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Short Communication: Indian Public Sector Commercial Banks: An Empirical Analysis of Bank-Specific Determinants of Credit Risk

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Abstract

The public sector banks dominate India's financial sector and play a crucial role. Commercial banks are indispensable in the processes of capital circulation, capital integration, capital resource allocation, and overall societal demand and supply adjustment. But performing these vital roles, the commercial banks are associated with different risks out of which credit risk hampers them a lot. This risk attacks the major pillar of the banking industry i.e., solvency on which the industry survives. In this paper, a modest attempt is made to identify the bank-specific determinants of credit risk in the public sector commercial banks in India. Data was collected from the RBI database for the period 2005 to 2020 for 13 banks. Variables pertaining to credit risk, bank size, capital adequacy ratio, profitability, liquidity and diversification were taken. These variables were analysed with the help of different panel data analytical tools. The size of the bank, represented by the log of total assets, and diversification, measured as the ratio of non-interest income to total income, were found to positively and significantly influence credit risk in public sector commercial banks. The Return on Asset, Loan-deposit ratio, and Capital adequacy ratio were found to be negatively correlated with credit risk.

Keywords: Credit Risk, Bank Specific Determinants, Public Sector Commercial Banks

JEL Classification: G21, G32

Introduction

Commercial banks assist in the mobilization of savings and the channelling of funds into successful ventures to support a developing nation's capital development through their network of branch banks (Dudhe, 2017). A trustworthy and effective banking system must accomplish three things: provide a sizable profit, provide clients with high-quality service, and have enough money to lend to borrowers (Al-Homaidi et al., 2018). Through their activities, such as providing resources to the public and extending loans to various organisations for their success and economic development, banks and other financial institutions continue to be in the driving seat of promoting economic growth (Das & Ghosh, 2007; Thiagarajan et al., 2011; Bittu & Dwivedi, 2012; Alam et al., 2021). Investors and other stakeholders place a great deal of confidence in commercial banks than they do in unregulated financial firms since the banks are governed by the central bank of the country (Antony & Suresh, 2023). By establishing adequate and effective credit risk management policies, systems, and environments that involve credit risk assessment, identification, monitoring, and control, banks can sustain and enhance their profitability (Ali & Dhiman, 2019). Therefore, proper management of different risks from the commercial bank has to be kept in mind first after the 2008-09 global financial crisis.

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By engaging in lending activities among other risky endeavours, banks are associated with numerous risks such as credit risk, market risk, operational risk, liquidity risk, reputational risk, business risk, and systematic risk, where credit risk is listed first (Morina, 2020; Antony & Suresh, 2023). Credit risk, also known as counterparty risk, refers to the danger that bank borrowers would not return loans received, resulting in losses for the banks. The substantial amount of non-performing loans in commercial banks is a marker of the significant credit risk exposure. Loans that are taken out but not repaid by the borrower at least 90 days after the due date are referred to as non-performing loans (Morina, 2020). In banks and other financial institutions, credit risk alone accounts for over half of all risk factor (Islam, 2020). Credit defaults are now a major worry for management organisations and regulatory bodies due to the increase in non-performing loans that occurred worldwide in the years following the financial crisis. The bank's profitability would decline and its long-term economic potential would be hampered by its uncontrolled exposure to credit risk (Islam, 2023). Among all commercial banks in India, public sector commercial banks have adopted liberal and loose credit policies, and have highly concentrated loans on certain borrowers and specific sectors, i.e., huge credit exposures to a few large corporate borrowers and to a few sectors such as infrastructures, powers, steels, mining, and telecoms (Brahmaiah, 2019). That increase the chance of non-performing assets as well as credit risk of these banks.

The high ratio of non-performing loans adversely affects banks' profits, and this ratio is always at odds with the development of the economy. Due to the importance and role of the banking system in economic development, it is necessary to analyse the factors or determinants of credit risk, given that this type of risk directly and negatively affects the performance of banks (Morina, 2020).

Review of Literature

Any economy aspiring for growth needs the public's and investors' trust in its banks. Increasing NPA levels cause "runs" on the financial system by undermining the trust that investors, depositors, and other stakeholders have in banks. Therefore, credit risk management plays a crucial role in helping banks lower their non-performing assets (NPA) since it boosts their long-term viability and profitability (Islam, 2020; Agarwal et al., 2021; Chaudhary & Kumar, 2023; Islam, 2023). Credit risk analysis of any financial institution starts with the ownership structure. Public sector commercial banks, being owned by public authorities, often adopt liberal and lose credit policies which enhance the risk of credit (Brahmaiah, 2019). In terms of performance against credit risk, private banks tend to much better than public banks (Sharifi et al., 2019). But Antony and Suresh (2023) stated that public sector bank performs better in context of credit risk because of their conservative approach. Following the implementation of Basel III norms, banks' operational efficiency has decreased because of the increased capital requirements, which place an additional financial burden on them. This negatively affects lending, profitability, and operational performance (Jangra, 2020).

In case of public sector commercial banks, both macroeconomic factors and bank-specific factors affect credit risk of the banks. Regarding bank-specific factors, credit growth and return of equity had a statistically significant negative impact on credit risk (Veni & Asfaw, 2015; Kasana & Naveed, 2016; Jegadeeshwaran & Basuvaraj, 2019; Antony & Suresh, 2023).

Both in short-run and long-run, the capital adequacy ratio has significant impact on credit risk as it reflects that how a bank could meet its obligations. Due to moral hazard hypothesis, the banks with low capital tend to be riskier by undertaking excessive lending and face higher NPAs as proxy for credit risk ((Kasana & Naveed, 2016; Gila-Gourgoura & Nikoladou, 2017; Bawa et al., 2019). As a result of the moral hazard incentives, banks may increase the risk in their loan portfolio as a result of low capital ratios (Kharabsheh, 2019). Therefore, Banks must maintain a sufficient level of capital to stay stable and handle unforeseen circumstances (Ali & Dhiman, 2019).

Once again, interest rate growth rate, loan-to-deposit ratio, and bank size have shown a positive impact, while GDP growth rate had negative impact on credit risk (Kasana & Naveed, 2016; Jayadev & Padma, 2020; Kharabsheh, 2019). GDP growth, real loan growth, operating expenses, and bank size play an important role in influencing problem loans (Das & Ghosh, 2009; Kasana & Naveed, 2016; Jegadeeshwaran & Basuvaraj, 2019). The extent of bank diversification was also found to positively affect bank health indicating that greater

bank diversification will lead to a fall in credit risk (Bawa et al., 2019; Antony & Suresh, 2023). A negative correlation between bank liquidity and credit risk actually demonstrates how the capacity to produce loanable funds and prudent loan disbursement positively affects bank confidence for the client and borrower, which in turn lowers bank credit risk. By creating resource mobility in the screening and monitoring of credit management, as well as ultimately reducing credit risk for the bank, the increase in profit really helps to increase efficiency (Islam, 2023). To recover the non-performing assets (NPAs) and to ensure the financial sustainability of Indian commercial banks, it is essential to implement asset classification, an appropriate credit appraisal system, effective training for bankers, appropriate follow-up, and enforce strict recovery measures (Sahoo & Majhi, 2020; Sushmitha & Nagaraja, 2020).

Public sector banks have a higher vulnerability to negative economic shocks in stressful time with less capital and high-risk assets when compared to the private sector and foreign banks (Antony & Suresh 2023). In most of the time of economic instability banking policies may be used as the correcting measure at that time. Therefore, mostly we have to focus on the institutional determinants of credit risk. To ensure the stability of the financial sector, attention should also be paid to managerial behaviour through the implementation of solid corporate governance practices (Kharabsheh, 2019).

However, by analysing the above discussed literature, it is found that the bank-specific variables reflect ambiguous result regarding the effect on credit risk. That means, the same variables like bank size, capital adequacy ratio, profitability, loan to deposit ratio, diversification, etc. demonstrate both positive as well as negative relation with credit risk in different studies. Therefore, the present study tries to find out that how bank-specific determinant affects the credit risk in Indian public sector banks.

Research Methodology

For this analysis, secondary data on public sector commercial banks has been collected from the RBI database from 2005 to 2020. An econometric analysis has been undertaken to study the relationship between dependent variables and independents variables by using Ordinary Least Ssquare model (OLS), Random Effect Model, and Fixed Effect Model. The study also used a correlation analysis between the variables and the descriptive statistics of the variables (Table 1).

Table 1: Specification of Variables

Variables	*Measurements*	*Paper*
Credit Risk	Non-performing Loan/ Total Loan	Thiagarajan et al., (2011); ASFAW & Veni, (2015); Raei et al., (2016); Kasana & Naveed, (2016) Antony & Suresh, (2023)
Bank Size	Log (Total Assets)	Das & Ghosh, (2007); ASFAW & Veni, (2015); Kasana & Naveed, (2016) Antony & Suresh, (2023)
Capital Adequacy ratio	Total Capital/ Total Asset	Kasana & Naveed, (2016)
Profitability	Total Income/ Total Assets	Raei et al., (2016); Kasana & Naveed, (2016) Antony & Suresh, (2023)
Loan to Deposit Ratio	Total of Loans & Advances/Total Deposits	Kasana & Naveed, (2016)
Diversification	Non-Interest Income / Total Income	ASFAW & Veni, (2015)

Source: Authors' own calculation.

The model is

$$CR_{it}=\alpha+\beta_1 BS_{it}+\beta_2 CAR_{it}+\beta_3 ROT_{it}+\beta_4 LDR_{it}+\beta_5 DV_{it}+u_{it}$$

Where,

i= cross section unit

t= time period

CR= Credit Risk (measured by Gross NPAs to Gross Advances Ratio)

BS= Bank Size (Logarithm of total assets)

CAR= Capital Adequacy Ratio (Ratio of total capital to total asset)

ROA= Return on Asset (Ratio of net income to total asset)

LDR= Loan to deposit Ratio

DV= Diversification (Ratio of Non-interest income to total income)

U_{it} = Error term.

The robustness of the results has been statistically checked through Hausman Specification Test which shows that out of fixed effect model and random effect model, which one is the efficient one.

Results and Discussions

In the Indian banking sector, especially public sector banks have undergone a numerous evolution. As a result, behaviour of various factors affecting to credit risk also changes. Therefore, initially we have to discuss about the descriptive statistics of the major variables affecting credit risk of commercial banks, as presented in Table 2. Though the mean value of credit risk is 6.82, there is a huge fluctuation between banks over the years as reflected by standard deviation of 5.69. Coming to independent variables, the mean values of bank size, diversification, capital adequacy ratio, loan to deposit ratio and profitability are 5.39, 11.63, 12.12, 69.42, and 0.32 respectively. All the banks being the public sector banks, bank size and profitability are less fluctuating from bank to bank over the years with standard deviation values 0.41 and 0.96 respectively. However, diversification, capital adequacy ratio, and loan-to-deposit ratio displays some level of variation over the years. In between loan-to-deposit ratio highly deviates from bank to bank because to capture the maximum market share different banks adopt different policies for advancing loan.

Table 2: Descriptive Statistics

Variables	*Minimum*	*Maximum*	*Mean*	*Std. Deviation*
Gross NPAs to Gross Advances Ratio (%)	1.27	25.29	6.82	5.69
Log of Total Asset	4.46	6.60	5.39	.41
Diversification	5.38	21.79	11.63	3.14
Capital Adequacy Ratio	5.56	18.16	12.12	1.43
Loan to Deposit Ratio	32.99	85.71	69.42	8.37
Return on Assets	-4.17	2.01	.32	.96

Source: Authors' own calculation.

Based on the correlation analysis presented in Table 3, the study has identified that bank size and diversification are positively but not highly correlated with credit risk of public sector banks. Other variables like capital adequacy ratio, return on asset, and loan-to-deposit ratio have shown a negative correlation with credit risk. But here return on asset and shows a higher correlation with credit risk than the rest two variables. Here the correlation table also helps to access the possibility of multicollinearity among the independent variables. Low correlation among the independent variables shows that multicollinearity problems are not present.

To ensure higher reliability, a Variance Inflation Factor (VIF) test was carried out to detect multicollinearity problems in Table 4. All VIF values below 1.6 demonstrate the absence of multicollinearity among independent variables.

Table 3: Correlation Analysis

Correlation (Probability)	*Gross NPAs to GAR*	*Log of Total Asset*	*Capital Adequacy Ratio (CAR)*	*Return on Assets*	*Loan to Deposit Ratio*	*Diversification*
Gross NPAs to GAR	1.00					
Log of Total Asset	0.28 (0.0016)	1.00				
CAR	-0.27 (0.0001)	0.14 (0.0514)	1.00			

Correlation (Probability)	Gross NPAs to GAR	Log of Total Asset	Capital Adequacy Ratio (CAR)	Return on Assets	Loan to Deposit Ratio	Diversification
Return on Assets	-0.58 (0.0000)	-0.07 (0.3279)	0.50 (0.0000)	1.00		
Loan to Deposit Ratio	-0.31 (0.0000)	0.40 (0.0000)	0.08 (0.2247)	0.25 (0.0004)	1.00	
Diversification	0.30 (0.0000)	0.07 (0.2876)	0.13 (0.0621)	-0.08 (0.2453)	-0.31 (0.0000)	1.00

Source: Authors' own calculation (GAR= Gross Advances Ratio)

Table 4: VIF Test Result

Variables	VIF
Log of Total Asset	1.343
Capital Adequacy Ratio	1.428
Return on Assets	1.512
Loan to Deposit Ratio	1.498
Diversification	1.187

Source: Authors' own calculation.

Determinants of Credit Risk

For panel data analysis the study has used Eviews 12 toll. Here we can go with three types of analysis like pooled regression analysis, fixed effect model and random effect model (Table 5-7).

Table 5: Pooled Regression Analysis

Variables	Coefficient	Probability
Constant	-1.20	0.796
Log of Total Asset	4.01	0.000
Capital Adequacy Ratio	-0.39	0.111
Return on Assets	-2.60	0.000
Loan to Deposit Ratio	-0.17	0.000
Diversification	0.32	0.001
R-squared= 0.476	F-statistic =36.749	Durbin-Watson stat= 0.467

Source: Authors' own calculation.

This regression analysis is statistically significant with probability value equal to 0.000. Here the independent variables explained 47.63% variation in dependent variable. Except capital adequacy ratio all other variables are statistically significant in explaining the dependent variable. However, weather this Ordinary Least Squares (OLS) analysis is efficient or not can be tested through Breusch-Pagan Test (Table 6).

In this test cross-section element shows statistical significance of the model but the time series element is not statistically significant with probability equal to 0.08. So, for proper estimation we have to go for random effect mode or fixed effect model.

Table 6: Random Effect Model

Variables	Coefficient	Probability
Constant	-4.32	0.27
Log of Total Asset	4.63	0.000
Capital Adequacy Ratio	-0.38	0.052
Return on Assets	-2.49	0.000
Loan to Deposit Ratio	-0.18	0.000
Diversification	0.35	0.000
R-squared= 0.474	F-statistic =38.485	Durbin-Watson stat= 0.482

Source: Authors' own calculation.

For panel data analysis, I have used random effect model. This estimation shows that the study is statistically significant and 48.78% of the dependent variable is explained by the independent variables. Notably, only variable that capital adequacy ratio shows statistical insignificancy and all other variables are statistically significant. Variables such as capital adequacy ratio, return on assets, and loan-to-deposit ratio reflect a negative influence on credit risk representative i.e., gross NPAs to gross advances ratio where as other variables like bank size and diversification have positive influence.

Now instead of random effect model, there is another model called fixed effect model is available for panel data analysis. So here we have to check that which one is appropriate for our study. For this, there is a test called Hausman Test is available. From this analysis, we have to accept the null hypothesis that random effect model is not statistically significant as the probability value is less than

0.05. Therefore, for our study, the random effects model is deemed inefficient, and we should proceed with the fixed effects model.

Table 7: Fixed Effect Model

Variables	*Coefficient*	*Probability*
Constant	-49.42	0.0000
Log of Total Asset	12.29	0.0000
Capital Adequacy Ratio	-0.39	0.0522
Return on Assets	-1.23	0.0002
Loan to Deposit Ratio	-0.19	0.0000
Diversification	0.72	0.0000
R-squared= 0.683	F-statistic = 24.06	Durbin-Watson stat= 0.845

Source: Authors' own calculation.

With the fixed effects model, it was observed that almost 68.30% of the variation in credit risk is explained by the aforementioned variables. All independent variables, except capital adequacy ratio are found as significant in explaining the dependent variable as the p-values are less than 0.05. The variables like bank size (log of total asset) and diversification influence positively to the credit risk and capital adequacy ratio, return on assets and loan to deposit ratio influence negatively to the credit risk.

The variable return on assets, which reflects the profitability of bank found to negatively affect credit risk of public sector commercial banks because one bank with high profits has less incentive to generate income and less liable to engage in risky activities, such as risky lending. The bank size and the credit risk are positively related in our study. This is because in larger bank, there is a massive mobilization of fund through branch expansion and provision of attractive deposit rate. Consequently, these banks have the capacity extend credit, which exposed the banks to credit risk.

Capital adequacy refers to the minimum level of capital that banks need to maintain as their reserve to ensure their ability to repay debts and deposits as needed and prevent the bank from banking distress. In our study, capital adequacy ratio has negative impact on credit risk of bank, because by maintaining sufficient capital level less reserve is available with bank to lend. So, with less reserve to lend, the banks mostly go for potential lending with less risk. Additionally, a well-capitalised bank has lower rate of bankruptcy costs and can reduce bank distress and failure.

Similarly, the variable loan-to-deposit ratio has negative effect on credit risk of bank backed by the fact that when a bank wants to go for potential lending by analysing the credit score of the borrower properly, less default will be found in regard to the loan repayment. So, the bank has to go for more potential lending to reduce capital risk.

In this study, diversification is reflected by the ratio of non-interest income to total income of the bank. The sources of non-interest income are like investment on government securities, insurance commissions, venture capital investment, credit card annual charges, over limit charges, late payment charges, loan processing fee, penalties, etc. Initally, it was expected that a negative relation between diversification and credit risk. But our study reflects a positive relation. This is happened because most of the non-interest income comes from the sources like credit card charges, over limit charges, loan processing fee, penalties on cheque bounces, etc. Again, this may arise because when initially a bank goes for diversification, its maintenance cost may high. This results in low earning for bank. So, to generate instant earning bank may go for quick lending without analysing the potential of repayment properly.

Conclusion and Policy Suggestions

Now we can conclude from the above analysis that excessive asset size, higher range of diversification, lower capital availability, and lower profitability are useful pointers to the deterioration in the financial health of banks and can be employed as early warning indicators of future problem loans.

While in future studies both the financial and non-financial sectors may be included, this study employed financial institutions to calculate credit risk. In contrast to future studies, which may use the Generalized Method of Moments for better analysis of the results, this study used regression modal and random fixed effect modal to analyse the credit risk.

The following suggestions were made in light of the regression analysis's conclusions and findings in general. Bank managers should place more emphasis on loan

quality than loan quantity in order to increase advances. Some managers did not fully consider the financial situation of the consumer while granting the loan. This causes banks to deal with non-performing loans. Conversely, management needs to strengthen internal controls to control the minimum capital required for banks' risk-taking practices. Most banks disregard this crucial element, putting their solvency at danger as a result of giving out too many loans. The loan department has to be more effective at following up with customers prior to their due dates and should assess potential borrowers for credit based on their moral and financial standing.

In order to grow in advance, bank managers should focus on the quality of loans instated of the number of loans. Some managers did not give full intention toward consumer financial position and grant the loan. Due to this factor banks face non-performing loans. On the other side, management should improve the internal control system to regulate the minimum capital requirement for risk-taking behaviour in banks (Kasana & Naveed, 2016).

It is suggested that the PSBs should develop necessary skills across all the levels and all their products and services. The government has to introduce flexible compensation packages and incentives to the top and senior management of PSBs so that they will improve the profitability of the PSBs and curtail the NPAs. The RBI's regulation should be ownership neutral. All banking regulatory powers of the RBI and its approaches in regulatory policies shall be neutral to bank ownership (Brahmaiah, 2019).

Limitation

The study has focused on 13 banks with 6 variables. However, it can be extended by including more banks and more macroeconomic variables like GDP growth rate, interest rate, inflation rate, exchange rate, etc., can offer as the factors affecting credit risk.

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