. The model specifications 1 through 7 report the simple regression results whereas, model specifications 8 through 13 report the results of multiple regression results.

In table 4, the regression results of liquidity on credit risk are positive and statistically significant at 5% significance level in all the regression models. The significant positive coefficients confirm that liquidity has positive impact on credit risk. The positive impact further confirms that, higher the liquidity, higher would be the credit risk in Nepali commercial banks. Therefore, there is no any evidences in favor of research hypothesis that liquidity has the significant negative impact on credit risk. This finding is contradict with the findings of Hyun and Zhang (2012). In contrast to liquidity, all the regression coefficients of capital adequacy ratio on credit risk with different combinations of

variables are negative and statistically significant at 5%. The significant negative coefficients reveal that capital adequacy ratio has negative impact on credit risk. It means, higher the capital adequacy ratio, lower would be the credit risk in Nepali commercial banks. Therefore, there is sufficient evidence in favour of research hypothesis that capital adequacy ratio has the significant impact on credit risk. In addition, the result is consistent with the findings of Djiogap and Ngomsi (2012), Hussain and Hassan (2004). Similarly, all the beta coefficients of inflation are negative and statistically significant at 5% level of significance. It indicates that inflation has the significant impact on credit risk. Moreover, higher the inflation in the economy, lower the credit risk is observed in Nepali commercial bank. However, the findings have no any sufficient evidences in favour of research hypothesis that inflation has a significant positive impact on credit risk. The finding contradicts with the findings of Loizis, Vouldis and Metaxes (2010) and Farhan et.al (2012). However, the regression coefficients of firm size and interest spread are not in a clear direction and statistically insignificant at 5% level of significance. It indicates that firm size and interest spread both have not a specific impact on credit risk. On the other hand, the regression coefficients of GDP growth are negative and statistically insignificant at 5% level of significance. The negative and insignificant coefficients further confirm that GDP growth has insignificant negative impact on credit risk in Nepali commercial banks. Unlike GDP growth, Interbank interest rate has insignificant positive impact on credit risk as all the coefficients are positive and insignificant at 5% significance level.

Conclusions

Due efforts were made to identify the major indicators of credit risk among the Nepali commercial banks. The study was conducted using the sample of 15 commercial banks operated in Nepali economy. One way Fixed Effect Model (FEM) of panel data analysis was used as a major tool of analysis. All the data for the study were obtained from the database of Nepal Rastra Bank for bank specific variables and database of world bank for macroeconomic variables for the year 2002/03 to 2014/15. The credit risk among the commercial banks in Nepal was regressed on bank specific variables such as liquidity, capital adequacy ratio, bank size, and interest spread. Similarly, the effects of macro-economic variables such as GDP growth, rate of inflation and interbank interest rate were also examined along with bank specific variables in identifying credit risk in Nepali commercial banks.

The study reveals that liquidity has significant positive impact on credit risk in Nepali commercial banks. In contrast, capital adequacy ratio and interest spread have the significant negative impact on credit risk. The analysis further confirmed that bank size and interest spread both have no any clear direction of impact on credit risk. Moving towards the GDP growth, credit risk in Nepali commercial banks is negatively fluctuates with GDP growth, however, the statistics shows the coefficients are insignificant at 5% level. Contrarily, Inter-bank interest rate has insignificant negative impact in credit risk in Nepali commercial banks.

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