

# Impact of Credit Risk Management on Financial Stability of Public Sector Banks in India

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## Abstract

**Objective:** The purpose of this study is to investigate the impact of credit risk management on financial stability in Indian commercial banks.

**Methods:** This study uses the Z-score to measure financial stability of banks. The key question is which factors affect the Z-score. The study uses secondary data from five public sector banks in India and spans the period of 2015-16 to 2020-21.

**Results:** According to the findings, non-performing loans have no significant relationship to Z-score, whereas loan loss provisions do have a negative relationship to z-score. Additionally, the capital adequacy ratio is positively correlated with the z-score, while a high deposit ratio negatively impacts financial stability.

**Keywords:** Public sector banks, Credit risk, NPAs, Financial stability, India.

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## **Impact of Credit Risk Management on Financial Stability of Public Sector Banks in India**

### **Introduction:**

Modern economies are driven by the banking industry. In an economy's success or failure, it plays a significant role as one of the major pillars of the financial system, particularly for developing countries. Their role is crucial in mobilizing deposits and disbursing credit to different sectors of the economy. The banking system boosts economic efficiency by mobilizing savings and allocating them to high-yield investments. The banking system is a reflection of the nation's economic health. Economic strength and efficiency are heavily dependent on a healthy and solvent banking system, in turn dependent on a strong financial system. The savings mobilized by sound banking systems are effectively deployed in productive sectors, while banks are able to meet their depositor obligations because of solvent banking systems. The banking sector dominates the Indian financial sector, accounting for more than half of its assets. Bank loans are the most important source of external financing for firms.

Banking in emerging economies is more than just financial intermediation; it is also a means of delivering government initiatives. A strong correlation exists between economic growth and the health of the banking sector, indicating that banking plays an important role in economic development.

As a result of their business activities, banks face several risks, including credit risk, interest rate risk, operating risk, market risk, liquidity risk, and solvency (or capital) risk. which affect the performance and activity of these banks, taking into consideration that the bank's primary objective is to maximize shareholder wealth, they seek to maximize their profitability through the exercise of the lending function, which is supposedly the core function and most of the income comes from these lending functions. The lending facilities offered by banks make it easier for individuals and

institutional investors to explore and expand productive investment opportunities. The bank collects the deposits of the people it saves, lends it to borrowers, and receives interest income in return. The difference between the interest banks pays on deposits and the interest they receive from borrowers generates cash flow for banks. The banks manage this cash flow by generating profits from interest payments and receiving, while assuming risks associated with providing credit to customers.

Considering that commercial banks obtain their income primarily through granting credit, credit risk is one of the major risks they face. Consequently, banks' profitability is affected by how they manage credit risk (Li and Zou, 2014). such a risk is inherent in any financial lending activity may be to an individual, trade, industry, transportation, agriculture, etc. As a result, lending and advances provide a significant source of income for financial institutions, but they also pose a credit risk, deteriorate asset quality, and adversely affect the performance of financial institutions if loans are not properly managed.

According to Chijoriga (1997) compared to other risks, credit risk poses the greatest threat to financial institutions' solvency, so it is the most expensive risk for them. It is possible for credit risk to cause serious losses and even bank failures because of the magnitude and extent of losses caused by it.

Managing credit risk is a critical element of commercial banks' lending processes, which cannot be overstated. There is a risk of default associated with loans and advances made to borrowers, whereas banks offer credit subject to borrowers repaying their loans. The bank's revenue declines when borrowers default on their loans, because the bank must make more provisions for loan losses. As commercial banks cannot predict what proportion of their borrowers will default, earnings will fluctuate, exposing them to additional risk of profit volatility (Onyiriuba, 2009). By managing credit risk effectively, banks can increase their goodwill and the confidence of

their depositors. It is therefore essential to have a good credit risk policy in order to protect a bank's capital adequacy and performance.

Accordingly, the study aims to determine the impact of credit risk management on the financial stability of Indian public sector banks.

### **Literature review:**

The literature review helps to find out the contribution of many researchers on the topic:

Kargi, (2011) examined how credit risk affected Nigerian banks' profitability. As a result of loans and advances, non-performing loans, and deposits, banks are exposed to a high level of liquidity risk. It is therefore important for management to implement a credit policy that does not negatively affect profitability, as well as to be aware of how credit policy affects their banks' operation to maximize profits and judiciously utilize deposits.

Kolapo, Ayeni, & Oke, (2012) The same model used by Kargi was used by Kolapo to investigate the quantitative impact of credit risk on Nigerian commercial banks' performance. In addition, they use regression analysis to show that credit risk has the same effect on bank performance across all banks examined. Additionally, results show that non-performing loans and provisioning reduce profitability as measured by ROA, whereas increases in loan advances positively affect profitability.

Parab & Patil, (2018) describes the issues related to the disruptive impact of impaired loans and the threat they pose to banks' capitalization and profitability as well as the impact of credit risk. The study involved 40 Indian banks, 24 of which were public and 16 private. According to their study, bank profitability, i.e., Net Interest Margin is determined by three independent variables, namely provision and loans, advances and deposits, loan loss provision.

Ahmad and Ariff, (2007) examined the key determinants of commercial bank credit risk on emerging economy in comparison to developed economies. According to Ahmad & Ariff, it is important to regulate banking systems that provide a wide scope of services. Management of risks is important for banks that focus on lending in emerging economies. Increased loan provision is also considered an important factor determining potential credit risk. Furthermore, the author states that emerging economy banks have a higher credit risk than developed economy banks.

Kithinji, (2010) reveal that non-performing loans and credit do not influence most commercial bank profit, suggesting profits are affected by other variables. It would be better for commercial banks that are eager to make high profits to focus on other factors other than credit and non-performing loans.

Ghosh and Das, (2005) focused on whether, government should require banks to meet capital adequacy standards, or alternatively, whether market forces can ensure bank stability. In this study, market forces were shown to motivate banks to select high capital adequacy ratios as a strategy for lowering borrowing costs.

Sharma, (2016), examined using regression analysis, the impact of NPAs (gross and net) on bank profitability (ROA, ROI and net interest margin). According to the results, a significant relationship exists between the variables. Thus, the profitability of Indian scheduled banks is said to be affected by the non-performing assets (NPAs).

Poudel (2012), for a period of 2001-2011, Poudel studied 31 commercial banks from Nepal to examine financial performance and credit risk management variables. According to the results, all proxies representing independent variables negatively influence the financial performance of the banks. Based on all factors, the default rate is the biggest determinant of a bank's financial performance.

Ogboi & Unuafe, (2013), examines the regulatory norms for credit risk management and capital adequacy in Nigerian commercial banks and their

impact on their financial performance. During the study period, the bank's performance has been positively impacted by good Credit Risk Management and capital adequacy, except for loans advanced by the bank, which negatively impacted profitability.

Noman, Chowdhury, Chowdhury, Kabir, & Pervin, (2015), This paper examines the impact of credit risk on the profitability of 18 private banks from Bangladesh using 172 observations derived from 2003 to 2013. In the Random Effect study, non-performing loans and loan loss reserves were found to have a reverse but significant impact on all profitability parameters, suggesting a prudential approach to credit risk management.

Abiola and Olausi (2014), An investigation have been conducted on Nigeria's commercial banks' performance in relation to credit risk management. A seven-year analysis of the financial reports of seven commercial banks was conducted (2005–2011). Model estimation was carried out using a panel regression model. Credit risk management indicators include non-performing loans (NPLs) and capital adequacy ratios (CARs) along with return on equity (ROE) and return on assets (ROA) as performance indicator. Nigerian commercial banks' profitability is significantly impacted by credit risk management, according to study.

Kodithuwakku, (2015), has assessed how credit risk management affects commercial bank performance in Sri Lanka using both primary and secondary data. As a performance indicator, return on assets (ROA) is used. Credit risk is measured by non-performing loans/total loans (NPL/TL), loan provision to total assets (LP/TA), and non-performing loans/total loans (NPL/TL). As per the result, Profitability is adversely affected by non-performing loans and provisions.

Thiagarajan, Ayyappan & Ramachandran, (2011), analysed the trend in non-performing assets for public and private banks between 2001 and 2010. Both private and public sector banks have shown consistent declines in non-

performing assets (non-performing loans compared to total loans) since 2001. During the sub-prime mortgage crisis during 2007-08, many developed economies faced serious credit risk issues, but Indian commercial banks recorded the lowest NPAs. However, the ratio shows a gradual increase for 2009 and 2010. Additionally, GDP growth and NPA are found to have an inverse relationship, whereas inflation and NPA have a positive correlation.

Maji & Dey found that Indian commercial banks' credit risk and insolvency risk were influenced by their size and capitalization. Based on the findings of the study, large size banks have lower gross nonperforming loans (GNPLs) and net nonperforming loans (NNPLs). Furthermore, capitalization has a positive impact on credit risk for both bank groups. Only banks with low capitalization show significant positive associations. Accordingly, no definite conclusions can be drawn regarding the association between level of capital and credit risk in the study.

A. Singh, (2014) found that there was a significant correlation between bank performance (return on assets) and credit risk management (nonperforming assets). In order for a bank to perform better, it must manage its credit risk better. Furthermore, a bank with a higher profit potential was able to absorb credit losses more effectively when they arose, resulting in better performance. There was also an inverse relationship between return on asset (ROA) and the ratio of non-performing assets (NPA). Consequently, higher interest incomes resulted in fewer NPAs, which is a sign of effective credit risk management.

Smarika Jain & Dr Sangeetha R., (2021) examined the relationship between capital adequacy and NPAs, as well as the financial condition of commercial banks. There were 13 banks selected in this regard, of which 7 were private sector banks and 6 were public sector banks, and data from 2009 to 2018 were selected. The study reveals that an increase in commercial bank's NPA results in a reduction in its profitability because of the significant and negative impact of NPA on ROE. Furthermore, an insignificant yet negative impact of capital adequacy ratio was found on return on equity.

In brief, based on the available literature, it confirms the numerous studies conducted on credit risk management and Indian banks' performance. However, no such studies have been conducted in recent years about the nexus between credit risk and financial stability, more specifically about the effect of management of credit risk on financial stability of Indian public sector banks. Since last few years profitability of banks is rapidly falling. some time, it is negative due to high non-performing loan. In this sense, credit risk and bank financial stability have become a serious research problem.

### **Objective of the study:**

In this study, we examined the role of credit risk management in public sector banks in India in order to determine their financial stability. In this respect, 5 commercial banks were selected (i.e., State Bank of India, Punjab National bank, Bank of Baroda, Indian Overseas Bank, Canara Bank) and data from 2015-16 to 2020-21 taken. The specific research objectives are explained below

- I. To have a descriptive account of the Indian public sector banks, particularly their financial stability and credit risk.
- II. To know the degree of association among the financial stability and credit risk variables of Indian public sector banks.
- III. To understand the movement of Z-score in the context of credit risk.

### **Research design & methodology:**

The research is based on secondary data of six years starting from 2015-16 to 2020-21 and consisting of 5 public sector banks in India (i.e., State Bank of India, Punjab National bank, Bank of Baroda, Indian Overseas Bank, Canara Bank). Based on market capitalization and availability of all types of data 5 commercial banks have selected for the study purpose. The secondary



data is directly sourced from the annual report of the relevant bank. To examine the impact of credit risk management on the financial stability of public sector commercial banks in India, the aforesaid secondary data have been analysed statistically. Since cross-sectional and time-series data have been used in this study, multiple regression analysis has been applied. To determine the impact of credit risk on financial stability of commercial banks in India, the following regression models have been used:

$$Z\text{-score}_{it} = \alpha_i + \beta_1 (NPLR)_{it} + \beta_2 (LLPR)_{it} + \beta_3 (CAR)_{it} + \beta_4 (BS)_{it} + \beta_5 (DR)_{it} + \epsilon_{it}$$

$$i = 1, 2, 3, 4, 5$$

$$t = 1, 2, 3, \dots, 6$$

where,  $i$  is the  $i^{\text{th}}$  bank and  $t$  is the time period for the variables.

#### Dependent Variables:

**Z-score** has now become a popular accounting measure of financial stability among the researcher. It is calculated as  $(ROA+CAR)/SROA$  where ROA represents a return on assets, CAR represents capital asset ratio and SROA represents the standard deviation of return on assets.

#### Independent Variables:

##### **Non-performing Loan Ratio (NPLR):**

An indicator of credit risk, non-performing loans serve as a proxy for how banks manage credit risk since non-performing loans are expressed as a proportion of gross loans to loan losses (Hosna et al, 2009). The bank's performance is directly impacted by high levels of non-performing loans, which reduce the bank's liquidity position and restrict credit expansion.

$$\text{Non-performing Loan Ratio} = \text{Non-Performing Loan} / \text{Loan and Advance.}$$

##### **Loan Loss Provision Ratio (LLPR):**

Loan loss provisions are cash reserves used by banks to cover problematic loans that may not be repaid. As a measure of how protected a bank is against future losses, the loan loss provision ratio is used. Banks with higher ratios are more resilient to future losses, including unexpected losses beyond the provision for loan losses.

$$\text{Loan Loss Provision Ratio} = \text{Loan Loss Provision} / \text{Non-Performing Loan.}$$

### **Capital adequacy ratio (CAR):**

RBI and the Basel norms both consider CAR to be a critical indicator of a bank's financial strength. An adequate Capital Adequacy Ratio leads to good profitability for the bank, and good Capital Adequacy Ratio enables it to absorb loan losses. A bank's total capital ratio must be at least 8%, implying that the bank needs to have permanent or near-permanent capital covering 8% of its risk-weighted assets. Ratios below 4% are considered undercapitalized by regulators and primarily used to grade bank capital adequacy.

Financial institutions are prevented from giving high rate of return due to CAR as a moderator against unforeseen events.

$$\text{Capital adequacy ratio} = (\text{Tire 1 capital} + \text{Tire 2 capital}) / \text{Risk-weighted Assets.}$$

### Control variables:

As control variables for the study, the following variables were used.

### **Bank Size (BS):**

The total assets of a bank determine its size. Bank size is inversely related to credit risk, as it is believed that a larger size will result in a bank's diversifying its activities, which decrease the risk of the bank. There will be a higher risk

associated with a small-sized bank since it cannot diversify its activities to many avenues.

### **Deposit Ratio (DR):**

As defined by Investopedia, a Bank Deposit is the money that is placed in banks for safekeeping and is deposited into savings accounts. A Bank Deposit represents a liability to the bank.

Due to its strong influence on results, Deposits was used as a control variable in order to test the dependent and independent variables.

$$\text{Deposit ratio} = \text{Deposit} / \text{Total Assets.}$$

## **Data analysis & findings of the study:**

### **Descriptive Analysis-**

Brief descriptive coefficients known as descriptive statistics are used to sum up a specific data set, which may be a sample of the complete population or a representation of it. Descriptive statistics are broken down into measures of central tendency and measures of variability, or spread. The mean and median are measures of central tendency, while the standard deviation or variance and the minimum and maximum values are measures of variability. Using descriptive statistics, we can describe the fundamental characteristics of the data in a study. They serve as the cornerstone for almost all quantitative analyses of data and are employed to convey quantitative descriptions in a clear and concise manner.

**Table1: Descriptive Statistics**

	N	Minimum	Maximum	Mean	Standard Deviation
NPLR	30	0.02	0.15	0.0618	0.03453
LLPR	30	0.33	1.69	0.6609	0.25810

CAR	30	0.09	0.15	0.1232	0.01666
BS	30	12.42	15.33	13.6408	0.85750
DR	30	0.73	0.89	0.8392	0.03709
Z-SCORE	30	3.09	9.25	6.4437	1.48260

Source: own calculation

In the Table 1, descriptive statistics are shown to provide an overview of the dependent and independent variables (Z-score, NPLR, CAR, LLPR, Bank size, DR). Mean value of Z-score is 6.4437 and SD is 1.4860, that indicates high fluctuation exist in the data set. While mean value of CAR is 0.1232 or 12.32%, which is more than 8% and SD is 0.01666. Which indicates that, selected banks are well capitalised. It means 12.32% of the bank's risk weighted assets must be covered by capital. It is important for banks to have good CAR because it means good profitability and it makes it easier for them to absorb bad loans. Ratio below 4% considered as undercapitalised as per Basel norms.

### Correlation Analysis-

Correlation is one of the most commonly used statistics and describes the degree of association between two variables, regardless of the unit of measurement. In order to measure the degree of linear correlation between variables, Karl Pearson correlation  $r$  is the most used correlation statistic. The following formula is used to calculate the Pearson correlation  $r$  –

$$r = \frac{\sum d'_x d'_y - \frac{(\sum d'_x) \times (\sum d'_y)}{N}}{\sqrt{\sum d'^2_x - \frac{(\sum d'_x)^2}{N}} \times \sqrt{\sum d'^2_y - \frac{(\sum d'_y)^2}{N}}}$$

Where,

$$d'_x = \frac{d_x}{h} \quad \text{and} \quad d'_y = \frac{d_y}{i}$$

$h$  = common factor of X series

$i$  = common factor for Y series

$d_x$  = Deviation of X series from assumed mean

$d_y$  = Deviation of Y series from assumed mean

$\sum d'_x d'_y$  = Sum of multiplies of  $d'_x$  and  $d'_y$

$\sum d'^2_x$  = Sum of squares of  $d'_x$

$\sum d'^2_y$  = Sum of squares of  $d'_y$

$\sum d_x$  = Sum of deviations of X series

$\sum d_y$  = Sum of deviations of Y series

$N$  = Total numbers of observations

Here symbol  $r$  represents correlation coefficient, and the coefficient  $r$  will always turn out to be between  $-1.0$  to  $+1.0$ . When correlations are negative, the variables have a negative relationship, and if correlations are positive, they have a positive relationship. Having a positive relationship means an increase in one variable results in an increase in another. Whereas, negative relationship means the two variables moves in opposite direction. Correlation coefficient measure the strength of association between two variables.

As shown in the table below, the correlation matrix tells us how variables are related. In this study Correlation can also be defined as dependence of one variable upon other(s). The diagonal line with '1' represents correlation of a variable with its own values.

**Table2: correlation analysis of variables (N=30)**

	NPLR	LLPR	CAR	BS	DR	ZSCORE
NPLR	1					
LLPR	-0.295	1				
CAR	-0.776**	-0.026	1			

BS	-0.668**	0.047	0.460*	1		
DR	0.337	-0.019	-0.188	-0.660**	1	
ZSCORE	-0.678**	-0.241	0.767**	0.658**	-0.510**	1

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

Source: own calculation

Table 2 show the correlation matrix of 5 public sector banks. The correlation coefficient between NPLR and Z-score is -0.678, which means there is a negative correlation between two variables. When bank NPLRs are high, the liquidity position of the bank is reduced as well as credit expansion, which negatively impacts the bank's performance and affects its financial stability. In other words, it indicates that low profitability is largely caused by an increase in Non-Performing Loans.

CAR has a positive relationship with Z-score. The degree of correlation coefficient between CAR and Z-score is measured on above table and their magnitude is high (0.767). It indicates more capitalized are more stable. Unexpected losses can be prevented by a high capital adequacy ratio.

The correlation coefficient between Bank Size and Z-score is 0.658 and the magnitude is moderate. It implies that a larger bank size has a better chance of diversifying its activities and thus will have a lower level of risk.

### **Regression Analysis-**

From the above analysis it can be said that the independent variables and control variables helps to predict the dependent variable Z-score to some extent.

To determine the impact of credit risk on financial stability of commercial banks in India, the multiple regression analysis have been used.

The below table represent the summary result of the regression model.

**Table: 3: Multiple regression results of 5 public sector banks.**

Source: own calculation. Here, ‘\*\*’ ‘\*’ represent 1 % and 5% level of

	MODEL (Z-Score)	
	coefficient	t - value
(constant)	8.765	1.140
NPLR	-9.3600	-1.064
LLPR	-1.749	-2.837**
CAR	42.693	2.992**
BS	0.226	0.830
DR	-10.636	-2.208*
R Square	0.811	
F-Statistic	20.600**	
Adjusted R <sup>2</sup>	0.772	

Significance respectively

The Table 3 describes the nexus between the bank’s specific credit risk factors with financial stability (Z-score) of 5 Indian public sector banks for 2015-16 to 2020-21.

The coefficient of C is 8.765 means if all study variables are taken to be Nil, then Z-score will be 8.765%.

The R-squared value, which is calculated as a coefficient of determination, represents how well the regression line approximates the real data points. Here R<sup>2</sup> value 0.811 implies 81.1% variation in Z-score have been accounted for by the independent variables and controlled variables, and the remaining 18.9% variation is still unaccounted for, which may be due to the external factors.

Value of adjusted R<sup>2</sup> is 77.2 %, it means power of model is good.

The F-statistic indicates whether the model has statistical significance. Here the value of F-statistics is 20.600 and it is significant at 1 % level. It means model is fitted.

Non-performing loan ratio is insignificantly related to Z-score. It means non-performing loan has no meaningful relation to financial stability.

Loan loss provision ratio and Z-score are negatively related, and the coefficient is statistically significant. It means high loan loss provision reduces financial stability; in other words, a regular basis of loan provision reduces financial performance as well as financial stability.

Capital adequacy ratio positively related to Z-score, and its coefficient is statistically significant. It implies that strong capital able to increase financial stability.

Deposit ratio negatively related to Z-score. It means high deposit ratio reduces financial stability. In other words, banks are unable to utilise their deposit in proper way to increase financial stability.

### **Conclusion:**

The study investigates how credit risk management impacts public sector banks' financial stability in India for the period 2015-16 to 2020-21. To study the relationship here we used the panel regression model.

Several interesting facts were revealed by the results about the credit risk management and financial stability of public sector banks in India. Non-performing loan (NPLR) has insignificant relationship to Z-score. While, loan loss provision ratio (LLPR) has negative relationship to Z-score and its coefficient is statistically significant. It means high loan loss provision reduces financial stability. In other word high loan provision is made for set of non-performing loan for this reduces financial performance as well as financial stability. Capital adequacy ratio positively related to Z-score. It means strong capital able to increase financial stability. High deposit ratio has a negative relation to financial stability. Which implies that, banks are not able to utilise their deposit in proper way to increase financial stability.

The empirical findings indicate that non-performing loans and loan loss provision ratios are major problems for achieving financial stability. While strong capital can increase financial stability.

*In this study there are some limitations that must be considered. One of the main limitations of the study is the use of sample banks. Here, only 6 public*



*sector banks were considered. The study also had the limitation of utilizing only three credit risk factors as variables. Therefore, further research can be done using a variety of data sets and variable types associated with credit risk.*

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