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***RELATIONSHIP BETWEEN CREDIT RISK MANAGEMENT AND PROFITABILITY
PERFORMANCE OF INDIAN PUBLIC SECTOR BANKS***

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Abstract

Credit risk management of the banking sector is significant not only because of the Global Economic Crisis in the latest years but also cause of its huge impact on the bank's financial performance, development, and survival. Credit is one of the key sources of income of commercial banks; therefore managing the risk related to credit greatly impacts the bank's profitability. The study is to explore the relationship between credit risk management and banks' profitability of Indian public sector banks from the FY2009 to FY2019 for a sample of fifteen Indian public sector banks. The paper employs return on assets and return of equity as a dependent variable and capital adequacy ratio, non-performing assets ratio, leverage ratio as credit risk management measures, and being Independent variables. Secondary data collected from the Reserve bank of India database and official website. The study used descriptive statistics, analysis of variance (ANOVA), correlation analysis, and multiple regressions. It revealed that banks' profitability performance (ROA & ROE) having a positive and significant relationship with CAR; whereas NPA having a vice versa relationship. On the other hand, there is no significant correlation between profitability performance (ROA & ROE) and LR. The findings indicate that banks' profitability performance was inversely affected by non-performing loans that could expose them to large amounts of volatility and the global financial crisis. The study, therefore, suggested that banks need to strengthen their credit risk management strategies not only to raise revenue growth but also to maintain a portfolio of qualitative assets and pay more attention to non-performing loans.

Keywords: credit risk, return on assets, return on equity, non-performing assets, etc.

1. INTRODUCTION

The banking sector plays an important role in the country's economic development (**Das & Ghosh, 2007; Ali et. al., 2011; Sharma & Saharan, 2015; Singh & Sharma, 2018**). The banking sector provides financial assistance to various industries, such as construction, agriculture, textiles, manufacturing, etc. (**Sufian & Chong, 2008**). The banking institute helps to directly increase national income and their overall growth. In this way, banks help in economic-financial growth (**Dash, 2009**). Banking sector stability depends on their profitability and capital adequacy (**Naser; Ahmadi & Emami, 2013**). Core banking operations are carried out by providing loans to their clients to commercial banks in most countries (**Gande, 2008; Muhamet & Arbana, 2016**). Credit creation is the principal source of income for the bank worldwide from which banks are subjected to credit risk (**Boffey & Robson, 1995; Kargi, 2011; Serwadda, 2018**). Company and business depend primarily on loan grants from the banks (**Berrios, 2013**). Credit risk is by far the most important risk posed by banks, and their operational efficiency depends to a greater extent on accurate measurement and management of that threat than any other risk (**Basel, 1982**). Countries' unstable environment has raised credit risk to the banking industry and has impaired banks' profitability (**Boffey & Robson, 1995; Berrios, 2013**). Rising the non-performing loan levels indicates abnormal or insufficient collateral incentives, poor credit risk control, and severe loan mechanism interventions (**Stuart, 2005**).

2. REVIEW OF LITERATURE

Within credit risk management and banking performance, various studies are conducted worldwide.

Stuart (2005) observed that the commercial banking sector facing the highest level of non-performing loans ratio all over the world from 1999 to 2009. **Sufian and Chong (2008)** found that bank size, bank's credit risk, and banks' expense are correlated vice-versa with the profitability of banks, while non-interest income and capitalization have a positively correlated. **Vyas, Singh, and Yadav (2008)** studied the impact of capital adequacy requirements on the performance of scheduled commercial banks and observed that there is a positive relationship between capital adequacy ratio and profitability. **Hosna, et. al. (2009)** presented a positive association between credit risk and profitability of Sweden commercial banks from 2000 to 2008 where NPLR has a significant effect of CAR on ROE and suggested that improve the profitability banks require improving the credit risk management policies. **Aduda and Gitonga (2011)** investigated the relationship between non-performing loan ratio as credit risk management and ROE as the profitability of thirty commercial banks in Kenya from 2000 to 2009 and observed that NPLR is a negative relationship and statistically significant to ROE. **Afriyie and Akotey (2012)** reported the existence of a significant positive association between non-performing loans and bank profitability of rural and public banks in Ghana from 2006 to 2010. **Kolapo, Ayeni, and Oke (2012)** documented that increase in NPAs or loan losses provision reduces ROA, whereas a rise in total loan and advances gets better profitability. **Nawaz, et. al. (2012)** evaluated the impact of credit risk on the profitability of Nigerian banks from 2004 to 2008 and found that the level of loan and advances, non-performing loans are negatively related to bank profitability. **Poudel (2012)** studied the CRM and financial performance of Nepalese banks in Nepal and suggested that banks have to

make the policies for enhancing profitability not only for reducing the exposure of the banks to credit risk. **Abdelrahim (2013)** observed that capital adequacy, asset quality, management soundness, and earning found an insignificant impact on the effectiveness of credit risk management of Saudi Arabian banks. **Kithinji (2013)** observed that total loans and non-performing loans have no significant effect on the profitability of banks. **Kaaya and Pastory (2013)** analyzed the association between credit risk and bank performance in Tanzania. They used loan loss to gross loan, non-performing loan, loan loss to net loan, and impaired loan to gross loan as credit risk indicators and return on asset used as the bank performance indicator. The study resulted that credit risk has a negative association with bank performance, meaning that an increase in credit risk tends to lower bank performance. **Ogboi and Unuafe (2013)** found that ROA positively associated with credit risk management of Nigerian banks from 2004 to 2009. **Bhattarai (2014)** observed the significant negative effect of non-performing assets ratio on bank performance in the context of Nepalese commercial banks. **Li and Zou (2014)** studied forty-seven commercial banks in Europe from 2007 to 2012 and found that credit risk management and profitability of banks positively correlated during the study period. **Alshatti (2015)** exposed the positive effect of non-performing assets ratio on the financial performance of thirteen commercial banks of Jordan from 2005 to 2013. On the other hand, he also found that the capital adequacy ratio does not affect banks' financial performance. **Gizaw, Kebede, & Selvaraj (2015)** revealed that there is a significant relationship between the non-performing loan, loan loss provisions, and capital adequacy within the commercial banks of Ethiopia. **Noman, et. al. (2015)** studied the credit risk and banking profitability in Bangladesh and suggested that banks should introduce the major policy for increasing profitability and defending banks from the crisis. **Singh (2015)** recommended that the banks should follow the better credit risk management policies for profitability. **Bhattarai (2016)** analyzed the effect of non-performing loans on the profitability of fourteen commercial banks in Nepal from 2010 to 2015 and revealed that the profitability of banks is influenced by non-performing loan ratio, bank size, cost per loan assets, and gross domestic product growth. **Ndoka and Islami (2016)** recommended that commercial banks of Albania focus on managing credit risk particularly on manage and supervise non-performing loans. **Rahman, et. al. (2016)** evaluated the impact of financial ratios on non-performing loans of twenty commercial banks in Bangladesh from 2010 to 2015 and found that financial ratios have a major effect on NPLs apart from net interest margin and return on equity. **Shrestha (2017)** revealed that ROA and ROE are associated with credit risk determinants capital adequacy ratio, cost per loan assets, and assets growth ratio. **Singh and Sharma (2018)** studied the impact of credit risk on the profitability of twenty-six Indian public sector banks from 2011 to 2016 and revealed that there is a positive relationship between ROA and CAR, LPNPL, but ROA and NPLR have a negative relationship. **Dutta, et. al. (2019)** explored the Impact of non-performing assets on the performance and liquidity of scheduled commercial banks of India from 1997 to 2017. **Ekinci and Poyraz (2019)** analyzed the impact of credit risk on banks' performance of twenty-six banks of Turkey from 2005 to 2017 and found a significant relationship. **Al-Eitan and Khalid (2019)** studied the credit risk of Jordanian commercial banks and financial performance from 2008 to 2017 and the outcome showed that CR has a negative and major effect on return on assets and return on equity.

After review the pertinent studies, we can't overlook the importance of loans in the banking sector and their serious economic effects, it is tremendously vital to expose the relationship between credit risk and bank profitability.

3. Data and Methodology

The study used empirical research design. The study was conducted on the top fifteen public sector banks according to market capitalization and the period of the study was 11 years i.e., from 2008-09 to 2018-19. A secondary source of the data has been used. Data collected from the RBI official websites and annual reports of the banks. ANOVA and Multiple Regression have been used for analysis. The relationships of credit risk management and profitability performance of the Indian public sector banks were investigated with different estimated models. Data analyzed with the help of IBM SPSS 19.0 version.

3.1 Null Hypothesis

To validate the objectives of the study, null hypothesis formulate:

H₀₁: There is no significant relationship between credit risk management and return on assets of Indian public sector banks.

H₀₂: There is no significant relationship between credit risk management and return on equity of Indian public sector banks.

3.2. Variables Selection

In the study, credit risk management used as independent variables, profitability performance used as dependent variables, a group control variable is used to be public sector banks specifically. Five different indicators used which are as under:

Variables	Variable Name	Calculating Method
Independent Variables (Credit Risk Management)	Capital Adequacy Ratio (CAR)	Total Capital/RWAs
	Non-performing Assets ratio (NPA)	Non-Performing Assets/Total Loans
	Leverage ratio (LR)	Total debt/ total equity
Dependent Variables	Return on Assets (ROA)	Earnings before Interest and tax to total assets
	Return on equity (ROE)	Net Income after tax to Total Equity
Control Variable	Market Capitalization	

3.3 Model specification and estimation

The panel regression model is expressed as:

$$ROA = \beta_0 + \beta_1 \times CAR + \beta_2 \times NPA + \beta_3 \times LR + e_1$$

$$ROE = \beta_0 + \beta_1 \times CAR + \beta_2 \times NPA + \beta_3 \times LR + e_1$$

Where;

ROA = Return on Assets of Public Sector Banks for the period of 2008-2019,

ROE = Return on equity of Public Sector Banks for the study period,

CAR = Capital Adequacy Ratio for the period of 2008-19,

NPA = Non Performing Assets Ratio for the period of 2008-19,

LR = Leverage Ratio for the period of 2008-19,

β_0 = Intercept (Constant),

$\beta_1, \beta_2, \beta_3$ = The slope represents the degree with which bank's performance changes as the independent variable changes by one unit of variable, and

$e_{i,t}$ = error component.

4. EMPIRICAL RESULTS

Table 1: Descriptive Statistics of the Variables

Variable	Variables	N	Mean	SD	Minimum	Maximum
Dependent	ROA	165	0.24	1.05	-4.68	2.00
	ROE	165	3.30	19.14	-85.92	28.02
Independent	CAR	165	12.19	1.35	8.69	15.38
	NPA	165	4.06	3.47	0.17	16.69
	LR	165	17.22	4.15	-2.24	29.99

Source: RBI official website.

Table 1 contains the descriptive statistics of variables such as ROA, ROE, CAR, NPA, and LR calculated from the database of fifteen public sector banks in India for the period from 2008-09 to 2018-19. The number of observations for each variable is 165. The mean value of ROA and ROE (dependent variables) is 0.24 percent and 3.30 percent, respectively. On the other hand, the mean scores of independent variables *i.e.*, CAR, NPA, and LR are 12.19 percent, 4.06 percent, and 17.22 percent, respectively.

Table 2: Coefficient of Correlations among variables

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Variables		ROA	CAR	NPA	LR	Variables	ROE	CAR	NPA	LR
Pearson Correlation	ROA	1.000				ROE	1.000			
	CAR	0.561	1.000			CAR	0.550	1.000		
	NPA	-0.747	-0.532	1.000		NPA	-0.775	-0.532	1.000	
	LR	0.012	-0.156	-0.147	1.000	LR	0.083	-0.156	-0.147	1.000
Sig. (1-tailed)	ROA	-				ROE	.			
	CAR	0.000*	-			CAR	0.000*			
	NPA	0.000*	0.000*	-		NPA	0.000*	0.000*		
	LR	0.438	0.023*	0.029*	-	LR	0.145	0.023*	0.029*	-

Source: RBI official website. **Note:** *Significant at 5 percent level.

Table 2 demonstrates that the coefficient of correlation between the dependent and independent variables. Independent variables i.e. CAR, NPA, and LR are correlated with ROA, and coefficients of correlation are 0.561, -0.747, 0.012, and coefficients of correlation between ROE and independent variables are 0.550, -0.775, 0.083 respectively. There is a significant and positive relationship between ROA, ROE, and CAR; whereas ROA, ROE, and NPA having significant and negatively correlated. On the other hand, there is no significant correlation between ROA, ROE, and LR.

Table 3: Model Summary and ANOVA results

Model	R	R-Square	Adjusted R Square	Std. Error of Estimate	ANOVA	
					F	Sign.
1	0.773	0.598	0.590	0.67	79.703	0.000*
2	0.792	0.628	0.621	11.78	90.566	0.000*

Predictors (Constant): LR,CAR,NPA
Dependent Variable: ROA (Model 1) and ROE (Model 2)

Source: RBI official website. **Note:** *Significant at 5 percent level.

Table 3 shows the Model Summary and ANOVA results in which the value of R^2 (0.598) indicates that the credit risk management variable predicts the ROA to the level of 59.8 percent. ANOVA result shows that there is a significant relationship between ROA and CAR, NPA, LR. Therefore, the null hypothesis (H_{01}), i.e. there is no significant relationship of credit risk management and ROA of Indian public sector banks, is rejected.

Likewise, The Second Model Summary in which the value of R^2 (0.628) depicts that CAR, NPA and LR predict the ROE to the level of 62.8 percent and ANOVA results show that there is a significant relationship between ROE and CAR, NPA, LR. Therefore, the null hypothesis (H_{02}), i.e. there is no significant relationship between credit risk management and ROE of Indian public sector banks, is rejected.

Table 4: Coefficients of the Variables

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Model	Coefficients t test (sign.)		Standardized beta (β)	
	ROA	ROE	ROA	ROE
(Constant)	-1.056 (0.293)	-1.336 (0.183)	-	-
CAR	3.452 (0.001)*	3.344 (0.001)*	0.212	0.198
NPA	-10.446 (0.000)*	-11.312 (0.000)*	-0.641	-0.668
LR	-0.936 (0.351)	0.299 (0.765)	-0.049	0.015

Source: RBI official website. **Note:** *Significant at 5 percent level.

Table 4 presents that the coefficients of the credit risk management variables are included in the model for the prediction of the dependent variables (ROA & ROE). Standardized beta (β) values are used to compare the contribution of each independent variable. The negative standardized beta (β) coefficient implies an inverse relationship between the dependent variable and independent variables. The highest negative beta value of NPA indicates that NPA contributed the maximum to explain the ROA and ROE. The results of the *t*-test indicate that the sign value of the independent variables (CAR and NPA) are greater than 0.05, therefore it is concluded that the contribution of CAR and NPA is a significant for the prediction of the ROA and ROE.

5. FINDINGS AND CONCLUSION OF THE STUDY

Better credit risk management outcomes in better bank profitability performance. The negative standardized beta coefficient implies an inverse relationship between the ROA & ROE and NPA. The highest beta values for NPA indicate that NPA contributed maximum in explaining the ROA & ROE. This study revealed that there is a positive and statistically significant relationship between capital adequacy ratio and banking profitability performance (ROA and ROE) also supported by **Ogboi and Unuafe (2013)**, **Shrestha, (2017)**, **Tuladhar (2017)**, but opposing to that of **Poudel (2012)**. It also found that a negative and significant relationship between non-performing assets ratio and profitability performance (ROA and ROE) also supported by **Aduda and Gitonga (2011)**, **Kolapo, Ayeni, and Oke (2012)**, **Kaaya and Pastory (2013)**, **Li and Zou (2014)**, **Bhattarai (2014)**, **Ndoka and Islami (2016)** while, **Afriyie and Akotey (2012)**, and **Alshatti (2015)** found vice-versa results. On the other hand, these studies (**Kithinji, 2010**; **Nawaz, 2012**; and **Ogboi and Unuafe, 2013**) did not find association between non performing loans and profitability performance of banks. The study suggested that banks need to strengthen the servicing of loans and reduce non performing loans in order to reach greater profitability. It also suggested that the management should use precautions as it does not impact profitability during the credit risk policy setting up.

6. IMPLICATIONS AND FUTURE SCOPE OF THE STUDY

Besides that, the results and recommendations of this paper often apply to financial firms, customers, lenders, government agencies, industry experts, economists, or any other lenders who might make some important decisions as a source of useful knowledge.

Further scope of the present study could be research on the relationship between financial risk management and financial performance of Indian Commercial banks focusing on other risk management such as liquidity risk, market risk, or operational risk also.

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