A PANEL DATA ANALYSIS AFFECTING THE PROFITABILITY OF BANKS IN INDIA

[1]Prof. Preeta Sinha

([1]Assistant Professor, Army Institute of Management, Kolkata)

Abstract: *The Banking system in India is going through a crisis where most of the public sector lenders are in breach of risk thresholds applicable for prompt corrective action. The rising slippages in the banking system are eroding the profitability of the banks. The Indian Banking System is battling against the falling asset quality and the low capital adequacy ratio in the light of piling bad loans. The present paper estimates panel data model to depict the banking industry during 2005 to 2017.Five banks each from public sector, Private sector and foreign bank category were selected on the basis of their market capitalization. The data were retrieved from the annual reports of the respective banks and from the RBI data base. The study examines the impact of Credit Deposit Ratio, NIM, NNPA, Asset Size, NIIR, BPE and PPE on the profitability of the banks by comparing the result of Panel data Fixed and Random Effect on it using R .Return on Assets is taken as an indicator of the performance. The paper is an attempt to compare the individual specific effect and idiosyncratic effect among the banks and focuses on the reasons behind the result.*

Keywords*: Asset Size, Banks, Credit Deposit ratio, Net Interest Margin, Return on Assets.*

I. Introduction

The Banking sector is paramount in shaping the economy of any country. The commercial and specialized banks play an important role in the growth and development of the financial system. The primary function of bank is accepting deposits and lending money to individuals, organizations aswell as businesses. The low profitability of banks affects the bank's ability and willingness to lend which are the key segments of the economy. The profitability of Bank is important to improve the banking sector's ability to absorb shocks, improve risk management and governance and strengthen bank's transparency and disclosures. India's Banking System is passing through a critical time due to overhang of large non performing assets (NPA). The declining profits of banks in the current scenario have forced the Reserve bank of India as well as the Union government to resolve the problem through multiple initiatives. The National Company law Tribunal (NCLT) is being harnessed for the resolution of NPA cases involving large borrowers in a time bound manner. The other initiatives to resolve the NPA problem have been the recapitalization of PSBs by the government and the Prompt corrective action (PCA). In October 2017, the government announced a Rs.2.11 trillion recapitalization package of PSBs, of which Rs. 1.53 trillion would be capital infused by the government and the remaining balance was to be raised from the market. The weak Balance sheet of PSBs is a hurdle when it comes to the market for recapitalization. The regulator has imposed certain restrictions on banks whose capital, asset quality and Profitability do not meet pre specified thresholds. 11 PSBs and one Private sector Bank are under PCA.The major restriction under PCA includes restriction on dividend distribution, infusion of capital by promoter/owners, restriction on branch expansion, higher provisioning requirement, restriction of Management expansion, etc.

There are numerous researches on the determinants of bank's profitability.On reviewing the existing empirical research on the determinants of the profitability of banks it was found to be divided into two categories-internal factors and the external factors. The internal factors constitute bank Specific determinants such as the financial statement of the banks and the managerial effects of the banks. The external factors are the macro economic factors and the regulatory requirements. These factors are uncontrollable. Bank specific factors are considered for analysis in this study as the indicator of profitability. The study examines the impact of Credit Deposit Ratio, NIM, NNPA, Asset Size, NIIR, BPE and PPE on the profitability of the banks. Return on Assets (ROA) which measures the profitability in relation to its total assets is taken as an indicator of the profitability of Banks. Fifteen banks comprising of five each

from Public Sector, Private Sector and Foreign Bank category were selected for the study on the basis of their market capitalization.

II. Literature Review

Various studies on the factors affecting the Profitability of the banks have been carried out with some being country specific while others being panel of countries. Return on Assets (ROA) and Return on Equity (ROE) are taken as the indicator of the profitability in some of the researches. Some has considered only the internal variables while others have taken both the internal as well as the external variables as the factors influencing the Profitability of the banks. The Commercial banks play a key role in the allocation of economic resources from those having surplus to the scarce community through lending.

Credit Deposit Ratio (CDR): Deposits are the major source of funding in the commercial bank. The Credit deposit Ratio (CDR) depicts the propensity of the bank to deploy credit with respect to the deposits mobilized. Kaur. R (2012) compared the financial performance of Public and private sector on the basis of many parameters like-Growth in Credit Deposit Ratio, total assets, advances, deposit etc. Kaur,R. compared the performance of the public and Private sector Banks in India during the time period 2009-2011 and observed that the overall performance of the public sector banks was better than private sector banks. The parameters used for the performance evaluation were growth in credit Deposit ratio, net worth, deposits, advances etc. Omid Sharifi and Javaid Akhtar (2016) conducted study on "Performance of Banking through Credit Deposit Ratio in Public Sector Banks in India." The study found a positive association between CDR on the profitability of the public sector Banks.

Net Interest Margin (NIM) or Spread: Demirgüç-Kunt and Huizinga (1998) evaluated the determinants of the profitability for 80 countries during the period 1988-1995of commercial bank. Interest margins (NIM) showed significant relation with the performance of the bank. Carter, McNulty, and Verbrugge (2004) and Carter and McNulty (2005) proposed that the profitability of the small banks can be increased by improving the risk adjusted loan yields and NIM. Bolda and Verma (2006) examined the factors affecting the profitability of banks in India. Multivariate regression model was used stepwise. The explanatory power of Net Interest Margin or the spread was found to be significantly high. According to Angbazo (1997) as the risk exposure increases appropriate Net Interest margin is required for generating adequate income and also to improve the capital .

Capital adequacy ratio (CAR):A significant positive association between capital adequacy ratio and profitability was the result of the study made by Bourke (1989).Berger (1995) and Anghazo (1997) found that US banks with relatively high capital adequacy were more profitable than other banks with lower capital ratio. Kaya (2002) evaluated the performance of Turkish banking sector for the period 1997-2000 and concluded the role of capital, liquidity, personnel expenditures, loans, non-performing loans and deposits.The study of 572 banks in 15 developing countries by Chiuri et al (2002) demonstrates that strict capital regulation norms hinders the lending capacity of the banks and thus affects its profitability.The requirements on Capital formation had a negative impact on the financial Performance of the banks was given by Pasiouras et al (2008) after conducting a study on 615 publicly quoted commercial banks over a 4-year period.

Business per Employee (BPE) & Profit Per Employee (PPE): Bourke (1989) examined the staff expenses on the profitability of the Banks .He observed a negative relationship with ROA. The study of Molyneux (1992) found a positive relationship between total profits and staff expenses. Panday &Parmar (2014) analyzed the performance of Indian banks on the basis of some variables such as business per employee, Profit per Employee (PPE), non interest income, credit Deposit ratio etc. His study demonstrated a significant association of BPE, CDR, and PPE with that of ROA.

Total Assets (TA):The study by Sinkey (1992) and Boyd and Runkle (1993) indicate a strong exploratory relationship between profitability and size of the Bank which is indicated by Asset Size (TA). They found a negative relationship with the size of the banks.Similar results were shown by Naceur (2003) in Tunisian Banking System. Javid et

al.(2011) observed that diseconomies of scales may not support positive association of asset size with that of Profitability of the Banks.

Non-Interest Income ratio (NIIR):PK Manoj (2010) demonstrated the importance of non interest income and management of Credit risk on the profitability of the bank. Basil Senyo Damankah et al (2014) explained the importance of non interest income of commercial banks in Ghana.K.B Singh &Yogesh Upadhayay studied the impact of non interest income on Risk and profitability of Banks in India and found that NII do not form a significant part of revenue for public sector banks but plays an important role in the case of Foreign banks.

2.7 NNPA: In the study on Non-Performing assets and its recovery in India Sing VR (2016) concluded that The value as well as the profitability of the banks are erodeddue to high credit defaults cases which results in high NPAs.In the research paper on the issues of growth and profitability of public sector banks Chaudhuri S (2002) found that NPAs directly erode profitability of Indian public sector banks.

III. Objective of the Study

The aim of the study is tofind the disparity and similarity between the methods of Panel data modeling given by Fixed and Random effect. It is an attempt to determine the reasons behind the results shown by the model.

IV. Research Methodology

For the study secondary source of Data has been collected from RBI data Statistics.Panel regression models include both cross sectional and time series data across individual entities. The Individual specific heterogeneity and idiosyncratic effect are taken into account in Panel data modeling. Both Fixed and Random effect model are used to study the dynamics of change across the profitability of banks in India and determine the best fit model among them. Banks with particular attributes are considered as a component in fixed effect model. Panel data is useful in detecting and measuring the effects across cross section and time series. When the number of time series data and cross sectional units is same it is known as balanced panel. All time-invariant differences between the individuals are controlled by fixed effect model.

Fixed effect model equation is expressed as:

$$Y_{it} = \alpha_i + \beta_1 X_{it} + U_{it} \dots\dots\dots\dots\dots\dots\dots(1)$$

Where, α_i = intercept for each bank (i= 1,2,…..15)
Y_{it} = Dependent variable (where, i=bank and t = time)
X_{it} = each independent variable
β_1 = coefficient for each independent variable
U_{it} = error term

The variation across entities is assumed to be random and uncorrelated with the independent variable in case of random effect model. Thus allowing time-invariant variables to play a significant role as explanatory variables. Time invariant variables can be included in random effects

Random Effect Model is expressed as:

$$Y_{it} = \alpha_i + \beta_1 X_{it} + U_{it} + \varepsilon_t \dots\dots\dots\dots\dots(2)$$

Where, α_i = intercept for each bank (i= 1,2,…..15)
Y_{it} = Dependent variable (where, i=bank and t = time)
X_{it} = each independent variable
β_1 = coefficient for each independent variable
U_{it} = error term Between Banks
ε_t = random error term within Banks

In this study Hausman test is used to decide between the Fixed and Random test. The Null Hypothesis is that the preferred model is random effect and the alternative is the fixed effect. The null hypothesis thus states that the unique errors are not correlated with the Predictors.

Data: The predictors used in the study are CDR,NIM,BPE, PPE, NIIR, CAR& NNPA to determine their influence on Return on Assets (ROA).

Return on Assets (ROA): The profitability is measured by ROA which is the ratio of Profit after Tax and Total Assets .Though both ROA and ROE are considered as the profitability indicators, the later is concerned about the return on investments made in equity. Emphasis is made on overall increase in the Profitability by managing the slippages in Spread and burden in the form of operating expenses.

$$ROA = \frac{Profit\ after\ Tax}{Total\ Assets}$$

Credit Deposit Ratio (CDR):CDR which is also termed as loan to Deposit ratio is the ratio of Total Advances to Total deposits. Optimization of Credit creation is one of the primary objectives of commercial banks. It measures the efficiency of credit creation or spread between inflow and outflow of funds in the form of advances and Deposits. It also evaluates the liquidity position and utilization of resources of the banks.

$$CDR = \frac{Total\ Advances}{Total\ Deposits}$$

Net Interest Margin (NIM):NIM is expressed as the ratio of net interest income to average earning assets. It measures the efficiency of the bank with respect to interest margin which bank receives after paying to its depositors. It is an indicator of profitability of the bank.

$$NIM = \frac{Interest\ Revenue-\ Interest\ expenses}{Average\ earning\ Assets}$$

Capital adequacy ratio (CAR): The capital adequacy ratio measures the bank's capital with respect to its risk weighted assets. This capital absorbs losses in the event of the company winding up its assets or liquidating. The risk weighted assets (RWA) represents its assets, weighted by their riskiness which comprises of all the risks. The capital to risk weighted assets ratio promotes financial stability and efficiency in the economic system.

$$CAR = \frac{Total\ Capital\ (Tier\ I\ capital + Tier\ II\ capital)}{Total\ Risk\ Weighted\ Assets}\ x\ 100$$

Business per Employee (BPE): BPE refers to the average revenue generated per employee .It measures the average financial productivity of each employee. BPE is one of the indicators for measuring the productivity and operating efficiency of the banks.

$$BPE = \frac{Deposit + Advance}{Total\ No.of.\ Employees.}$$

Profit Per Employee (PPE): PPE is the ratio of Net Profit and Total No. of employees. It measures the human resource efficiency in the bank.

$$PPE = \frac{Net\ Profits}{Total\ No.of.\ Employees.}$$

Net Interest Income ratio (NIIR): NIIR refers to the fees collected in the form of service charge for account maintenance, transaction fees, Rental fees for safe deposits, inactive account fees, penalty for cheque bounce etc.

$$NIIR = \frac{Non\text{-}interest\ income}{Total\ assets100}$$

Net Non-performing Asset (NNPA):Loans or advances which remained unpaid for more than 90 days are termed as Non performing Assets.Net nonperforming assets are Gross NPA after deductingprovisions for unpaid debts.

Net NPA = Gross NPA – (Balance in Interest Suspense account + DICGC/ECGC claims received and held pending adjustment + Part payment received and kept

V. Result and Analysis

15 scheduled commercial banks were considered over a period of 13 years from 2005-2017. 5 banks each from public sector, Indian Private and Foreign banks category were considered for the study according to the market capitalization.

5.1 Descriptive Statistics: (2005-2017)

Table 5.1: Descriptive Statistics

	ROA	CDR	NIM	NIIR	BPE	PPE	CAR	NNPA
Min	-0.780	32.06	0.880	0.590	24.31	-2.880	9.93	0.010
Max	3.130	114.77	6.310	4.870	480.93	7.920	35.06	10.190
Mean	1.337	77.06	3.254	1.786	133.46	1.557	14.52	1.336

The data shows that the ROA of Bank of Baroda in 2016 was negative as well as the minimum across the years while the maximum is for Standard Charted bank in 2007.The mean value of Credit Deposit Ratio (CDR) is found to be 77.06 which imply that about 77% of the core funds are used for lending. The maximum CDR of 114.77 was recorded for Yes bank in 2005.The NIM of Deutsche bank is found to be maximum as well as minimum in 2012 and 2005 respectively. The Deutsche bank also performed well in terms of Non interest income parameter. In 2006 the NIIR of the Bank was the highest among the banks taken for the study. The lowest ratio was recorded for Bank of India in the year 2006.The financial Productivity of employees in Deutsche bank is again maximum in 2016 with 480.93 while it is worst for SBI in 2005. Similar result is seen in case of PPE. The minimum value of CAR is 9.93 which are above the norms give by RBI. The mean value of 14.52 implies that the banks are adhering to the norms set by Basel and RBI. The NNPA of DBS bank in 2005 was abnormally high which started declining after that.

5.2 Fixed effect model:

The heterogeneity or individual specific effect of each bank is depicted by individual intercept which is time invariant in this model. The heterogeneity within the banks is assumed to be constant over time and is correlated with the

independent variable. The dependent variable ROA is found to be statistically significant. The response variable Return on Asset (ROA) is found to be statistically significant with 54% of the variation being explained by the

Table 5.2: Summary of Fixed effect

	Coefficients	Std. Error	t-value	P. value
CDR	0.004	0.003	1.442	0.151
NIM	0.273	0.049	5.614	0.000*
BPE	-0.001	0.000	-1.807	0.072
PPE	0.257	0.029	8.956	0.000*
NIIR	0.224	0.058	3.852	0.000*
CAR	-0.011	0.01	-1.16	0.248
NNPA	-0.06	0.025	-2.392	0.018**

F.Value=36.862   Adjusted R Square =0.541

*Sig at 1% Sig Level   ** Sig at 5% Sig Level

stimulus variables. CDR, NIM,PPE and NIIR are found to be positively associated with ROA whereas BPE,CAR and NNPA shows negative correlation

5.3 Random Effect Model

Random effect model is appropriate when there is no correlation between individual error component and the regressors. All the predictor variables except BPE, CAR and NNPA are showing positive relation with the performance of the banks.The predictor variables CDR, NIM,BPE,PPE,NIIR and NNPA statistically significant at 5% level of Significance. All the fifteen Banks have the common intercept.

Table 5.3 Summary of Random Effect

	Coefficient	Std. Error	t-value	P-value
(Intercept)	0.063	0.269	0.234	0.815
CDR	0.005	0.002	2.41	0.017**
NIM	0.224	0.04	5.517	0.000*
BPE	-0.002	0	-3.799	0.000*
PPE	0.25	0.026	9.417	0.000*
NIIR	0.162	0.044	3.685	0.000*
CAR	-0.016	0.009	-1.77	0.078
NNPA	-0.07	0.021	-3.352	0.000*

Adjusted R Square= 0.663   F statistic=55.50

** Sig at 5% Sig Level

5.4 Hausman SpecificationTest

Hausman specification test is used to determine whether to select Fixed effect model or the Random effect Model.The Null hypothesis states that the errors are not correlated with the predictor variable which leads to the selection of Random Effect Model. The p-value is found to be significant at 5% level of significance whichleads to the acceptance of alternative hypothesis. Thus the Fixed effect model is appropriate in this case.

Table 5.4 Hausman Test

Chi Square Statistic	17.455
p-value	0.01469**

** Sig at 5% Sig Level

VI. Conclusion

The time invariant characteristics of individual entity (bank) are omitted by the Fixed effect model which ultimately determine the net effect of the explanatory variables on the outcome variable. The result shows the acceptance of fixed effect which implies that the individual banks are quite distinct due to the presence of individual characteristics.It indicates that we need to improve the statistical analysis of time series and cross-sectional panel data at multiple levels as the fixed effect model is more suitable for large variations within the entity over time.

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