

Effect of Credit Risk Management Measures on Commercial Banks' Profitability in India

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Abstract

The present research work has examined the influence of credit risk management (CRM) measures on commercial banks' profitability in India. CRM measures are indicated as CAR (Capital Adequacy Ratio), NPLR (Non-performing Loans Ratio) and AQ (Asset Quality) while bank's profitability is measured as ROE (Return On Equity). The secondary data of selected banks have been extracted from the RBI website, annual report and statistical tables relating to banks in India for a period of 8 years from 2010-2017. The panel data regression model has been used to analyze the data. The research results exhibit a statistical significant association among CRM measures and financial performance of Indian commercial banks. These results indicate that NPLR and CAR are positively related to banks' financial performance (ROE) whereas asset quality has been found to be negatively related to ROE. Furthermore, this research reveals that NPLR and AQ are significant variables while CAR is found to be insignificant variable to explain ROE. In consideration to findings of this study, it is recommended to the banks for accelerating effective credit risk management strategies and policies, make stringent norms before granting advances to borrowers, create proper maintenance and controls over credit so that bad lending could be reduced to zero and ultimate aim of attaining higher profitability may be realized in true sense.

Key Words

Commercial Banks, Profitability, Capital Adequacy Ratio, Non-Performing Loans, Asset Quality, India.

INTRODUCTION

The aspect of credit risk management has emerged as one of the major issues in the field of the highly complex and competitive banking activities in the present scenario. Currently, the banking industry is the biggest monetary or fiscal organization which facilitates financial exchange and fulfils the large economic requirements of the country. Trades and industrial sectors are profusely reliant on the credits of these banking institutions. The precarious and unstable economic climate throughout the world has magnified the credit-related insecurity and this, in turn, is influencing the profit dimension (Berrios, 2013). In the present global market, all the leading world markets are targeting to gain and hold the lucrative clients for the purpose of generating more and more income and profits (Brown Bridge and Harvey, 2000). In the modern competitive and dynamic financial environment, the commercial banks are playing a decisive role in the financial markets. Banks cannot ignore risk factor associated with various financial transactions. Three types of risks such as monetary risk, operational risk and strategic risk are faced by the banks (Cornett and Saunders, 2002). There exists different types of risks threatening parameters like market risk, liquid risk, credit risk, country risk and exchange rate risk, but credit risk is a noticeable risk that puts banks into major stress as it involves fear of losing money. Therefore, there is an utmost need on the part of banking sector to manage the credit risk in an efficient and effective manner.

Credit Risk Management in Banks

Risk in lending arises when the borrower or the counterparty does not fulfil his/her commitments concerning to lending, trading, hedging settlements or the other financial transactions. While lending loans and advances, it has been the core activity of the banks to analyse the financial soundness or capability of the borrowers since its inception. Growth in the derivative markets has enlarged the scope of credit risk almost on the part of the banking sector. According to Basel (1999), credit risk has been explained as the prospective of borrower not making their predetermined contractual commitments when they do not fulfil their committed terms to banks.

In the banking sector, risk components have increased manifold due to liberalization, deregulation, global integration of the financial markets, growing fierce competition, market flexibility, cross-border business activities, changing socio-economic factors and increased foreign exchange transactions. All these speedy growth and development issues have given rise to the varied risk-related

problems. Amongst all these concerns in banking operations, credit risk has posed as the most challenging task for the commercial banks. Although lending business produces income for the banks, but it is also associated to the fear of losing money all times from the debtors.

Being one of the oldest and significant types of risk, banks inherit credit risk in its lending business. Credit risk or default risk arises when the borrower or the counterparty does not fulfil his/her commitments concerning to granting money, business operations, hedging settlements or the other financial transactions. The Basel Committee on Banking Supervision (2001) described chances of defaulting money so lent by the borrowers in time wholly or in part as the term credit risk. Higher credit risk interrupts the monetary position of the banks more because this factor influences the financial health as an internal determinant. Therefore, the management of credit risk is most important practice that includes identifying, measuring, aggregating, controlling and continuity in monitoring the credit risk (Greuning and Bratanovic, 2009).

As the global financial markets are amplifying and expanding, various kinds of risk are also enlarging simultaneously and becoming more complex pertaining to global inflation, exchange rate and interest rate fluctuations. The majority of banks have been working continuously to maximize their profits, and it is reflected as a focal point that the banks are centred on advantageous low-risk customers for customized and personalized packages in providing the credit (Saunders and Lange, 2001). Financial institutions are essentially significant for the economic development of any nation just like blood arteries are vital for the human beings since they put into force the financial possessions from those who are having it to those who are in need (Shanmugan and Bourke, 2003).

With the introduction of Basel norms, the concept of Credit Risk Management (CRM) has gained much importance. Due to increasing non-performing assets, a dire need arises on the part of Indian banking sector to improve capital adequacy ratio according to the new Basel Accord norms. Reducing the level of loan losses should be the priority of the Indian banks after the U.S. financial sector crisis happened due to bad lending practices. Thus, efforts should be made on qualitative loans lending along with its quantity after taking into consideration various factors associating with collaterals. As per the limits of RBI and Basel Accord, banks should maintain adequate capital adequacy ratio, NPAs and assess the part of risk properly. Credit risk is so vital to handle for the banks because primary revenue generates from the lending activities. Hence, credit risk management influences profitability in banks (Li and Zou, 2014).

According to previous researches, credit risk management is essential part of vital banking activities due to the fact that profitability, financial performance, survival, growth and expansion; all depend on effective credit. Therefore, the present study has been oriented to investigate the association between credit risk management and profitability of the Indian banks over a period of last eight years (2010- 2017). The results of the present research would be highly beneficial for banking institutions and strategy makers in maintaining their vital decisions associated with the credit risk management.

REVIEW OF LITERATURE

In the past decades, numerous studies have been carried out to analyse the relationship between credit risk management and financial performance of banks. The efforts were made towards making a base for the present research by reviewing the previous literature in the concerned thrust area.

Afriyie and Akotey (2013) have demonstrated a link between the credit risk and profitability with the help of an analysis of credit risk management and profitable aspects of a Ghanaian banking institutions. They have concluded that there lies a significant and positive link between the non-performing debts and profitability in the banks. So, banking institutions with greater loans can also produce the high profits which may be implied to the improper schemes of credit risk management. The Ghanaian banks charge the total expense of non-performing debts from the other clients by charging them higher interest rates. Likewise, Gizaw *et al.* (2015) have concentrated on the association between credit risk management as well as profit-making rates of the Ethiopian commercial banks. The results of this study indicate that an important link is present among bad loans, provision of bad loans and capital adequacy within the Ethiopian commercial banking institutions. On the other hand, Aduda *et al.* (2011) have observed a statistically significant association between CRM and profitability of the banks in Kenya by means of a regression model.

In credit risk, there is a fear that the customer would not be able to pay partially or fully their amounts in the given time. The credit risk management procedures insist upon the banks to determine a distinct procedure regarding the approval of fresh credit along with the allowance on the current credit. The protocols are monitored carefully and the required actions are implemented so that the risk in lending can either be controlled or lessened (Basel, 1999). There is a leading part to perform for commercial banking in the lending processes (Allen and Gale, 2004). Investment banking tasks are regularly carried out by commercial banks in numerous nations by providing new debt to the customers

(Gande, 2008). Several possible risks exist like liquidity risk, rate of interest risk, translation risk, market risk, fear of default and sovereign risk (Campbell, 2007) but still credit risk remains a major risk in the field of banks and financial mediators (Gray, Cassidy and RBA., 1997). The signs of credit risk comprise of the level of non-performing advances, bad loans or obligation for the loan losses (Jimenez and Saurina, 2006). Once the funds are moved from savers to persons who are in need, credit creation mechanism functions in a scientific way (Bernanke, 1993).

An association between the credit risk management measured as loan losses and bank financial performance measured as ROE and ROA for a five year dataset of Qatar Central Bank (QCB) has been investigated (Achou *et al.*, 2008); and a considerable amount of relationship has been found between the variables which reflects that careful credit risk management system is being adopted by the bank which results in the enhancement of their profits. Likewise, Hosna *et al.* (2009) undertook a study in four Swedish commercial banks to investigate the association between CRM and profitability. Credit risk management indicated as NPLR and CAR whereas financial performance was measured as ROE. This study revealed that NPLR affects ROE considerably more than that of CAR. Ho and Yusoff (2009) have surveyed fifteen financial institutions in Malaysia to find out the types of risk management approaches and risk controlling systems being followed by them. The study highlighted the three major strategies being considered by these financial institutions such as categorization in credit services, risk lessening and training and development of employees. Kithinji (2010) evaluated the association between credit risk management measured as loans and advances, non-performing advances and the profitability measured as return on total assets with the use of a panel regression model. The results of the study indicated that not only profitability but other variables also found to be dependent on level of loans and non-performing credit. Aduda and Gitonga (2011) evaluated an association amid loan losses and profitability as indicated by ROE of thirty Kenyan banks for 10 years (2000-2009) with the help of a regression model. This research work showed a significant impact of CRM on banks' financial health. Kolapo *et al.* (2012) conducted a quantitative research on five Nigerian banks to assess the association among the default risk and the profitability measured as Return On Assets (ROA) for the period of 2000-2010. The cross-sectional invariant results were found by the study which means more stringent actions on the abidance of regulations are required. Boahene *et al.* (2012) assessed a liaison between default risk and profitability of six Ghanaian banks from 2005 to 2009. Credit risk measures are indicated as NPLR, net charge-

off rate, and the ratio of pre-provision profit to net credit, whereas ROE reflects profitability proxy. The results of the study showed a positive and considerable liaison among the variables so involved in model which signifies that profitability is still higher even if rate of default risk is high. Baasi (2018) investigated the impact of non-performing loans on the profitability (ROE) on four major banks in Ghana. Two main independent variables were taken in the study such as non-performing loans (NPLR) and capital adequacy ratio (CAR). The results showed a negative relationship between NPLR and ROE whereas a significant positive relationship between CAR and ROE. Poudel (2012) attempted towards assessment of linkage between credit risk management (CRM) and profitability of 31 Nepalese banks from 2001 to 2011. CRM measured as rate of loan losses, expense on loan advances and ratio of capital adequacy whereas financial performance measured as ROA. This study exhibited that all credit risk management variables are negatively related to ROA although default rate has been found to be a significant variable of profitability. Adeusi *et al.* (2013) investigated the relationship between a system of risk management represented as liquidity, credit, and capital risks and profitability represented as ROE, ROA in 10 Nigerian banks from 2006 to 2009. The findings of the research showed a considerable relationship among the variables.

The foremost objective of every business organisation is profitability and it is very significant for business ventures to endure in the long-run. Profits are earned from its business operations and are calculated by revenues and expenditures (Waweru & Kalani, 2009). They have concluded that businesses which are having higher profitability have more potential of higher return on investments. Gakure *et al.* (2012) determined the credit risk management methods influencing the unsecured credit in Kenyan banks with the help of a regression equation in which dependent variable was loan performance whereas the independent variables were indicated as risk detection, risk measurement, monitoring of risk, credit approval and sanctions. The researchers found that risk identification, risk measurement and risk monitoring influenced the performance of unsecured bank loans to a greater extent. Wachira (2017) has carried out an empirical analysis to explore the link between CRM system and performance of Kenyan banks. The study indicated a stringent credit strategy exist in banks and properly adopted while sanctioning advances to borrowers.

Fredrick (2012) carried out a study to assess the liaison between the credit risk management indicated as CAMEL components and profitability indicated as ROE in Kenyan commercial banks. The results have shown that all CAMEL components have a weak association with ROE except that of Earnings

component of CAMEL. Likewise Munir and Bustamam (2017) assessed the impact of performance measured as CAMEL components on the profitability (ROI) in the Indonesian banks from 2010 to 2015. They have found a considerable performance impact based on CAMEL analysis on the profitability of sampled banks.

Arora (2013) has investigated the factors that lead to credit risk analysis in Indian banks and he also attempted to compare the credit risk analysis practices between the public and private sector banks. This research work has found two important determinants for analyzing credit risk as credit worthiness analysis and collateral requirements. These results also exhibited efficient credit risk management among Indian banks.

Kaaya and Pastory (2013) evaluated the linkage between the credit risk measures and financial health (ROA) of eleven banks in Tanzania with the help of a regression model. A negative relationship between the variables has been found which proves more risk in credit advancements would result into more losses to banks or low banking profits. Singh (2013) has studied several kinds of credit advancements, its implication on superiority of loans, making-up and issuing of various guidelines to SBUs for NPAs and recoveries, volume of exposure, periodical review of the performance, adequate controlling and monitoring mechanisms etc. Abiola and Olausi (2014) undertook a research work in seven commercial banks of Nigeria to investigate the relationship between credit risk management and profitability during the span of seven years (2005-2011). Credit risk management was indicated as NPLR and CAR whereas financial performance as ROE. Bad credit risk management strategies have been found to be present in the banks signifying that in spite of rising bad loans, the level of profitability is still high. Udom *et al.* (2018) assessed the relationship between the capital adequacy requirements and performance (ROA) of Nigerian commercial banks. Indicators of capital adequacy requirements were measured as total qualifying assets (TQA), adjusted shareholders fund (ASF), credit to risk-weighted assets (CRWA). The results of this research work revealed a significant and positive impact of capital adequacy measures on the performance of the banks. Afande (2014) examined the existing credit risk management practices used in Kenyan commercial banks which have adopted the latest practices of credit risk management. Li and Zou (2014) have determined the association between CRM indicated as NPLR and CAR and financial performance indicated as ROE and ROA of forty-seven European banks from 2007 to 2012. Both the independent variables are positively related to the profitability but NPLR has a statistically significant impact on profitability.

Singh (2015) has studied a relationship between CRM and financial health of ten public and ten private sector banks from 2003 to 2013. A considerable association has been found between the dependent variable taken as ROA and CRM variables considered as CAR and NPA. Kayode *et al.* (2015) evaluated the linkage between the credit risk and financial performance measured as ROA of six banks in Nigeria for a period of 2000-2013. This study demonstrated that credit risk management variables are negatively related to ROA. Implementation of stringent credit risk management practices is recommended to avoid anticipated credit losses and to enhance profitability. Koranteng *et al.* (2016) evaluated the management of credit risk measured as loan scrutiny, loan strategy, credit guidelines, monitoring, and non-performing loans in Ghana non-banking financial institutions (NBFIs). NBFIs has been found to be the major support provider to the firms in diversifying and increasing their business activities and there were some hindrances such as ineffective credit risk management practices which needed to be rectified in a scientific way. Oino (2016) examined an association among CRM and financial health of 7 public and 7 private sector banks from 2009 to 2012 in India. The findings of this study revealed that private sector banks are more capitalized and more profitable than public sector banks. Alfarra and Xiaofeng (2016) have investigated whether the banks in Palestine make and follow the practices of assessing, measuring and controlling the credit risk as per the new Basel Accord norms. The results showed that Palestine banks have adopted the practices and procedures of assessing the credit risk as per the international norms. Kattel (2016) investigated whether the banks in Nepal are conscious of tools, techniques and procedures for assessing, measuring and controlling of credit risk. Muigia and Maina (2018) examined the impact of credit risk management measures indicated as appraisal of advances, loan requirements, credit management tools and loan recovery procedures on the financial performance of commercial banks in Kenya with the help of both primary and secondary data. The authors found a positive and significant relationship among the study variables.

After reviewing the past studies, it is observed that there have been several studies on the credit risk management practices in banks but there are very few empirical studies carried out in India that has considered the influence of these credit risk management aspects on the financial performance of commercial banks. Thus, there is an urgent need prompted by these aspects to study the CRM and its impact on the profitability of commercial banks in India. In this view, we have attempted this present literature review which may serve as assistance to the managers and policy makers in Indian commercial banks.

RESEARCH OBJECTIVE

The present study intends to investigate the influence of credit risk management (CRM) measures on the profitability of Indian commercial banks over a period of eight years (2010-2017). A financial association has been investigated between the credit risk management measures taken as NPLR (Non-Performing Loans Ratio), CAR (Capital Adequacy Ratio), Asset Quality (AQ) and the bank's profitability measured as ROE (Return on Equity).

METHODOLOGY

The present research work has been carried out to determine whether credit risk management measures influence the financial performance of commercial banks in India over a period of 2010-2017. A financial association has been investigated between the credit risk management and banks' profitability. Credit risk management has been used as independent variable and its measures are taken as Capital Adequacy Ratio (CAR), Non-Performing Loans Ratio (NPLR) and Asset Quality (AQ); whereas banks profitability has been used as dependent variable.

The target population for the present study is the commercial banking sector in India. The study has selected 25 banks from three bank groups, namely State Bank and its associates, nationalized banks and new private sector banks on the basis of their higher investments as on March 31, 2016. It includes (1) State Bank of India & its (5) associates, (13) nationalised banks and (6) new private sector banks on the basis of their within the group higher investments. For the purpose of panel data analysis State Bank and its (5) associates have been considered as a single unit.

The data has been extracted from RBI website, annual report of the banks and statistical tables relating to banks in India. The panel regression model is adopted to analyse the data for examining the effects of CRM measures on profitability of the banks. The study has taken care of the problem of unit root (non-stationary) in panel data model technique. Stationary of all the independent variables and dependent variable under investigation are tested with the help of Augmented Dickey-Fuller (ADF) Test. Rejection of unit root (non-stationary) null hypothesis of all variables have been done. All variables are stationary at the second difference.

The panel regression model is specified as below :

$$ROE = \beta_0 + \beta_1 CAR + \beta_2 NPLR + \beta_3 AQ + e$$

Where,

β_0 = constant term

$\beta_1, \beta_2, \beta_3$ = coefficient of independent variables

e = error term

Credit risk management measures have been used as the explanatory/ independent variables in the study whereas profitability has been used as dependent variable. Independent variables and dependent variables are explained in detail as below :

Table 1
Definition of the Variables Employed in the Study

Variables	Measured as	Description
CAR (Capital Adequacy Ratio)	Independent Variable	$CAR = \frac{\text{Tier1 capital} + \text{Tier2 capital}}{\text{Risk-weighted Assets}}$
NPLR (Non-Performing Loan Ratio)	Independent Variable	$NPLR = \frac{\text{Ratio of Gross NPA}}{\text{to Gross Advances}}$
AQ (Asset quality)	Independent Variable	$AQ = \frac{\text{Ratio of Net Non-performing Assets}}{\text{to Net Advances}}$
ROE (Return on Equity)	Dependent Variable	$ROE = \frac{\text{Net Income}}{\text{Equity}}$

RESULTS AND DISCUSSION

Descriptive Statistics

Table 2 shows a descriptive analysis of sampled commercial banks in India. Profitability of the banks has been indicated by ROE and it shows an average value of 14.58% which exhibits that banks profitability is quite good over the study period. Credit risk management indicators show average value of CAR as 16.48% meaning thereby sufficient amount of capital is kept by the banks as recommended by RBI (9%) and Basel- III norms (8%). Mean value of NPLR and AQ are 4.50% and 3.40% respectively showing that the credit risk in sampled banks is on the lower side on an average basis. Low credit risk reveals that banks use effective and stringent credit risk management practices in their lending activities.

Table 2
Descriptive Statistics

	ROE	CAR	NPLR	AQ
Mean	14.5809	16.4820	4.5064	3.4067
Median	14.4184	12.9450	3.0713	1.595
Maximum	118.1654	81.0100	22.3900	69.6700
Minimum	-172.5800	9.6300	0.2003	0.0100
Observations	160	160	160	160

Multi-collinearity Test

Variance Inflation Factor (VIF) test has been performed to check the problem of multicollinearity.

Table 3
Collinearity Statistics

Independent Variables	Tolerance	VIF
CAR	0.6	1.668
NPLR	0.612	1.634
AQ	0.454	2.201

Dependent Variable : ROE

Table 3 indicates that there is no problem of multicollinearity, is found in the study as all VIF are below 10 and tolerance level is above 0.1 (Hair *et al.*, 1995).

Fitness of Model Testing

The panel regression analysis consists of mainly two models such as Fixed Effect Model (FEM) and Random Effect Model (REM). In Fixed Effect Model (FEM), heterogeneity among cases is allowed to have its own intercept value. The term fixed effect signifies when omitted variables are controlled that may differ between cases but does not vary over time, it is time invariant. Random Effect Model (REM) is applied when some omitted variables may not be varied over time but vary between cases and other variables may not vary between cases but vary over time (Sayrs, 1989). To check which model is suitable whether FEM and REM, Hausman test is used. The Hausman test at 5% level of significance specifies Random Effect Model is adopted for the analysis

Table 4
Results of Panel Regression (REM)

Independent Variables	Coefficients	Std. Error	t-Statistic	Sig. Value
CAR	0.618789	0.513795	1.204352	0.2309
NPLR	1.848321	0.502879	3.675480	0.0004
AQ	-4.006536	0.276371	-14.49695	0.0000
Constant	-0.221719	1.132656	-0.195751	0.8451
F-Statistic	83.85854			0.0000
R-Squared	0.684419			
Durbin Watson	2.541211			

Following two hypotheses are framed to investigate the fitness of regression model. With the help of F-statistic distribution test, the wellness of the model has been tested.

H_0 : The model is not appropriate (Independent variables do not explain dependent variable).

H_1 : The model is appropriate (Independent variables explain dependent variable).

If the significance value of F-statistic is less than 5% then accept H_1 and if the significance value of F-statistic is more than 5% then accept H_0 .

Table 4 shows that the value of significance (F-stat.) equals to 0.0000 which is less than 0.05, meaning thereby rejection of H_0 (null hypothesis) and acceptance of alternative hypothesis (H_1). Acceptance of H_1 means that the model applied is appropriate. Hence, it describes that independent variables explain dependent variable or it can be said that CRM measures have an impact on profitability. Furthermore, the variation in dependent variable can be explained by independent variables jointly under study with the help of value of R-square. Table 4 illustrates that approximately 68% variation in dependent variable measured as profitability (ROE) as a result of change in independent variables.

Correlation Analysis

Correlation analysis has been carried out to know the relationship between dependent and independent variables under study. For the purpose of examining the correlation between variables, following null hypotheses are framed :

H_0 : There is no significant correlation between CRM measures and profitability of commercial banks in India.

Sub-hypotheses:

H_{01} : There is no significant correlation between capital adequacy ratio and ROE.

H_{02} : There is no significant correlation between non-performing loans ratio and ROE.

H_{03} : There is no significant correlation between asset quality ratio and ROE.

The regression analysis results presented in Table 4 describes that sig. value/p-value of CAR equals to 23%, which is more than 5% level of significance meaning thereby H_0 cannot be rejected. It means research results confirm that there is no significant correlation between capital adequacy ratio and ROE. In other words, the regression analysis shows an insignificant relationship between CAR

and ROE. On the other hand, the p-values of NPLR (0.0004) and AQ (0.0000) has been found to be less than 5% which proves that there is a correlation between NPLR and ROE and it is significant to explain ROE. Furthermore, asset quality is also found to be a significant variable and it is correlated to ROE.

The impact of independent variables on the dependent variable is shown by the coefficient values. It can be observed from Table 4 that there is a positive impact of capital adequacy ratio and non-performing loans ratio on bank's profitability (ROE). On the other hand, asset quality ratio has negative effect on bank's profitability (ROE).

Divergence in dependent variable due to independent variables is also depicted by the values of coefficient. Below-mentioned is a regression equation of profitability (ROE), on the basis of values of coefficient.

$$\text{ROE} = -0.221719 + 0.618789 (\text{CAR}) + 1.848321 (\text{NPLR}) - 4.006536 (\text{AQ})$$

DISCUSSION

The present research work investigates the financial association among the credit risk management indicators and profitability of commercial banks in India over a period of eight years (2010-2017). The findings of the study point out towards that credit risk management measures considered under study have a statistical impact on the bank's profitability (ROE). The empirical results of the study indicate that non-performing loans ratio is positively related to banks' financial performance (ROE) and has found to be a significant variable to explain ROE. These observations prove that in spite of increase in loan losses, banks profitability increase. A positive relationship between NPLR and ROE implies that increasing bad loans lead to increase in profitability that is unusual to happen because notionally NPLR is expected to show negative relationship with profitability. Rising non-performing loans show poor credit risk management practices in banks. Banks should focus on reviewing and refining effectiveness of their credit risk management practices so that ultimate aim of attaining higher profitability may be achieved and poor lending practices could be lessened. On the other hand, capital adequacy ratio is positively related to banks financial performance (ROE) and has been found to be an insignificant variable to explain ROE. Capital adequacy ratio signifies that banks are keeping sufficient amount of capital to absorb loan losses. Higher CAR shows higher profitability of the banks. Banks are required to maintain an adequate amount of capital at all times to avoid any kind of financial shocks and remain sustainably progressive. So, a positive impact of CAR on profitability (ROE) exhibits that increase in CAR

may lead to increase in profitability (ROE). Notionally, it is expected to realize that CAR and profitability are positively related to each other. The findings of this study claim that though capital adequacy ratio is positive but it is insignificant.

Lastly, asset quality is negatively related to banks financial performance (ROE) of banks and has found to be a significant variable to explain ROE. Asset quality indicates the strength of banking institutions against loan losses. Here, asset quality means how much bad loans are represented out of net loans and advances. Better quality of advances help in reducing loan losses as weak assets that are ultimately recoverable from capital which may lead to the reduction in earning capacity and finally reduces the profitability of the banks. Theoretically, a negative relationship between non-performing assets and financial performance has been considered to be ideal. These results point out towards a negative association between AQ and ROE which explains that increase in asset quality results a decrease in financial performance (ROE), which means that if net non-performing loans increase, profitability would be decreased. Furthermore, the empirical results reveal that asset quality has a statistical significant impact on banking profitability (ROE).

A positive correlation between non-performing loan ratio and ROE is in agreement with the findings of Abiola (2014) and Li and Zou (2014), who found a significant relationship of NPLR with ROA and ROE while insignificant relationship of CAR with ROA and ROE. Boahene *et al.* (2012) also supports our results of a positive relationship between high default risk and profitability (ROE). The results are in disagreement with Kaaya and Pastory (2013) who found a negative association between credit risk indicators such as NPLR, Loan loss to gross loan, loan loss to net income with profitability measured as ROA. Gizaw *et al.* (2015) and Poudel (2012) in contrary observed a negatively significant correlation of non-performing loan with ROA and capital adequacy ratio with ROE. Further contrary to our results, Kolapo *et al.* (2012) found non-performing loans and loan loss provision ratio to be negative but significantly related to ROA. While, Asset quality is negatively related to banks financial performance (ROE) and has found as a significant variable meaning thereby increase in net non-performing loans may lead to decrease in profitability. However, our results are in agreement with previous researches that increase in bad loans result in reduction of banks profitability (Kolapo *et al.* 2012; Gizaw *et al.* 2015 and Poudel 2012).

CONCLUSION

The primary focus of this study has been intended to examine the linkage amid credit risk management measures and commercial banks' profitability in India for a period of 8 years (2010-2017). Credit risk measures are indicated as NPLR, CAR and AQ, while profitability is indicated as ROE. The panel regression model technique has been used to analyze the data. The empirical results of the study reveal that credit risk management indicators have statistical effect on bank's financial performance. Non-performing loans ratio and asset quality ratio have been found to be significant variables to explain ROE whereas capital adequacy ratio seems to be an insignificant variable in order to explain profitability. Furthermore, results also indicate a positive relationship between NPLR and ROE which is unusual to the fact that increasing bad loans may lead to increase in profitability. It defines the ineffectiveness of credit risk management practices. It has been found that CAR and ROE are positively related which means banks with higher capitals are having higher profitability (ROE). Capital adequacy ratio justifies that banks are keeping sufficient amount of capital to absorb loan losses. Theoretically, a positive association is expected between CAR and profitability. Banks are required to maintain an adequate amount of capital at all times to avoid any kind of financial shocks and to remain economically stronger. While, asset quality is negatively related to banks profitability (ROE) and has found to be a significant variable meaning thereby that increase in net non-performing loans out of total loans may result to decrease in profitability.

The overall results of study show a significant impact of CRM indicators on financial performance of banks, thus CRM system exhibits a vital role in banking activities. Banks should carry out the rigorous efforts towards devising better credit risk management strategies and policies in order to maximize their financial performance. Effectiveness of credit risk management practices should be reviewed and refined from time to time so that ultimate aim of attaining higher profitability may be achieved and bad lending practices could be avoided to minimum level.

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