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EFFECT OF CREDIT RISK MANAGEMENT ON FINANCIAL PERFORMANCE: AN EMPIRICAL STUDY OF NEPALESE COMMERCIAL BANKS

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ABSTRACT

This study empirically explored the effect of credit risk management on the financial performance of ten listed commercial banks in Nepal for the period, 2011/12-2017/18. Credit risk management, the independent variable, was surrogated by three parameters- Non-Performing Loan to total Loan Ratio (NPLLR); Non-performing Loan to total Deposit Ratio (NPLDR) and Capital Adequacy Ratio (CAR). Return on asset (ROA) and Return on equity (ROE) was used as proxies for financial performance. Using the ordinary least squares (OLS) regression as data estimation technique, the study revealed that all the three credit risk parameters capital adequacy, loans and advances and liquidity have a significant relationship with ROA and ROE. Based on the findings, the study recommended that the management of commercial banks should develop rigorous and robust credit policies that will enable banks to effectively assess the creditworthiness of their customers. The regulatory agencies should also come up with modern credit risk measurements, identification and control. Prompt and necessary action should also be taken against the management of any bank that flouts their credit risk guidelines in order to avoid unpleasant distress in the financial system in Nepalese context.

KEYWORDS

return on asset, return on equity, capital adequacy ratio, non-performing loan ratio, loans and advances, liquidity.

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INTRODUCTION

Performance evaluation is the important approach for enterprises to give incentive and restraint to their operators and it is an important channel for enterprise stakeholders to get the performance information. The performance evaluation of a commercial bank is usually related to how well the bank can use its assets, shareholders' equities and liabilities, revenues and expenses. The performance evaluation of banks is important for all parties including depositors, investors, bank managers and regulators. Thus, this study is focused towards analyzing how much of impact does the adequate capital and the management of credit risk holds in defining the performance of Nepalese banking sectors. It is crucial to know whether this optimism is truly warranted. It is against this backdrop that the present study set out to empirically ascertain whether credit risk management and capital requirement have enhanced profitability of Nepalese banks (Poudel, 2012).

Poor asset quality and low levels of liquidity are the two major causes of bank failures and represented as the key risk sources in terms of credit and liquidity risk to examine its impact on bank profitability. The study found that credit risk management is an important predictor of banks financial performance. In this study it was stated that the degree of impact strongly depends on regulatory environment in which banks operate. The most interesting aspect of the result is the positive and significant relationship between capital adequacy and banks financial performance. Liyugi (2007) found negative relationship between credit risk and liquidity on banks performance.

The increase in loan loss provision decreases the profitability whereas increase in total loan and advances increase profitability. The effect of credit risk on bank performance measured by the return on assets of banks is cross-sectional invariant. That is, nature and managerial pattern of individual firms do not determine the impact. Loan and advances ratio (LA) coefficient exerts most significant positive effect on the profitability across the banking firms (Funso et.al, 2013).

The capital adequacy ratio is a key measure to determine the health of banks and financial institutions. Capital adequacy refers to the sufficiency of the amount of equity to absorb any shocks that the bank may experience. In Nepal the commercial banks need to maintain at least 6 percent Tier-1 capital and 10 percent total capital (Tier 1 and Tier 2), that is, core capital and supplementary capital respectively. Tier 1 capital consists of paid-up capital, share premium, non-redeemable preference share, general reserve fund, accumulated profit, capital redemption reserve, capital adjustment fund, and other free reserves. The Tier 2 capital comprises of capital comprises of general loan loss provision, assets revaluation reserve, hybrid capital instruments, subordinated term loan, exchange equalization reserve, excess loan loss provision, and investment adjustment reserve. These minimum capital adequacy requirements are based on the risk-weighted exposures of the banks (Etzel, 2010).

Mostly nonperforming loan to total loan ratio, net nonperforming loan to total loan ratio is used as the indicators of the quality of assets of the commercial banks. (Baral, 2005). The maximum NPL allows for a healthy bank is 5 percent. Management quality plays a big role in determining the future of the bank. The management has an overview of a bank's operations, manages the quality of loans and has to ensure that the bank is profitable. Though there are above mentioned studies, still there are no such studies using more recent data are available in Nepal.

In today's world the performance of commercial bank is affected by many factors. But the major concern of the study here is to understand how the capital adequacy and credit risk management influences the overall profitability of the bank. The importance of the capital is to finance the assets as well as to protect the long term and short-term creditors who make the fund available to the business. The health of the financial system has important role in the country as its failure can disrupt economic development of the country (Das & Ghosh, 2007). Financial performance is company's ability to generate new resources, from day-to-day operation over a given period of time and it is gauged by net income and cash from operation.

Similarly, Capital adequacy is a percentage ratio of a financial institution's primary capital to its assets, used as a measure of its financial strength and stability. A ratio that can indicate a bank's ability to maintain equity capital sufficient to pay depositors whenever they demand their money and still have enough funds to increase the bank's assets through additional lending.

The remainder of this study is structured as follows: Section two literature review, section three describes statement of the problems, section four objectives of the study, section five research methodology, and final section analysis the results and conclusions.

LITERATURE REVIEW

Furlong and Keeley (1991) concluded that profit maximization, avoidance of bankrupt and their negative externalities on the financial system and incentive to increase risky assets.

Sinkey (1992) argued that the goal of credit risk management is to maximise a bank's risk adjusted rate of return by maintaining credit risk exposure within acceptable parameters. Banks need to manage the credit risk inherent to the entire portfolio as well as the risk in individual credits as transactions.

Rodrik (1992) has examined a panel of data for 198 banks found consistent evidence that the imposition of banks' lending rates and thus contributes to lower credit growth. The study on credit risk management concluded that high NPLs increase the uncertainty regarding the capital position of the banks and therefore limit their access to financing.

Robert and Gary (1994) found that net effect of increasing the ratio of substandard credits in the bank's credit portfolio and decreasing the bank's profitability, the well capitalized banks face lower need to external funding and lower bankruptcy and funding costs, and this advantage translates into profitability. Therefore, researches widely posit that the more capital a bank has, the more resistant it will be to failure.

In the study of Brownbridge (1998) has claimed that the single biggest contributor to the bad loans of many of the failed local banks was insider lending and further observed that the second major factor contributing to bank failure were the high interest rates charged to borrowers operating in the high-risk. The study examined a panel of data for 201 banks. The research found that impact of high non-performing loans in banks portfolio is reduction in the bank profitability especially when it comes to disposals.

Huzinga (1999) found that a bank should hold adequate capital against these risks and that they are adequately compensated for risks incurred.

Stoica (2000) has found evidence that the introduction of higher minimum bank capital requirements may well induce an aggregate slowdown of bank credit.

Barrios and Blanco (2000) found that bank performance and capital adequacy have impact on bank's profitability.

Staikouras and Wood (2003) concluded that a long-run relationship between profitability and concentration, capital asset ratio, loan-asset ratio and demand deposits-deposits ratio.

Li Yugi (2007) examined the determinants of bank's profitability and its implications on risk management practices in the United Kingdom. The study employed regression analysis on a time series data between 1999 and 2006. Six measures of determinants of bank's profitability were employed. They used Liquidity, credit and capital as internal determinants of bank's performance. GDP growth rate, interest rate and inflation rate were used as external determinants of banks profitability. The six variables were combined into one overall composite index of bank's profitability. Return on Asset (ROA) was used as an indicator of bank's performance. The study found that liquidity and credit risk have negative impact on bank's profitability.

Samuel et al. (2013) investigated the relationship between commercial banks' profitability and credit risk in Ghana by taking into consideration six commercial banks in their sample which were chosen using purposive sampling techniques for the period 2005-2009. The study employed secondary data only which were obtained from annual financial statements of respective banks for the period under study. The multiple regression models were employed to test the relationship which exists between the variables in the model. The ratio of Net profit to equity fund (ROE) were considered as a measure of banks' profitability and stood as a dependent variable in the model. Three ratios which were employed to represent credit risk in the model were (i) Non-performing loan to total loans and advances, (ii) Net charge off (impairment) to total loans & advances and (iii) Pre-provision profit to net total loans and advances. The study concluded that credit risk as positive and significant relationship with banks' profitability in Ghana. Their observations implied that as the probability of borrowers to default increases, commercial banks in Ghana realizes more profits.

Poudel (2013) appraised the impact of the credit risk management in bank's financial performance in Nepal using time series data from 2001 to 2012. The result of the study indicates that credit risk management is an important predictor of bank's financial performance. It also concluded that commercial banks are not giving more focus on credit risk mitigation that could help them to increase their eligible capital components, which is the another cause that some of the commercial bank have lower capital adequacy. Majority of the bankers and experts believe that the present capital adequacy framework prescribed by the central bank is adequate and the banks should follow the standards for the betterment of every concerned parties associated directly and indirectly with the performance and risks of the banks.

Jha and Hui (2013) analyzed the financial performance of different ownership structured commercial banks in Nepal based on their financial characteristics and identify the determinants of performance exposed by the financial ratios, which were based on CAMEL Model. The study financially analyzed eighteen commercial banks for the period 2005 to 2010. In addition, econometric model (multivariate regression analysis) by formulating two regression models was used to estimate the impact of bank-specific variables on the financial profitability namely return on assets and return on equity of these banks. Furthermore, the estimation results reveal that return on assets was significantly influenced by capital adequacy ratio, interest expenses to total loan and net interest margin, while capital adequacy ratio had considerable effect on return on equity.

Tamimi and Obeidat (2014) conducted a study aimed to identify the most important factors that determine the capital adequacy of commercial banks of Jordan in Amman Stock Exchange for the period from 2000 - 2008 using multiple linear regression analysis and the correlation coefficient (Pearson Correlation). There is a statistically significant positive correlation between the degree of capital adequacy in commercial banks and the following independent factors: liquidity risk, and the rate of return on assets. In another hand, there is an inverse relationship with statistical significance between the degree of capital adequacy of commercial banks and factors independent of the following: the rate of return on equity and interest rate risk. There is an inverse relationship is not statistically significant between the degree of capital adequacy in commercial banks and factors independent of the following: capital risk, credit risk, and the rate of force-revenue. As shown by the results of the study that the independent variables combined with a relatively high effect on the dependent variable and the changes that occur within, as the percentage of the interpretation of the independent variables of the dependent variable reached approximately 61 percent.

In the study conducted by Odunga et al. (2014) have examined the effect of bank specific performance indicators, credit risk and capital adequacy on the operating efficiency of commercial banks in Kenya. Specifically, we sought to establish the effect of bank specific credit risk ratios (Net charge off to gross loans ratio, loan loss provision to total loans ratio, loan loss provision to equity, loan loss reserves to equity ratio) and capital adequacy ratios (Core capital ratio, risk-based capital ratio, total capital ratio and equity capital to total assets ratio) on their operating efficiency. The study adopted an explanatory research design and analysed the panel data using Fixed Effects Regression. The results of the study indicated that the previous year operational efficiency and risk based capital ratio positively and significantly affected the bank's operating efficiency.

Ogboi and Unuafé (2014) conducted a study to find out the impact of credit risk management and capital adequacy on the financial performance of commercial banks in Nigeria. The data for the study were obtained from the published financial statement of six out of twenty-one banks operating in Nigeria as at December 2009. Panel data regression analysis was used to investigate the extent to which credit risk management and capital adequacy affect bank's financial performance in Nigeria in the period 2000 to 2009. The results showed that sound credit risk management and capital adequacy impacted positively on bank's financial performance with the exception of loans and advances which was found to have a negative impact on banks' profitability in the period under study.

Ikpefan (2014) examined the extent of the impact of capital adequacy, management and performance of the commercial banks in Nigeria (1986-2006). Capital adequacy ratios is found to have a negative impact on earnings. The researcher measured the efficiency of the management and operational expenses and found that there is a negative correlation to the return on capital. The implications of this study, among other things, pointed out that sufficient shareholders' funds can contribute to the promotion of Nigerian commercial banks, increase performance and also increase customer confidence, especially after the global financial crisis, which has led to huge losses in the Nigerian financial system.

Samuel, Olausi and Abiola (2015) conducted a study to analyse the impact of credit risk management on the commercial banks performance in Nigeria. The aim of this study was to investigate the impact of credit risk management on the performance of commercial banks in Nigeria. Financial reports of seven commercial banking firms were used to analyse for seven years. The panel regression model was employed for the estimation of the model. In the model, Return on Equity (ROE) and Return on Asset (ROA) were used as the performance indicators while non-performing loans (NPL) and capital adequacy ratio (CAR) as credit risk management indicators. The findings revealed that credit risk management has a significant impact on the profitability of commercial banks' in Nigeria.

David and Osemwegie (2017) looked at the importance of capital adequacy and its impact on the financial business in the Nigerian banks through GLS estimator technique Statements for the period from 2007 to 2016. The application and study proved through empirical evidence the impact of capital adequacy in promoting financial business to the banks of Nigeria supporting the overriding impact of capital adequacy in improving the financial deeds of banks. Capital adequacy is closely linked to the economic growth of a country. The issue of capital adequacy in banks has gained significant importance under global regulatory changes especially in recent years as a result of the increased risks and financial crises they face. The interest of the industrialized countries in the subject of capital adequacy and the need to unify their control systems (Basel III), led them to make attempts to strengthen the capacity of global capital and rules. In order to avoid risks and transition of liquidity more rules and regulations were set up to reach to a more flexible banking sector and resolve problems. This has created safety margins, leverage rates and introduced liquidity risk management indicators to have high quality capital during periods of stress and crisis.

Joseph and Tabitha (2017) try to investigate the impact of capital on the financial performance in the context of commercial banks in Kenya. They found that the core capital to total risk weighted assets ratio and the total capital to total risk weighted assets ratio decreased for both the Tier I and Tier II banks during the years 2010 and 2015. Accordingly, both Tier I and Tier II banks upgraded these two ratios at a significantly higher level than the set minimum requirement of 8% and 12%, respectively.

Nwude and Okeke (2018) have found that credit risk management had a positive and significant impact on total loans and advances, the return on asset and return on equity of the deposit money banks. The study recommended that bank managers need to put more efforts to control the non-performing loan by critically evaluating borrowers' ability to pay back. The regulator should strengthen its monitoring capacity in this regard.

Oduro, Asiedu and Gamali Gadzo (2019) have observed that variables such as capital adequacy, operating efficiency, profitability, and net interest margin are inversely related to credit risk. Conversely, bank size and financing gap tend to relate positively with credit risk. Also, analysed changes in inflation tend to positively affect credit risk. Again, it was observed that, increase in bank credit risk negatively affects corporate financial performance which is consistent with Basel accord. Thus, for banks to survive in their industry, critical attention needs to be paid to management of its credit risk exposure.

Gadzo, Kportorgbi and Gatsi (2019) have found that operational risk influences the financial performance of the universal banks in Ghana negatively. Furthermore, the study indicated that bank specific variables measured by (asset quality, bank leverage, cost to income ratio and liquidity) significantly influence credit risk, operational risk as well as the financial performance of the universal banks positively.

In Nepalese context, there also have various efforts being made to find out answers for some of the questions like what is the role of capital adequacy requirement set by NRB? Similarly, the studies on profitability measurement are scarce in context of Nepal. In order to understand the performance of bank it's necessary to understand the determinants of profitability. But in Nepalese context there are very few studies with small sample sizes to analyse the factors affecting profitability. This study has focused on what is the role of capital adequacy in shaping the bank performance? What is the effect of bank liquidity in its profitability? How non-performing loan does contribute in determining the bank performance? How does loan and advances affect the profitability of bank?

STATEMENT OF THE PROBLEM

This study therefore deals with the following issue in the context of Nepalese banks: What are determinants (Capital Adequacy Ratio, Non-performing Loan, Loan Loss Provision, Liquid Assets Ratio and Credit Deposit Ratio) of profitability of Nepalese?

OBJECTIVES OF THE STUDY

The major objective of this study is to analyse the determinants (Capital Adequacy Ratio, Non-performing Loan, Loan Loss Provision, Liquid Assets Ratio and Credit Deposit Ratio) of profitability of Nepalese.

RESEARCH METHODOLOGY

The study is based on the secondary data that were collected from the 10 commercial banks of Nepal. The sample banks are Bank of Kathmandu, Citizen International Bank, Everest Bank, Himalayan Bank, Kumari Bank, Standard Chartered Bank, Laxmi Bank, Machhapuchhre Bank, Nabil Bank and Nepal Bangladesh Bank. The main sources of data are annual report of respective commercial banks which were collected from the website. The data were collected for return on equity and return on assets as the dependent variables. Whereas, non-performing loan/total loans and advances, loan loss provision/total loan, loans and advances/total deposit, total deposit/ loans and advances and capital adequacy ratio as independent variables. This study employs panel data techniques to determinants of profitability of commercial banks in Nepal for the period of 2011/12-2017/18.

This study has employed descriptive, correlation and causal comparative research design to deal with issues associated with the credit risk and bank performance in the context of Nepal. The descriptive research design has been employed to describe, measure, compare, and classify the financial situations of Nepalese commercial banks. The study also applied casual comparative research design to test the significance of variables on performance of Nepalese commercial banks. The basic purpose of employing causal comparative research design in this study is to understand and examine whether it is possible to predict bank performance measured by ROA and ROE on the basis of information about credit risk variables.

THE MODEL

In order to explain the effect of credit risk on bank performance have been used in this study. The multiple regression model of the form including all variables as specified in following equations have been used:

$$ROA_{it} = \beta_0 + \beta_1 CAR_{it} + \beta_2 NPL_{it} + \beta_3 LA_{it} + \beta_4 LLP_{it} + \beta_5 LQD_{it} + \epsilon_{it} \dots \dots \dots (I)$$

$$ROE_{it} = \beta_0 + \beta_1 CAR_{it} + \beta_2 NPL_{it} + \beta_3 LA_{it} + \beta_4 LLP_{it} + \beta_5 LQD_{it} + \epsilon_{it} \dots \dots \dots (II)$$

Where,

ROA_{it} = Return on Assets of Bank 'i' for period 't'

ROE_{it} = Return on Equity of Bank 'i' for period 't'

CAR_{it} = Capital Adequacy Ratio to Total Risk Weighted Assets of Bank 'i' for period 't'

NPL_{it} = Non-Performing Loan to Total Loans and Advances of Bank 'i' for period 't'

LA_{it} = Loans And Advances to Total Deposit of Bank 'i' for period 't',

LLP_{it} = Loan Loss Provision to Total Loan of Bank 'i' for period 't',

LQD_{it} = Liquid Assets to Deposit and Borrowings of Bank 'i' for period 't',

β_0 = constant

β_1 - β_5 = Coefficient parameters

ϵ_{it} = error terms,

VARIABLES AND HYPOTHESIS

Dependent Variables

The dependent Variables and Independent Variables have been used in this study are as follows:

Profitability: Return on Asset (ROA)

The Return on Asset (ROA) and the Return on Equity (ROE) have been used extensively as measures of profitability. ROA indicates how effectively a bank is managing its assets to generate income. ROA is the income earned on each unit of asset usually expressed as percentage. The problem with ROA is that it excludes from the total assets off-balance sheet items (for instance, assets acquired through a lease) thereby understating the value of assets.

Profitability: Return on Equity (ROE)

As an alternative measure of profitability the Return on Equity (ROE) is computed by dividing net income by equity. It measures the income earned on each unit of shareholders' capital. The shortfall of this measure is that banks with high financial leverage tend to generate a higher ratio. Banks with high financial leverage may be associated with a higher degree of risk although these banks may register high ROE. Thus ROE may sometimes fall short in exposing the true financial health of banks. Another challenge with using ROE is that it is affected by regulation. However, ROE is commonly used in conjunction with ROA.

Independent Variables

The following Independent Variables have been used in study:

Non-Performing Loan

The quality of assets held by a bank depends on exposure to specific risks, trends in non-performing loans, and the health and profitability of bank borrower. The study also reports the effect of credit risk on profitability appears clearly negative, this result may be explained by taking into account the fact that the more financial institutions are exposed to high risk loans, the higher is the accumulation of unpaid loans, implying that these loan losses have produced lower returns to many commercial banks (Miller & Noulas, 1997).

H1: There is significant and negative relationship between non-performing loan and bank's profitability.

Loan Loss Provision

Loan loss provision is an amount of money that a bank set aside from its annual earnings as a precaution against possible loss of a non-performing loan, or to offset a lost credit facility. Ahmad and Ariff (2007) examined the key determinants of credit risk of commercial banks on emerging economy banking systems compared with the developed economies and study found that an increase in loan loss provision is also considered to be a significant determinant of potential credit risk.

H2: There is significant and negative relationship between loan loss provision and banks profitability.

Loans and Advances

Loans and advances is a facility granted to a bank customer that allows the customer make use of banks funds which must be repaid with interest at an agreed period. Kithinji (2010) analysed the effect of credit risk management measured by the ratio of loans and advances on total assets and the ratio of non-performing loans to total loans and advances on return on total asset in Kenyan banks. The study found that the bulk of the profits of commercial banks are not influenced by the amount of credit and non-performing loans. The implication is that other variables apart from credit and non-performing loans impact on banks' profit.

H3: There is significant and positive relationship between loan and advance and banks profitability.

Liquidity

Liquidity measures the ability of banks to meet short-term obligation or commitments when they fall due. Liquidity is a prime concern for banks and the shortage of liquidity can trigger bank failure. Banking regulators also view liquidity as a major concern. This is because banks without sufficient liquidity to meet demands of their depositors' risk experiencing bank run. Holding assets in a highly liquid form tends to reduce income as liquid asset are associated with lower rates of return. For instance, cash which is the most liquid of all assets is a non-earning asset. It would therefore be expected that higher liquidity would negatively correlate with profitability.

H4: There is significant and negative relationship between liquidity and bank's profitability.

Capital Adequacy Ratio

Capital adequacy ratio (CAR) is chosen because it is the core measure of a bank's financial strength from a regulator's point of view. Capital adequacy ratio consists of the types of financial capital considered as the most reliable and liquid, primarily shareholders' equity. Bank with good capital adequacy ratio have good profitability. With good capital requirement, commercial banks are able to absorb loans that have gone bad. Bourke (1989) report a positive and significant relationship between capital adequacy and profitability. As indicated above following variables were taken to test the effects of credit risk management on the financial performance of the commercial banks. The study used the tools to test the significance of the independent variables and dependent variables.

H5: There is significant and positive relationship between capital adequacy ratio and bank's profitability.

RESULTS AND CONCLUSION

To achieve the purpose, the method applied to analyse secondary data are descriptive statistics, Pearson correlation coefficients and stepwise cross sectional regression analysis. The detail of data analysis has been presented in the respective sections.

DESCRIPTIVE STATISTICS

In this section it shows the average, standard deviation, minimum and maximum of overall data of profitability (ROA and ROE) as dependent variables, capital adequacy, non-performing loan ratio, loan and advance, loan loss provision ratio and liquidity are independent variables.

In the Table 1 which shows the descriptive analysis of variables, the return on asset ROA of 10 sample commercial banks is 1.84 percent on average. The return on assets varies in a wide range from a minimum of 0.92 percent to a maximum of 2.82 percent. The return on equity for sample bank on average is 17.57 percent with standard deviation of 2.66. The minimum value for return on equity is 9.79 whereas maximum value stands for 28.27 percent.

TABLE 1: DESCRIPTIVE STATISTICS (N=70)

Measures\Variables	Mean	Standard Deviation	Minimum	Maximum
ROA (%)	1.84	0.22	0.92	2.82
ROE (%)	17.57	2.66	9.79	28.27
CAR (%)	12.85	0.71	11.32	16.31
NPL (%)	1.82	1.94	0.4	4.46
LA (%)	77.17	2.15	57.73	84.4
LLP (%)	1.05	0.66	0.4	2.47
LQD (%)	31.62	1.52	25.38	40.15

Source: Annual report of sample commercial banks and results are drawn from SPSS 21.

The capital adequacy ratio for sample bank on average is 12.85 percent with standard deviation of 0.71. The minimum value for capital adequacy ratio is 11.32 whereas maximum value stands for 16.31 percent. The nonperforming loan for sample bank on average is 1.82 percent with standard deviation of 1.94. The minimum value for non-performing loan is 0.4 whereas maximum value stands for 4.46 percent. The loan and advance for sample bank on average is 77.17 percent with standard deviation of 2.15. The minimum value for loan and advance is 57.73 whereas maximum value stands for 84.46 percent. The loan loss provision for sample bank on average is 1.05 percent with standard deviation of 0.66. The minimum value for loan loss provision for is 0.40 whereas maximum value stands for 2.47 percent. The liquidity for sample bank on average is 31.62 percent with standard deviation of 1.52. The minimum value for liquidity for is 25.38 whereas maximum value stands for 40.15 percent.

CORRELATION ANALYSIS

In this section the correlation between profitability measures; return on asset and return on equity and explanatory variables; capital adequacy ratio, non-performing loan, loans & advances, loan loss provision and liquidity have been presented and analysed. A correlation matrix used to ensure the correlation between explanatory variables. Cooper & Schindler (2009) suggested that a correlation coefficient above 0.8 between explanatory variables should be corrected for because it is a sign for multicollinearity problem. Hair et al. (2006) argued that correlation coefficient below 0.9 may not cause serious multicollinearity problem.

TABLE 2: PEARSON'S CORRELATION MATRIX FOR DEPENDENT AND INDEPENDENT VARIABLES DURING THE PERIOD OF 2007/08 TO 2017/018

	ROA	ROE	CAR	NPL	LA	LLP	LQD
ROA	1						
ROE	0.917**	1					
CAR	0.524**	0.499**	1				
NPL	-0.306**	-0.396**	-0.633**	1			
LA	0.243**	0.139	0.319**	-0.274**	1		
LLP	0.348**	0.470**	0.575**	0.785**	0.239**	1	
LQD	-0.618**	-0.631**	0.516**	-0.347**	0.099	-0.417**	1

Source: Annual report of sample commercial banks and results are drawn from SPSS 21.

The single asterisk (*) sign indicates that result is significant at 1 percent level, double asterisk (**) sign indicates that result is significant at 5 percent level.

The ROA reflects the ability of a bank's management to generate profits from the bank's assets and this profitability measure is correlated with other explanatory variables either positively or negatively. In Table 2 below, the correlation analysis was undertaken between profitability measure; return on asset and return on equity and explanatory variables; capital adequacy, non-performing loan, loans & advances, loan loss provision and liquidity.

As per the Table 2, the correlation coefficient between return on asset and loans and advances was 0.243 which is the smallest positive coefficient as compared to other variables, this mean that commercial banks loans and advances have small association with profitability. This result shows that the liquidity of commercial banks which measured by the ratio of liquid assets to deposit have negative correlation with the profitability measured by return on asset.

Return on equity (ROE) is more concerned about how much the bank is earning on their equity investment. As described in the above table there is a positive relationship between return on equity and capital adequacy, loans & advances and liquidity. Again in this case liquidity has a considerable relationship with ROE (a coefficient of 0.631) whereas there is a negative correlation of -0.396 between return on equity and non-performing loan.

REGRESSION ANALYSIS

In order to test the statistical significance and robustness of the results, this study also relies on secondary data analysis based on cross-sectional regression model as specified earlier. It basically deals with regression results from various specifications of the model 1 and model 2 to examine the estimated relationship of bank performance (ROA and ROE) with capital adequacy and credit risk variables for cross-sectional data of 10 sample commercial banks that include 70 observations during the period 201/11 through 2017/18.

REGRESSION ANALYSIS OF RETURN ON ASSETS

The Table 3 shows that the beta coefficient for capital adequacy ratio is positive with return on asset which indicates that higher the capital adequacy ratio higher would be banks profitability.

TABLE 3: ESTIMATED RELATIONSHIP FROM REGRESSION OF RETURN ON ASSETS ON CAPITAL ADEQUACY, CREDIT RISK VARIABLES, AND LIQUIDITY RATIO FOR 10 SAMPLE BANKS WITH 70 OBSERVATIONS DURING THE PERIOD 2012 THROUGH 2018

Models	Intercept	CAR	NPL	LA	LLP	LQD	F	Adj. R ²	SEE
I	-0.010 (-2.15)*	0.232 (6.85)*					46.97*	0.269	0.016
II	0.023 (11.98)*		-0.141 (3.58)*				12.81*	0.086	0.018
III	-0.011 (-1.01)			0.040 (2.79)*			7.76*	0.051	0.019
IV	0.026 (11.36)*				0.675 (4.13)*		17.07*	0.114	0.018
V	-0.023 (-4.64)					-0.143 (8.74)*	76.43*	0.376	0.015
VI	-0.032 (-4.83)	0.124 (3.57)*					32.09*	0.427	0.014

Source: Annual report of sample commercial banks and results are drawn from SPSS 21

The single asterisk (*) sign indicates that result is significant at 1 percent level.

The Table 3 shows that the beta coefficient for loan and advance is positive with return on asset which indicates that higher the loan and advance higher would be banks profitability and it is significant and 1 percent level. The table shows that the beta coefficient for loan loss provision is positive with return on asset which indicates that higher the loan loss provision higher would be banks profitability. It is significant and 1 percent level. The table shows that the beta coefficient for liquidity ratio is negative with return on asset which indicates that higher the liquidity ratio lower would be banks profitability. It is significant and 1 percent level.

REGRESSION ANALYSIS OF RETURN ON EQUITY

The Table 4 shows that the beta coefficient for capital adequacy ratio is positive with return on equity which indicates that higher the capital adequacy ratio higher would be banks profitability.

TABLE 4: ESTIMATED RELATIONSHIP FROM CROSS-SECTIONAL REGRESSION OF RETURN ON EQUITY ON CAPITAL ADEQUACY, CREDIT RISK VARIABLES, AND LIQUIDITY RATIO FOR 10 SAMPLE BANKS WITH 70 OBSERVATIONS DURING THE PERIOD 2011/12 THROUGH 2017/18

Model	Intercept	CAR	NPL	LA	LLP	LQD	F	Adj. R ²	SEE
I	-0.006 (0.17)	1.608 (6.41)*					41.07*	0.243	0.120
II	0.227 (17.05)*		-1.329 (-4.80)*				23.07*	0.150	0.128
III	0.067 (0.825)*			0.167 (1.56)***			2.44***	0.011	0.138
IV	0.260 (16.613)*				6.622 (1.118)*		35.09*	0.214	0.123
V	-0.123 (-3.403)					-1.061 (9.060)*	82.08*	0.393	0.108
VI	-0.116 (-2.45)**	0.529 (-1.72)***	-0.392 (-1.34)			-0.851 (6.44)*	32.93*	0.434	0.104

Source: Annual report of sample commercial banks and results are drawn from SPSS 21

The single asterisk (*) sign indicates that result is significant at 1 percent level, double asterisk (**) sign indicates that result is significant at 5 percent level and triple asterisk (***) sign indicates that result is significant at 10 percent level.

The study reveals that capital adequacy, loans and advances and liquidity has positive significant relationship with ROA whereas nonperforming loan to total loan and loan loss provision to total loan have negative and significant relation with ROA. In case of ROE, loan loss provision to total loan has negative and significant relation with ROE. Liquidity, capital adequacy, loans and advances and non-performing loan has positive and insignificant relation with ROE.

SUMMARY AND CONCLUSIONS

Credit risk management is an important predictor of banking financial performance thus success of bank performance depends on risk management. Since the risk management in general has very significant contribution to bank performance, the banks are advised to put more emphasis on risk management.

Capital adequacy is a percentage ratio of a financial institution's primary capital to its assets, used as a measure of its financial strength and stability. A ratio that can indicate a bank's ability to maintain equity capital sufficient to pay depositors whenever they demand their money and still have enough funds to increase the bank's assets through additional lending. Banks list their capital adequacy ratios in their financial reports. It is stated in terms of equity capital as a percent of assets. Capital requirements imposed by regulators tend to be simple mechanical rules rather than applications of sophisticated risk models.

The major objective of this study is to analyse the effect of credit risk management and capital adequacy on performance of commercial banks in Nepal. However, the specific objectives are to examine the relationship of capital adequacy with bank performance in terms of ROA and ROE, to examine the capital adequacy, credit measures and non-performing loan in commercial bank of Nepal, to determine whether credit risk measured by nonperforming loan, loan loss provision, and loans & advances affects bank performance in terms of ROA and ROE.

This result shows that the liquidity of commercial banks which measured by the ratio of liquid assets to deposit have negative correlation with the profitability measured by return on asset. Return on equity (ROE) is more concerned about how much the bank is earning on their equity investment. As described in the above table there is a positive relationship between return on equity and capital adequacy, loans & advances and liquidity.

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