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Credit Risk and Public and Private Banks' Performance in India: A Panel Approach

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ABSTRACT

The study is mainly concerned with Credit Risk and Public and Private Banks' Performance in India and uses panel data of 40 commercial banks, comprising of 24 public and 16 private banks which were listed on Bombay Stock Exchange during the study period. The study employs various credit risk ratios as independent variables and three performance indicators as dependent variables for a period of 16 years from 2000-01 to 2015-16. The proxy for credit risk used in the study include Gross Non Performing Asset ratio, Loan Loss Allowance to Total Advances, Capital Adequacy Ratio, Credit Deposit Ratio, Loan Loss Allowance to Non Performing Assets, Loan Loss Allowance to Assets, and Advances to Assets. Deposits and Size have been used as control variables. Return on Assets, Return on Equity and Net Interest Margin have been used as proxy for performance. The result of the Random Effect Model shows that there is positive and significant relationship between Loan Loss Allowance and all the three performance indicators used in the study. Credit Deposit ratio is also significant at varying level and positively influences all the three performance indicators. Loan loss Allowance to Non Performing Asset is significant and inversely influences all three performance indicators. Loan loss Allowance to Total Assets is significant for two performance indicators viz., NIM and ROE and positively influences the same.

Keywords: Credit risk, performance, panel study, non performing assets, loan loss allowance, credit deposit, Capital Adequacy Ratio, Return on Asset, Return on Equity, Net Interest Margin.

INTRODUCTION:

Banking industry acts as the catalyst for the economy of any country and has become an indispensable segment of the economy contributing to the economic sustainability of a country. In emerging economies, banks are more than mere agents of financial intermediation and shoulder the additional responsibility of achieving the government's social agenda also and thus indicating close relationship between banking and economic development and correlation between the overall growth of the economy and the health of the banking industry. The banking system reflects the economic health of the country as the strength of the economy depends on the strength and efficiency of the financial system, which in turn depends on a sound and solvent banking system. A sound banking system efficiently deploys the generated savings in productive sectors and in turn meets its obligation towards the depositors. The banking system is one of the most essential components of a robust economy of any country.

The main objective of the bank is to maximise the wealth of their shareholders and to achieve this objective banks seek to enhance their profitability by performing the lending function so called its core function along

with other functions but their maximum income comes from their core function of lending. The credit facilities offered by the banks facilitate the exploration and expansion of productive investments avenues by individuals and institutional investors. Banks pool deposits from those who save money and supply these funds in the form of loans to the borrowers and in return receive interest income. Thus the profits of the banks are derived from the spread between the interest rate that they pay on the deposits and the interest rate they receive from borrowers and thereby create the flow of funds for the banks. By managing this flow of funds, banks act as intermediary and generate profits from interest paid and interest received, and has been taking the risks of offering credit over the years.

Credit Risk is the principal challenge faced by the banks and such risk is inherent to any business of lending of funds may be to an individual, trade, industry, transport, agriculture etc. Credit Risk indicates change in net asset value due to change in the perceived ability of counter parties to meet their contractual obligations. Credit Risk is that risk where a lender will suffer a financial loss due to borrowers' failure to perform the terms and conditions of the credit loan agreement. Credit Risk is the probability of loss due to a decline in the quality of Loan Asset.

Thus granting of loans and advances is the main source of income of the financial institutions but this is also the source of credit risk and deteriorating asset quality and if loans not monitored properly, will inversely affect the performance of banking sector. As a result the influence of Credit Risk on the performance of Commercial Banks has been the concerns in both developed and developing economies of the world and hence credit risk is considered as the major factor affecting the profitability performance of the banks.

This study is motivated by the damaging effect of impaired loans and the menace created by them on the banks capitalization and profitability in the Indian banking industry and would be of great relevance to direct the issues related to the influence on banks' performance by the credit risk.

RESEARCH OBJECTIVE:

The study aims at assessing the influence of credit risk on the performance of public and private banks in India.

LITERATURE REVIEW:

Literature reviewed shows contribution of many researchers on the topic impact of credit risk on the performance of banks in different countries of the world, of which core studies are presented below:

(Kithinji, 2010a), in her study on Credit Risk Management and Profitability of Commercial Banks in Kenya collected secondary data on variables like credit, magnitude of nonperforming Assets and profitability for a period from 2004 to 2008 and presented trend of these variables and the study result as revealed by regression shows that there is no relationship between these three variables and sizable profits of the commercial banks are not determined by the amount of credit and impaired loans, thereby the author concludes the influence of other variables on the banks profitability.

(Kargi, 2011) evaluates the impact of credit risk on the profitability of Nigerian banks. The results of the study conducted for the period from 2004-2008 exhibit that management of credit risk has a significant effect on the profitability of banks from Nigeria and the author concludes that banks' profitability is negatively influenced by the amount of loans, impaired loans and deposits, and thus affecting the cash flows of banks considerably.

(Aduda & Gitonga, 2011), using primary and secondary data from 2000-2009 recognizes the association existing between the proxy for Profitability in commercial banks in Kenya and the Credit Risk Management. Selecting a random sample of 30 financial institutions out of 44 the study has used ROE and ratio of Non Performing Loan to represent the dependent variable profitability and independent variable risk management respectively. The regression model discloses the effect on the profitability of all the selected banks.

(Mekasha, 2011), using Longitudinal data has analysed the influence of credit risk management of six Ethiopian Commercial Banks on the performance of selected sample, covering a time of 10 years. The regression model used by the researcher reveals negative association of non-performing loan and provision on loan with performance and Loan provision to impaired loans and assets positively and significantly influences return on asset.

(Nawaz & Munir, 2011), using accounting ratios have determined the bank performance and credit risk of Nigerian banks, covering a study period from 2004 – 2008. Regressions findings reveal inverse influence by the magnitude of loans advanced by the banks, non-performing assets and banks deposits on the performance.

(Kolapo, Ayeni, & Oke, 2012), have adopted the same model as used by Kargi (2011) in their study to investigate the quantitative effect of credit risk on the performance of commercial banks in Nigeria Their study also employ regression revealing the fact that effect of credit risk on bank performance is same across all banks under study.

Results also show that rise in non-performing loan and provisioning reduce the profitability as indicated by ROA, whereas increase in amount of loans advanced positively influences the profitability of banks.

(Poudel, 2012), explores various variables related to the credit risk management and financial performance of banks while studying 31 commercial banks from Nepal, for a period from 2001-2011.The result discloses that all the proxies' representing independent variables have negative impact on the financial performance of the banks. The author concludes that out of all factors default rate is the most influencing determinant of banks financial performance.

(Boahene, Dasah, & Agyei, 2012), using time series and cross sectional data of six selected commercial banks from Ghana covering a period of five-years from 2005-2009 analyses the relationship between Profitability and Credit Risk The regression result reveals that credit risk, bank size and bank growth rate and capital structure are the key determinants influencing the profitability of the banks and have a constructive impact on the performance of the banks proposes that banks in Ghana realize higher profits when exposed to high credit risk, thus contradicting earlier studies which shows credit risk parameters are inversely related to profitability.

(Afriyie & Akotey, 2012), using secondary data for a period of five years from 2006 to 2010 examines the influence of Credit Risk Management on the Profitability of Rural Banks in the Region of Brong Ahafo of Ghana. The study presents unusual findings of the panel data regression model, where significant positive relationship between credit risk and profitability was observed resulting in higher profitability with high credit risk exposure.

(Fredrick, 2013), uses CAMEL indicators to analyse how Credit Risk Management in 42 Commercial Banks in Kenya affect financial performance for the period from 2006- 2010. The study has used Pearson correlation and the results of multiple regressions reveal great association between the CAMEL components and commercial banks financial performance. Weak relationship between financial performance as represented by ROE and the capital adequacy, asset quality, management efficiency and liquidity was shown by the Pearson correlation.

(Singh, 2013), has examined credit risk management and analysed its effect on the performance of Indian private and public banks. The two way regression model applied on a sample of 20 banks, 10 public and 10 private including a period from 2002-03 to 2012-13, reveals that better management of credit risk results in better performance.

(Ogboi & Unuafe, 2013), examines the impression of the efficient management of Credit Risk and Capital Adequacy norms of Commercial Banks in Nigeria on their Financial Performance. Sound Credit Risk Management and capital adequacy have positively affected the bank's performance except loans advanced by the banks which negatively impacts profitability during the study period.

(Kaaya & Pastory, 2013), have analysed the relationship between Commercial Banks Performance in Tanzania and default Risk. The outcome of the research indicate that there is negative impression of credit risk indicators viz. Loan loss to Gross Loan and Net Loan, and Impaired Loans which implies that exorbitant default risk lowers the performance of banks.

(Kurawa & Garba, 2014), while evaluating the Profitability of Nigerian Banks used random-effect generalized least square (GLS) regression to find relationship existing amongst performance indicators and credit risk management indicators. The outcome of the study brings to light noteworthy direct relationship between Default Rate and Operating Cost to Asset and ROA.

(Zou & Li, 2014), investigated what influence credit risk management has on the profitability of European banks and results of Multivariate regression analysis shows that deterioration in credit risk management affects the performance and the ratio of Non Performing Loans largely affect the profitability as denoted by Return on Equity and Return on Asset while Capital Adequacy Ratio has negligible consequence on both ROE and ROA.

(Marshal & Onyekachi, 2014), factually probed into the Performance of sampled Deposit Money Banks from Nigeria and included a period of Fifteen years from the year 1997 to 2011. Study highlights that Deposits Money Banks have minimum amount of default rates as a result their performance are not affected. The study results establishes positively influencing connection between Loans to Deposits and banks performance as growth in the size of loans brings improvement in the performance through increased interest income realized from lending operations.

(Noman, Chowdhury, Chowdhury, Kabir, & Pervin, 2015), with 172 observations derived from the year 2003 to 2013 on eighteen private banks from Bangladesh, observe the consequence of credit risk on profitableness of banks. The Random Effect results submit reverse but great impact of Rate of Non Performing Loans and Loan Loss Reserve on all the profitability parameters included in the study, thus suggesting need for prudential system of credit risk management.

(Samuel, 2015), using secondary data applies ordinary least square technique to determine the consequence on

the performance of the independent variable credit risk on Nigerian Banks. The study has adopted Kargi's (2011) model and the results appear that the ratio of Advances to Deposits and GNPA is reversely related to the bank's profitability.

(Tekalagn, Anwen, & Bari, 2015) while examining the impression of Management of Credit Risk on the Banks Performance have studied Nine Ethiopian Banks and the analytical tools disclose reverse influence of CAR on the banks' performance and positive influence of provision on bad loans.

(Gizaw, Kebede, & Selvaraj, 2015), in their study on eight sampled Banks in Ethiopia observed the influence the credit risk has on the profitability of commercial banks.. The results for the period from 2003 to 2012 show improvement in the credit risk profile of Ethiopian banks thereby resulted in improvement in performance and the ratios of accepted parameters of credit risk viz., GNPA and Loss Provisions have been showing decreasing trend. Adequate capital has enabled the banks to resist the disturbances encountered from rising credit risk.

(Uwuigbe, Uwuigbe, & Oyewo, 2015), while assessing management of Credit and the impact on how banks performs, made study of Banks listed on Nigeria Stock Exchange and concluded that impaired loans ratio has relevance to performance of the banks included in study but there exist no relationship between the ratio of loans for which security is given and the unsecured loans without security with how bank's have performed.

(Alshatti, 2015), using panel regression made an examination of financial performance of the Jordanian commercial banks and considered credit risk management variables as independent variables. The authors observation can be summed up in three different ways where he finds association is positive when it comes to NPA ratio, negative while making use of Provision ratio and the ratio of Capital adequacy doesn't have any on influence on Return on Asset.

(Bhattarai, 2016), has examined how performance of banks is influenced by the credit risk exposure of banks and to do so the author has analysed Nepalese banking institution and brings to light reverse association between the default rate ratio and the banks achievements in terms of profitability. The other results shown include positive correlation amongst 'cost per loan assets', bank size when compared with performance and no relation exist while including Capital adequacy and cash reserve ratio

(Muriithi, 2016), is another researcher who has assessed the consequences the bank will face in presence of Credit Risk, and for this purpose carries out study on forty three banks and chooses the period from 2005 to 2014. This study also show opposite and reverse association of poor asset quality contributing to financial distress due to NPA menace both in the short and long run in the banks from Kenya like other countries.

Based on the literature reviewed it can be concluded that Credit risk is a major threat to affecting the performance of the banks and the effect of credit risk on banks are multidimensional deteriorating the quality of loan assets held by the banks and having repercussion on performance..

DATA AND METHODOLOGY:

The research methodology used in the study reveals the scope within which the study was conducted, how the sampled banks were selected and the type of data collected and used for the study and the tools of analysis.

Data:

The study uses Secondary Data for the period from 2000-01 to 2015-16 and the annual reports have been retrieved from the websites of public and private banks included in the study.

Selection of Sample:

40 Indian Banks have been selected for the purpose of study, of which 24 are public banks and 16 are private banks. All banks listed on Bombay Stock Exchange and in existence as on 31-3-2016 have been selected for the purpose of study and out of 43 listed banks 03 banks viz. SBI Patiala, SBI Hyderabad and IDFC have been dropped due to unavailability of annual reports.

Public Sector Banks:

Oriental Bank of Commerce	Allahabad Bank	Andhra Bank	Bank of Baroda
SBI	Punjab National Bank	Punjab and Sind Bank	State Bank of Bikaner and Jaipur
Vijaya Bank	State Bank of Mysore	United Bank of India	State Bank of Travancore
Syndicate Bank	UCO Bank	Bank of India	Bank of Maharashtra
Canara Bank	Central Bank of India	Corporation Bank	Dena Bank
IDBI	Indian Bank Ltd	Indian Overseas Bank	Union Bank of India

Private Banks:

Axis Bank	City Union Bank Ltd	DCB Bank	Dhanlaxmi Bank Ltd
Federal Bank	HDFC Bank	ICICI Bank	Indusind Bank
Jammu & Kashmir	Karnataka Bank	RBL Bank	Karur Vysya Bank
South Indian Bank Ltd	Lakshmi Vilas Bank	Yes Bank Ltd	Kotak Mahindra Bank

Parameters, Tools and Software used to analyse Data:
The parameters used in the study are based on the literature reviewed and the study uses Panel data for 16 years of 40 banks and results have been generated from STATA 12.

Parameters as used in Regression Model	Tools Used
1. **A)Dependent Variable:** 2. **Profitability Indicators:** 3. ROA, ROE and NIM. 4. B**) Independent Variable:** 1. NPLs to Total Loans and Advances 2. Loan Loss Provision to Total Loan 3. CAR 4. Loan to Deposit Ratio 5. Loan Provision to Non Performing 5. Loan 6. 6.Loan Provision to Total Assets 7. Loans and Advances to Total Assets 8. **Control Variables:** 9. Deposit 10. Size	i) Correlations ii) Regression Analysis

Definition of Variables:
Performance Indicators:
As the study deals with effect of credit risk on the performance of the banks, performance is the dependent variable and following three variables have been used as proxy representing the performance.
Return on Asset:
This is the ratio which is used to measure Net Profit earned by the banks on the amount of total net assets employed. It is the rate at which returns are generated on the assets owned by the banks and also an indication of good capital strength of the financial institution. Higher Return on Assets enjoyed by the banks will prove efficiency of the banks. This ratio discloses the fact that whether banks are making efficient use of employed assets or not and enables to know individual financial institution its position when compared with others.
Return on Equity:
The Return on Equity is another ratio the author uses to represent performance and the ratio is calculated by considering Net Profit as the numerator and Total Equity is the denominator. The ratio measures the returns on shareholders' investment in the bank, where higher ROE shows competency of the bank management in making good use of shareholders' equity for generating net profit.
Net Interest Margin:
Net Interest Margin is another performance indicator used in the study which is useful in examining the success of firm's investment decisions when compared with its debt decisions. This ratio is calculated by considering net of Interest Income and Interest Expenses divided by the Earning Assets. When the sign of NIM is negative it means that whatever returns generated by investments made have failed to recover interest expenses. Rise in the magnitude of Non Performing Assets will reduce the interest earned which will result in declining NIM.

Independent Variables:
Following independent variables used in the study represent the parameters of credit risk.
Gross Non Performing Loans Ratio:
This ratio is expressed as Gross Non Performing Assets to Total Loans advanced by the banks and the ratio indicates the proportion of gross loans those are not performing and is an evidence of poor quality of loan portfolio held by the bank and their exposure to credit risk. When the rate of this ratio is low it signifies low

credit risk and better quality of loan assets and less doubtful loan. Therefore the researcher expects inverse relationship of this ratio with the dependent variable.

Loan Loss Provision to Total Loans:

It is an allowance earmarked as an expense for loan amount which has not been collected by the banker and not paid by the customer. The purpose of creating this provision is to cover the likely losses on account of defaults. The ratio is calculated as a percentage to Loans. Poor loan portfolio quality and high credit risk exposure encourages banks to make provision at higher rates but high rate of provisions made help in covering up the probable losses and lesser provisions in future. The expected relationship between this variable and the dependent variable is negative.

Loan Provision to Non Performing Loans:

The amount of money that a bank sets aside from its annual earnings as a precaution against expected losses on account of deteriorating assets represents loan provision made as a percentage to impaired loans. High ratio is the indication of the better asset management quality and low credit risk as bank provides for likely losses, therefore, expected relationship with dependent variable is positive. The banks which make such provisions at higher rates are recognized as more conventional thereby making their investors to feel secured about the quality of assets held by their banks.

Loan Provision to Total Assets:

Under this the provision is calculated on the Total Assets employed and the expected relationship with dependent variable is negative.

Capital Adequacy Ratio:

Capital Adequacy is considered as cautious credit risk management tool in the hands of the banks. Basel 1998 accord advocated Capital Adequacy for determining the asset quality. It is calculated using total capital and risk adjusted assets of the bank. High ratio indicates availability of sufficient amount of capital with the banks during the crisis period to master bad loans. It is **a** well accepted fact that Banks with high ratio of capital adequacy enjoy high profitability thereby protecting themselves from failure. This reserve secures the interest of the depositor from any contingency. As per BASEL II Norms banks have to hold compulsorily CAR @ 8% of their risk weighted assets. Thus the expected relationship between CAR and Performance is positive, as CAR contributes to the profitability directly.

Advances to Deposit:

Advances to Deposits ratio suggest that bigger the size of loan portfolio relative to deposits size, the higher should be the probability of loan default. Other way it also means that low ratio signifies low earnings. Literature says that Credit Deposit ratio affects profitability and credit risk simultaneously in two ways viz., if Credit Deposit increases default may increase, accordingly negative impact on the profitability, and other way when Credit Deposit ratio increases it results in increase in assets, which will improve the profits, so here the expected relationship is Positive.

Loans and Advances to Total Assets:

The components of this ratio indicate bank's aggressiveness in lending which ultimately results in improved performance. Therefore the higher ratio is always preferred but the resultant impact could be positive or negative.

Table 1: Correlation Matrix

	Size	NIM	CAR	Deposit	ROA	ROE	NPA to GA	LLP to TL	Loan to Deposit	LLP to NPA	LLP to TA	Loans to TA
Size	1.0000											
NIM	-0.1169	1.0000										
CAR	-0.1516	0.1770	1.0000									
Deposit	-0.0006	-0.0423	-0.0526	1.0000								
ROA	-0.0166	0.4115	-0.1454	0.0101	1.0000							
ROE	0.0839	0.2287	-0.3524	0.0946	0.1817	1.0000						
NPA to GA	0.0071	-0.1804	-0.0739	0.0157	-1.0957	-0.1317	1.0000					
LLP to TL	0.4794	-0.0976	-0.1461	-0.0357	0.0419	0.3213	-0.0293	1.0000				
Loan to Deposit	-0.1110	0.6526	-0.1332	-0.0324	0.5543	0.3222	-0.1416	-0.0790	1.0000			

	Size	NIM	CAR	Deposit	ROA	ROE	NPA to GA	LLP to TL	Loan to Deposit	LLP to NPA	LLP to TA	Loans to TA
LLP to NPA	-0.0583	0.0650	-0.0099	-0.0187	0.0132	0.0150	-0.1137	-0.0271	0.0576	1.0000		
LLP to TA	-0.0110	-0.0204	-0.1517	-0.0262	0.0393	0.2519	-0.893	-0.0087	-0.0120	0.5312	1.0000	
Loans to TA	-0.1927	0.4540	-0.1993	-0.0494	0.2713	0.3304	-0.2190	-0.1221	0.6173	0.0565	0.0452	1.0000

Source: Individual Banks Reports and generated results from software

Correlation indicates the extent to which two variables fluctuate together and correlation value is found between plus and negative 1. Positive correlation implies extent to which these variables increase or decrease in parallel. When increase in one variable makes other variable in move in opposite direction then it is called as Negative correlation. There is positive correlation ship between Credit Deposit Ratio and all profitability indicators NIM, ROA and ROE, which means increase in credit to deposits results in improved performance. Again positive correlation is found between Provision and Total Asset and ROE, but it is a weak correlation. There is negative but weak correlation between the ratio of impaired assets to total loans and all three performance indicators, which means increase in nonperforming loans has adverse impact on the performance.

Empirical Analysis of Econometrics Model:
In Panel Regression there are three types of Model:

Pooled Regression:
The Ordinary Least Square is primarily used in the study for identifying the relationship due to the advantage of enabling the best fit of coefficient for the future prediction provided that all the assumptions are met.

Fixed Effect Model:
This model enables to analyse the effect of variables that changes over time and finds the association between independent and outcome variables within the financial institution and each such entities own individual feature may or may not decide the predictor variables. This is based on the presumption that respective characteristics of an individual entity may affect or favour the predictor or dependent variables, which is required to be controlled. It thus removes the effect of those times invariant characteristics and assesses the effect of the predictors on outcome variables.

Random effect:
The rationale behind this model is that, the differences across units is assumed to be random and unrelated with the independent or predictor variable included in the model. If there are no omitted variables and if the omitted variables are uncorrelated with the variables that are in the model, then a random effects model is preferable to the fixed effects.
HausmanTest is applied to determine whether to adopt random effect or fixed effect and the study result shows random effect model, where Null Hypothesis is accepted, where error are not correlated with the regressor.

Study Result of Random Effect Model:

Variables	ROA	NIM	ROE
LLP to Total Loans	0.246***	0.546***	0.216***
	(0.0583)	(0.163)	(0.0630)
Loans to Deposits	0.246***	0.565*	0.210**
	(0.0909)	(0.299)	(0.0968)
LLP to NPA	-0.735**	-2.438**	-0.921**
	(0.325)	(0.940)	(0.353)
LLP to Total Assets	0.480	2.498**	0.702*
	(0.337)	(0.971)	(0.367)
Loans to Total Assets	0.0823	0.0373	-0.217
	(0.267)	(0.957)	(0.291)

Variables	ROA	NIM	ROE
NPA to Total Assets	0.0947	-0.348	-0.201
	(0.276)	(0.980)	(0.294)
Deposits	7.13e-07***	1.50e-06**	6.76e-o7**
	(2.59e-07)	(7.14e-07)	(2.71e-07)
Size	-2.14e-07	2.12e-06**	-3.65e-08
	(3.55e-07)	(9.74e-07)	(3.91e-07)
Constant	-4.439***	5.203*	-1.797*
	(0.849)	(2.741)	(0.916)
Observations	102	84	88
R-squared	0.319	0.485	0.297
Number of Code			
Standard errors in parentheses ***p < 0.01 ** p <0.05 *p < 0.1			

Source: Annual Reports of Banks and authors deductions from the Regression Results

The results of panel regression using three different models viz., ROA, NIM and ROE as proxy for performance, have been presented below.

Credit Risk Indicator Loss Provision to Total loans is significant at 1 % level for all three dependent variables ROA, NIM and ROE and there is positive relationship, which indicates increase in loan loss provision to total assets improves the performance of the banks.

Loan to Deposit is also significant for all three performance indicators but with ROA it is highly significant, and there is positive and direct relationship leading to improvement in performance with the increase in credit to deposit ratio.

Provision on loan losses to Non Performing Asset is significant at 5 % but there is inverse relationship with all three performance indicators, which means increase this ratio results in adverse impact on the profitability of the banks.

Provision to total assets is significant at 5% for NIM and 10% to ROE and there is positive relationship.

Deposits and size have been used as control variable, and held constant to assess the association existing between the two other variables. If there is change in a control variable it would disprove the correlation amongst the parameters and thus skewing the results.

Deposits used as control variable is significant for ROA, ROE and NIM but highly significant for ROA and has positive relationship. Control variable Size is significant only for NIM and it is positive, which means total assets used as proxy for size helps to perform better.

CONCLUSION:

The efficient and effective performance of the banking industry of a country over a period of time is the indication of financial stability of a nation and the extent to which banks extending credit to the public for productive purposes accelerates the process of development.

The overall explanatory power of the above ROA model is 32% thereby indicating 32% variation in the percentage change in this parameter can be explained by the variations in 3 significant independent variables. The explanatory power of Model 2 NIM is 49%, thereby giving better results as 49% variations in performance indicator NIM is explained by the 4 significant independent variables. The explanatory power of 3rd Model ROA is 30%, thereby 4 significant Variables explaining 30% variations in the performance indicator. Thus it can be concluded that performance as represented by Net Interest Margin is decided by three independent variables viz. Provision and loans, advances and deposits, loss provision to loans which are not performing and loss provision to the assets, all proxy for credit risk.

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Appendix: Fixed Effect Model

Variables	ROA	NIM	ROE
LLP to Total Loans	-0.0197	0.0177	0.00234
	(0.0239)	(0.0521)	(0.0291)
Loans to Deposits	0.158***	-0.0132	-0.00627
	(0.0399)	(0.0637)	(0.0489)
LLP to NPA	-0.0262	-0.00596	-0.0365
	(0.116)	(0.180)	(0.140)
LLP to Total Assets	-0.0508	-0.0720	-0.0829
	(0.117)	(0.194)	(0.143)
Loans to Total Assets	0.0730	-0.227	0.123
	(0.0886)	(0.186)	(0.112)
NPA to Total Assets	0.160*	-0.194	-0.0112
	(0.0827)	(0.179)	(0.101)
Deposits	9.48e-06***	-2.92e-05***	1.38e-06
	(3.46e-06)	(8.33e-06)	(4.23e-06)
Size	-2.09e-07	3.12e-07	-3.94e-07*
	(1.42e-07)	(2.44e-07)	(2.24e-07)
Constant	-4.556***	15.04***	-1.300**
	(o.447)	(1.089)	(0.594)
Observations	102	84	88
R-squared	0.271	0.312	0.202
Number of Code	12	11	11
Standard errors in parentheses			
***p < 0.01 ** p <0.05 *p < 0.1			
