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DETERMINANTS OF RETURN ON ASSETS: AN EMPIRICAL ANALYSIS OF PUBLIC AND PRIVATE SECTOR COMMERCIAL BANKS IN INDIA

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Abstract

This empirical study critically investigates the relationship between return on Assets of 43 scheduled commercial banks in India and bank specific determinants for the period 2002-2003 to 2013-2014. The study aims to find the association between Return on Assets (ROA) and bank specific determinants with the help of statistical tools such as descriptive statistics, multiple correlation analysis and multiple regression analysis. The analytical results confirmed that the SBI and associates banks and new private sector banks operate in the same fashion whereas nationalised banks and old private banks are functioning in a similar way. These results imply the unique attributes of scheduled commercial banks.

Keywords:

Return on Assets to Total Assets, Public and Private Sector Commercial Banks, Return on Investment and Multiple Regression Analysis.

1. INTRODUCTION

The *ROA* is a functional indicator of bank's profitability. It is considered an accounting measure of bank's profitability. It gives an idea as how efficiently management deploys its assets to generate income. *ROA* have been extensively used in most of the studies on profitability of commercial banks. Higher return on assets reflects better utilization of available assets and lower return indicates otherwise. RBI had proposed to infuse capital to tune of 70,000 crore rupees to public sector banks based on their *ROA* and *ROE* of last three years. There are various factors such as provisioning, operating efficiency ratio, gross non-performing assets ratio and RBI policy rates which may impact the return on assets. Apart from this, macroeconomic factors are also affecting the return on assets of commercial banks. In this study, bank specific determinants are considered for the analysis of return on Assets of 43 public and private sector commercial banks.

With this few introductory note, the study is organized into following sections. Section 2 deals with research design, section 3 explains the research methodology, section 4 presents the summary of empirical results and section 5 concludes the entire work.

2. REVIEW OF LITERATURE

Sufian [3] analyzed the profitability of banks in Korea, while controlling for a wide array of bank specific and macroeconomic determinants. The study used an unbalanced bank level panel data set for the period 1992-2003, which was characterized as a time of significant reform in the country's financial sector. It was observed from the results of both the parametric *t* test and non-parametric Mann Whitney (Wilcoxon) and Kruskal Wallis test that on average the Korean Banking sector had been relatively more profitable during the pre-crisis period under both profitability measures i.e., *ROA* and *ROE*. It was noticed that Korean Banks' credit risk had been lower during the pre-crisis period ($0.00262 \leq 0.02695$) and was statistically significant at the 1% level. It was also found that Korean Banks had derived a higher proportion of income from non-interest sources during the pre-crisis period. The empirical findings suggested that Korean Banks with lower liquidity levels exhibited higher profitability levels. Higher diversification regarding banks' income sources towards derivative instruments and other fee-based activities had a positive effect. The impact of credit risk and costs were always negative. Business cycle effects exerted a substantial pro-cyclical impact on bank profits. The industry concentration of the national banking system positively and significantly affected banks' profitability. The impact of Asian financial crisis was negative, while Korean Banks had been relatively more profitable during the pre-crisis period compared to the post-crisis period.

Nandy [2] attempted to identify the various factors affecting profit performance of banks and examined whether they had any significant influence on profitability of commercial banks in India. The study examined the profitability of banks using six regressors such as interest income, other income, interest expenses, operating expenses, Net *NPA* and spread. Net profit as a percentage of total assets had been used as dependent variable of multiple regression models. Net profit as a percentage of total assets showed an improvement in the performance of almost all the banks groups although this had not been uniform across individual banks within the same bank group. The *F*-test for the model showed that 94% of the variation in net profit could be explained by only interest expenses. The *t* value of interest expenses was also highly significant.

Namita et al. [7] provided an empirical approach to the analysis of profitability indicators with a focal point on non-performing assets of commercial banks in the Indian context. They discussed NPA, factors contributing to NPA, magnitude and consequences. The focus of analysis and discussion in their study is mainly on the 27 public sector banks with the objective of identifying the determinants of NPAs and its relationship with profitability during the study period from 1997-98 to 2009-2010. By using the analytical perspectives, the authors observed that NPAs affected significantly to the performance of the banks in the present scenario. Besides these factors like better credit culture, managing the risk and business conditions which lead to lowering of NPSs. The empirical findings using observation method and statistical tools like DEA, correlation, regression and data representation techniques identified that there is a negative relationship between profitability and NPAs measures. The analysis concluded that there is a diminishing trend in the ratios of non-performing assets as GNPAs and NNPAs to affect the amount of NPAs.

Swamy [9] identified the determinants of default risk of public sector banks in emerging economies. The study also examined the impact of macroeconomic and endogenous factors on non-performing assets during 1997-2009. The regression results of the analysis showed that GDP growth rate had no significant relationship with NPAs whereas Per Capital Income had negative significance on Non-Performing Assets. The coefficient of asset turned out to be negative and very significant indicating that large banks might have better risk management procedures and technology which would allow them to finish up with lower levels of Non-Performing Assets. It was also observed that credit to deposit ratio was negatively associated with bad loans. The index of industrial production growth rate indicated the negative and significant relationship with non-performing assets. The market capitalisation ratio also showed a positively significant relationship with NPA implying that transition to market orientation had impinged on the problem loans. It was found from the analysis that return on assets was strongly associated with the NPAs negatively. Return on equity was also found to be significantly associated with the NPAs negatively. The lending rate denoted an insignificant and negative relationship. The results of old private and new private sector banks dummy and foreign banks dummy appeared to manage their NPAs efficiently i.e., in their efficiencies in better credit risk management in containing NPAs which indicated that bank privatization led to better default risk management.

Dutta [9] analyzed the determinants of return on assets of public sector banks in the context of global growth, escalation of the sovereign debt crisis and financial market crisis. Net interest margin declined marginally during 2011-2012 as compared with previous year. The study focused on all banks in India under public sector consisting of 19 nationalized banks and 7 SBI and its associates. Regressors such as spread ratio, credit to deposit ratio, investment to deposit ratio, capital adequacy ratio, operating expenses, provisions and contingencies, non-performing assets ratio and non-interest income were used as independent variables in multivariate regression analysis using backward method. The result also confirmed the absence of multicollinearity problem which explain the same relationship as is measured by another variable or group of variables. The regression model summary showed that 83% of variation in return on assets was explained by the factors during 2009-2010. It could also be observed that the spread to total assets, operating expenses, provisions and contingencies, non-performing assets and non-interest income were found to be significant.

Thota [6] examined how bank specific and macroeconomic factors affect the profitability of commercial banks in India in the post reform period from 1999 to 2011 using an unbalanced bank level panel data. Liquidity risk, bank size, asset quality, diversification, operating or overhead cost and equity to assets were used as bank specific regressors where as inflation rate, annual GDP growth rate and money supply (M3) growth were used as macroeconomic factors. The result showed that the impact of credit risk was positively related to foreign and private banks profitability levels and in rest of the cases it was not significant. The estimated results provided conflicting signs for the effect of diversification on bank profitability but significant positive coefficients were found for SBI and associates banks and public banks for both return on equity and return on assets. The macroeconomic indicators were significant on return on assets when the whole samples were pooled together and private bank as a group. These indicators were insignificant on return on equity.

3. RESEARCH DESIGN

This section consists of statement of the problems, objectives of the study and statement of hypotheses.

3.1 STATEMENT OF THE PROBLEM

Commercial Banks constitute the crucial part of financial sectors India, accounting for over half of the financial transactions in the economy. Commercial Banks functioning have come under constant scrutiny of RBI and other regulatory bodies. Now-a-days, commercial banks are very prone to the threats of mounting NPAs and financial scams. Though commercial banks have drastically improved their profitability during the recent years, NPAs subside the increasing profitability. Moreover, a hefty amount of profits is allocated for NPA provisions. Commercial Banks are also facing competitive threats from internal and external players. Many commercial banks especially public sector banks depend on fund for capitalisation announced by RBI. Return on Assets (*ROA*) has been used as key indicator of profitability along with Return on Equity (*ROE*) and Net Interest Margin (*NIM*). In this back drop, the authors have thrived to study the determinants of Return on Assets of 43 public and private sectors commercial banks for a period of 12 years.

3.2 RESEARCH OBJECTIVES

- To examine the relationship between Return on Assets (ROA) and bank specific determinants such as Investment Deposit Ratio, Logarithm of Interest Income, Return on Investment, Operating Expenses to Total Assets, Operating Profit to Total Assets, Return on Investment and Gross Non-Performing Assets of scheduled commercial banks in India.
- To assess the impact of bank specific determinants on return on assets of scheduled commercial banks in India in the context of expected relationship.

3.3 STATEMENT OF HYPOTHESES

The following hypothesis has been framed to assess the relationship between dependent and independent variables.

- H_0: There is no significant relationship between Return on Assets of Scheduled commercial banks and banks specific determinants.
- H_a: There is a significant relationship between Return on Assets of Scheduled commercial banks and banks specific determinants.

3.4 RESEARCH METHODOLOGY

For the purpose of analysis, all the scheduled commercial banks have been taken depending on the availability and consistency of data. The analysis primarily depends on secondary data. The required data for 43 commercial banks have been taken from trend and progress of banking in India published by Reserve Bank of India. The selected ratios of scheduled commercial banks reported in statistical tables relating to banks in India have been

used for the present study. The study covers a period of 12 years starting from 2002-2003 to 2013-2014.

The following statistical tools are employed in this study in order to compare the relationship between dependent and independent variables and analyses how independent variables influence the dependent variable.

- Descriptive Statistics
- Multiple Correlation and
- Multiple Regression Analysis.

3.4.1 Specification of Multiple Regression Model:

The empirical model for all the banks has been framed having considered after careful scrutiny for the existence of the multi collinearity *p*. The bank specific return on Assets variables are fitted into multiple regression equation as follows:

$$ROA = \alpha + \beta_1 IDR + \beta_2 LII + \beta_3 ROI + \beta_4 OETA + \beta_5 OPTA + \beta_6 PCTA + \beta_7 BTA + \beta_8 GNPA + \xi$$

where, α = Constant, $\beta_1 \ldots \beta_8$ = Estimated coefficients and ξ = error term.

Table.1. Summary of Relationship between Dependent and Independent Variables

Dependent Variable	Independent Variables	Expected Relationship
ROA – Return on Assets	***IDR* –** Investment to Deposit Ratio	+
	***LII* –** Logarithm of Interest Income	+
	***ROI* –** Return on Investment	+
	***OETA* –** Operating Expenses to Total Assets	-
	***OPTA* –** Operating Profit to Total Assets	+
	***PCTA* –** Provisions and Contingencies to Total Assets	-
	***BTA* –** Burden to Total Assets	+/-
	GNPA – Gross Non-Performing Assets Ratio	-

4. ANALYSIS AND DISCUSSION OF EMPIRICAL RESULTS

The Table.2 presents the descriptive statistics of 43 scheduled commercial banks operating in the Indian Banking sector during the period from 2003-2014. The summary statistics delineates a wide variability among the bank specific factors which have effect on scheduled commercial banks' return on assets. The Investments to Deposits ratio (*IDR*) variable has the highest mean value followed by Logarithm of Interest Income (*LII*) and Return on Investment (*ROI*). The mean of *IDR* is 36.8404 and standard deviation is 8.6296, which show that the *IDR* deviates to the extent of 8.62960 from both the ends. From Table.4, it can be seen that *GNPA* (Gross Non-Performing Assets Ratio) has the highest standard deviation which implies that *GNPA* has more significance in terms of variability than any other variables in the study over the study period. It also shows the highest disparity between its minimum and maximum values which are 0.38% and 19.88% respectively. To study the return on assets, Return on Assets to Total Assets (*ROA*) has been taken as dependent variable. Return on Assets is one of the major profitability indicators used to measure the financial health of the commercial banks. The average value of Return on Assets is 1.2012 and its minimum and maximum value ranges from -3.50 to 19.67.

Table.2. Descriptive statistics analysis of return on assets determinants of public and private commercial banks

Variables	Minimum	Maximum	Mean	Std. Deviation
ROA	-3.50	19.67	1.2012	2.39480
IDR	20.41	73.62	36.8404	8.62960
LII	4.17	12.81	8.4108	1.63457
ROI	4.42	23.35	7.2193	1.49090
OETA	.04	15.46	2.0813	1.37948
OPTA	-.67	6.68	1.9636	.81334
PCTA	-.04	10.60	1.0249	.68761
BTA	-11.69	14.55	.8282	1.59551
GNPA	.38	19.88	5.1979	11.23617

Table.3. Multiple correlation analysis of return on assets determinants of public and private sector commercial banks

	IDR	LII	ROI	OETA	OPTA	PCTA	BTA	GNPA
IDR	1							
LII	.002	1						
ROI	.294**	-.254**	1					
OETA	.117**	-.083	.071	1				
OPTA	.320**	-.051	.311**	.013	1			
PCTA	.361**	.089*	.223**	-.056	.248**	1		
BTA	-.167**	-.123**	-.016	.742**	-.145**	-.415**	1	
GNPA	.095*	-.205**	.126**	.020	.050	.083	.007	1

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

*. Correlation is significant at the 0.05 level (2-tailed).

The Table.3 exhibits correlation among independent variables of return on Assets of scheduled commercial banks, the quantum as well as the direction of relationship between any two variables. Multiple regressions were run in SPSS 16 using the Enter Method to test the set hypotheses or more clearly to test how the independent variables explain the return on assets of sample banks. Before running the regression, investigation into the multicollinearity problem was carried out using the Pearson Correlation method. First of all, bivariate (pair-wise) correlations among the independent variables were examined to find out the multicollinearity problem. The existence of correlation of about 0.80 or larger indicates that there is problem of multicollinearity. None of the pair-wise coefficient of correlation is 0.80 or larger. Burden to Total Assets (*BTA*) and Operating Expenses to Total Assets (*OETA*) ratio are the highly correlated variables among all other explanatory variables. Though Burden to total assets (*BTA*) ratio is having a low correlation value, it is negatively correlated

with investments to deposits ratio (*IDR*). Natural logarithm of interest income (*LII*) and Gross Non-Performing Assets (*GNPA*) are also having weaker correlation with *IDR*. All the other variables such as Return on Investment (*ROI*), operating profits to total assets ratio (*OPTA*) and provisions and contingencies to total assets (*PCTA*), are having positive and moderate correlation with investments to deposits ratio (*IDR*).

5. EMPIRICAL ANALYSIS AND DISCUSSION OF RESULTS

In this section, detailed workings and discussion on how banks specific determinants such as Investments to Deposits Ratio (*IDR*), Logarithm of Interest Income (*LII*), Return on Investment (*ROI*), Operating Expenses to Total Assets (*OETA*), Operating Profits to Total Assets (*OPTA*), Provisions and Contingencies to Total Assets (*PCTA*), Burden to Total Assets (*BTA*) and Gross Non-Performing Assets (*GNPA*) explain the Return on Assets (*ROA*) are shown.

5.1 MULTIPLE REGRESSION ANALYSIS OF RETURN ON ASSETS DETERMINANTS IN PUBLIC AND PRIVATE SECTOR COMMERCIAL BANKS

Multiple regression is an appropriate statistical tool to find out the impact of chosen regressors or study variables. It consists of various analyses such as model summary, ANOVA and regression co-efficient. Model summary describes the extent of relationship between dependent and independent variables whereas ANOVA indicates the significant relationship between dependent and independent variables. Regression coefficient summary describes impact of each independent variable on dependent variable.

Table.4. Model summary of multiple regression analysis on ROA

Model	*R*	R^2	Adjusted R^2	Std. Error of Estimate
SBI Associates Banks	.966	.932	.924	1.62693
Nationalised Banks	.836	.699	.688	.24496
Old Private Sector Banks	.797	.635	.615	.38151
New Private Sector Banks	.890	.792	.759	.46754

The Table.4 shows the model summary which explains the overall relationship between criterion and predictors variables. Based on these predictors, regression model has been developed for commercial banks. The model for the banks' specific determinants has been selected on the basis of high diagnostics for multicollinearity and high value for the R^2. The value for the R^2 in SBI Group is 0.932 which endorses that 93.2% of the variation in the dependent variable is explained by the chosen regressors. The 6.8% variation in the dependent variable remains unexplained by the independent variables of the study. The adjusted explanation of the model is about 0.924 which implies the goodness of the fit of the model. All other banks model summary also suggests the model fit appropriate for the analysis as R^2 values and adjusted R^2 values are more than 60%. Therefore, it is very clear that return on assets of scheduled commercial banks is largely influenced by the chosen independent variables.

Table.5. ANOVA on return on assets and bank specific determinants

Model		Sum of Squares	df	Mean Square	F	Sig.
SBI and Associates Banks	Regression	2294.079	8	286.760	108.338	.000
	Residual	166.755	63	2.647		
	Total	2460.833	71			
Nationalised Banks	Regression	30.509	8	3.814	63.556	.000
	Residual	13.141	219	0.060		
	Total	43.650	227			
Old Private Sector Banks	Regression	37.161	8	4.645	31.914	.000
	Residual	21.396	147	0.146		
	Total	58.557	155			
New Private Sector Banks	Regression	42.431	8	5.304	24.264	.000
	Residual	11.148	51	0.219		
	Total	53.579	59			

To assess the significance of the return on assets regressors, ANOVA values have been computed for all the four category of commercial banks. The null hypothesis has been framed that the impact of selected predictors on the return on assets of scheduled commercial banks is zero. The ANOVA results in the Table.5 exhibit that the chosen regressors have been statistically significant in explaining the variation in return on assets of scheduled commercial banks. Hence, the null hypothesis expressing no impact of selected predictors on the return on assets stands rejected. Thus, it can be clearly inferred that the variation caused by independent variables such as investment to deposit ratio, logarithm of interest income, return on investment, operating expenses to total assets, operating profits to total assets, provisions and contingencies to total assets, burden to total assets and gross non-performing assets have significant impact on return on assets of public and private sector scheduled commercial banks.

Table.6. Summary of Regression Coefficients of Return on Assets Determinants in Scheduled Commercial Banks

Variables	SBI and Associates Banks		Nationalised Banks		Old Private Sector Banks		New Private Sector Banks	
	Beta	P-Value	Beta	P-Value	Beta	P-Value	Beta	P-Value
(Constant)		.002		.000		.005		.052
IDR	.248	.001	-.168	.008	-.004	.946	.286	.002
LII	.298	.002	-.322	.000	-.037	.564	.081	.423
ROI	-.067	.223	-.038	.386	.179	.010	.208	.016
OETA	.715	.000	.078	.145	-.344	.000	.002	.989
OPTA	.255	.016	1.135	.000	.625	.000	.180	.168

PCTA	-.173	.086	-.796	.000	-.283	.000	-.184	.195
BTA	.088	.106	.025	.512	-.154	.033	-.146	.430
GNPA	-.133	.024	.003	.933	-.008	.885	-.619	.000

The Table.6 presents the estimated results of the regression model. Correlation coefficients and collinearity statistics tests are used to detect the multicollinearity problem. In multiple correlations, collinearity is said to be a problem, when the relationship between any two independent variables is showing a correlation coefficient of 0.80 or more. In the same way, multicollinearity is assumed to exist in regression coefficients of the model, when the variance inflation factor reveals a VIF value of 10 or more than 10 or the tolerance limit of 1 or more. The value of VIF in the collinearity statistics shows the absence of multicollinearity problem in the model. After checking up the multicollinearity problem and nonexistence of multicollinearity, the regression was run with Return on Assets (*ROA*) as dependent variable and Investment to Deposits Ration (*IDR*), Logarithm of Interest Income (*LII*), Return on Investment (*ROI*), Operating Expenses to Total Assets (*OETA*), Operating Profits to Total Assets (*OPTA*), Provisions and Contingencies to Total Assets (*PCTA*), Burden to Total Assets (*BTA*) and Gross Non-Performing Assets (*GNPA*) as independent variables. The significant value of *F* (.000<.05) proves that the relationship between the Return on Assets and bank specific determinants are linear. The regression coefficient of investments to deposits ratio (*IDR*) is positive in SBI and Associates Banks and new privates sector banks with return on Assets. In contrast with our expectation, it shows a negative relationship with *ROA* in nationalised banks and old private sector banks. It denotes a statistically significant relationship in all the sectors except the old private sector banks. It reflects that IDR of the banks increases profitability of these banks. This result coincides the empirical evidence of Vigneswaraswamy (2013). The regression coefficient of Logarithm of interest income delineates a positive relationship for SBI and Associates Banks and new privates sector banks. However, it reveals a negative relationship for nationalized banks and old private sector banks which contradicts our expected relationship. At the same time, it is having statistically significant relationship at 5% level with return on Assets of all the public sector banks only. This result implies that interest income is one of the important determinants of banks return on assets of public sector banks. In line with the expected relationship, the coefficient for return on investment is having a negative and significant relationship with *ROA* of public sector banks. The return on investment (*ROI*) is having a positive association with *ROA* of private sector banks. But, it is having an insignificant association with *ROA* of public sector Banks. Turning to another explanatory variable, it is found that the coefficient of operating expenses to total assets (*OETA*) is positively correlated with *ROA* of all sector except old private sector Banks. However, this result is significant in SBI and Associates and old private sector banks only. This result is consistent with the empirical evidence of Ani et al. [1], Nandy [2], Chisti [3] and Thota [6]. In accordance with the expected relationship the coefficient of operating profits to total assets (*OPTA*) is positively associated with *ROA* of all commercial banks. It is highlighting the ability of operating profits to the positive contribution of profitability indicator. In tune with the expected relationship, the regression coefficient of provisions and contingencies to total assets ratio (*PCTA*) is negatively correlated with *ROA* of all the sector banks. This result supports the empirical findings of Dutta et al. [8]. In tune with the expected relationship, the regression coefficient of Burden to total assets (*BTA*) is positively correlated with *ROA* of all public sector banks and negatively correlated with private sector banks. However, this result is not statistically significant. It implies that the impact of non-interest expenditure is ignorable in commercial banks. The regression result of Gross non-performing assets ratio (*GNPA*) reveals a negative relationship with ROA of all banks except nationalised banks. This result is consistent with the empirical evidence of Ani et al. [1], Vigneswaraswamy [9], Manoj [5] and Weersainghe and Perera [10]. It confirms the major assumption that *NPA* reduces the banks' profitability i.e., Return on Assets (*ROA*).

6. CONCLUSIONS

This study empirically analysed the relationship between bank specific determinants and return on assets of 43 public and private sector commercial banks for the period 2003-2014 using multiple regression analysis. The empirical results of multiple regression analysis revealed that bank specific determinants such as investment to deposit ratio, logarithm of interest income, return on investment, operating profits to total assets, provisions and contingences to total assets, burden to total assets ratios, and gross non-performing assets ratio alone could not determine the return on Assets of public and private sector commercial banks. It is also affected by macroeconomic factors and the RBI's policy decisions. It could be clearly observed from the multiple regression models that SBI and associates banks and new private sector banks operate in the same fashion whereas nationalised banks and old private banks are functioning in a similar fashion.

Appendix.1. List of Public and Private Sector Commercial Banks used in the Analysis

SBI and Associates Banks		**Old Private Sector Banks**	
1	State Bank of India	1	Catholic Syrian Bank Ltd
2	State Bank of Bikaner and Jaipur	2	City Union Bank Limited
3	State Bank of Hyderabad	3	The Dhanalakshmi Bank Ltd
4	State Bank of Mysore	4	Federal Bank Ltd
5	State Bank of Patiala	5	ING Vysya Bank Ltd
6	State Bank of Travancore	6	Jammu and Kashmir Bank Ltd
Nationalised Banks		7	Karnataka Bank Ltd
		8	Karur Vysya Bank Ltd
1	Allahabad Bank	9	Lakshmi Vilas Bank Ltd
2	Andhra Bank	10	Nainital Bank Ltd
3	Bank of Baroda	11	Ratnakar Bank Ltd
4	Bank of India	12	South Indian Bank Ltd

5	Bank of Maharashtra	13	Tamilnadu Mercantile Bank Ltd
6	Canara Bank	**New Private Sector Banks**	
7	Central Bank of India		
8	Corporation Bank	1	Axis Bank Ltd
9	Dena Bank	2	Development Credit Bank Ltd
10	Indian Bank	3	ICICI Bank Ltd
11	Indian Overseas Bank	4	Indusland Bank Ltd
12	Oriental Bank of Commerce	5	HDFC Bank Ltd
13	Punjab and Sind Bank	• SBI and Associates Banks - 6 • Nationalised Banks - 19 • Old Private Sectors Banks - 13 • New Private Sector Banks - 5	
14	Punjab National Bank		
15	Syndicate Bank		
16	UCO Bank		
17	Union Bank of India		
18	United Bank of India		
19	Vijaya Bank		

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