IMPACT OF BRANCH NETWORK SIZE AND FIXED ASSETS INVESTMENT ON BANK PERFORMANCE: AN INDIAN PERSPECTIVE

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ABSTRACT

The present study examines the relationship between branch network size and investment in fixed assets and profitability of major banks in India from both public as well as private sector for ten years' time period. Commonly available literature highlights the significance of financial variables such as capital base, loans and advances, deposits and return on assets (ROA), return on equity (ROE) and/or return on sales (ROS) while indicating the relationship between the variables involved and their effect on the performance of banks, but no research has been conducted on the significance of fixed assets and branch network size in Indian banking sector. The research findings indicate negative relationship between the investment in fixed assets and return on assets implying that profitability of the sample banks falls with additional expenditure on fixed assets. Further the study found that opening up of additional bank branches has statistically highly significant positive relationship with return on assets.

Keywords: Banks, Fixed Assets, Return on Assets, Size, Tangible Assets

INTRODUCTION

One of the most basic objectives of commercial banks is to create credit due to which numerous studies have examined the performance of the banks in terms of accounting variables and a variety of financial ratios. Balance sheets of commercial banks in India show fixed assets and number of branches as the only two long term assets. The role of fixed assets as well as branch network is of great importance in the banking business. Although the information technology revolution had already been leading the way towards digitalization but the occurrence of abrupt circumstances due to COVID-19 has resulted in increased use of digital banking. The growing trend towards digital banking has led to large number of bank closures in various countries (Kreiss, 2021; Nguyen, 2014; EBA, 2020; Wyles *et al.*, 2020), but the same is not true in India. The number of branches of scheduled commercial banks in India increased at almost consistent rate from 1980-2007 and more bank branches have been opened at an increasing rate from 2007 onwards. Whereas bank closures have occurred due to COVID-19 in other countries, increase in number of bank branches continued in India even during COVID-19 phase. Years after liberalizing branch opening norms by

the Reserve Bank of India, the Ministry of Finance still stresses upon to either open brick-and-mortar branches or branchless outlets especially in rural areas so as to meet the targets of financial inclusion. Launch of a unified payment interface (UPI123 Pay) for over 40 crore feature phone mobile subscribers (RBI, 2022) is a major step towards the attainment of financial inclusion targets in the country. The use of digital banking depends upon variety of factors such as education level, financial status, access to technology, digital knowledge, financial literacy, sense of security in digital transactions and appropriate support from the banking ecosystem etc. With the highest percentage of youth population, India is also ranked amongst the rapidly emerging markets in the world. The adoption of digital banking does not seem to be a difficult task for the new generation, but the role of brick-and-mortar banks is very crucial to encourage banking habits in the country.

Various internal factors that determine profitability of a bank include size of capital and deposits, liability component and size of credit portfolio, interest rate policy, asset quality and quality of risk management, bank size, level of information and communication technology, ownership and control etc. Assets of a bank mainly consist of current assets, fixed assets, deposits, credit portfolio and other investments. Balance sheet of a bank generally shows that significant share of financial resources is spent on investment in fixed assets so as to carry on banking operations efficiently. Fixed assets (FA) constitute the basic tangible infrastructure necessary for a business entity and has an indispensable role in routine business activities. Tangible assets constitute physical as well as financial assets. Financial assets are current assets consisting of cash, cash equivalents, accounts receivables, stock inventory and short-term investments. A variety of tangible assets such as premises, machinery, computers, vehicles, furniture and fixtures, safe deposit lockers, leased assets, branches, assets under construction and other equipment such as computers, computer hardware and software, automated teller machines, cash deposit machines, coin dispensers, coin vending machines etc. are entered as fixed assets in banks' balance sheet (Dick, 2003; SBI Annual Reports, various issues). Massive use of technology in modern day banking operations includes the long-term investments in tangible as well as intangible assets.

Up till the year 2019, India's central bank – the Reserve Bank of India have been maintaining its fixed assets with the system of Core Banking Solutions wherein verification and reconciliation of these assets was carried out manually in majority of the offices. The inventory number generated for each item was highlighted on it, making it a slow and tedious job of record keeping and also lacked efficient maintenance of these assets. Whereas the RBI has initiated the process of using Radio Frequency Identification for tagging and reading of fixed assets in all its offices throughout the country with the help of Fixed Assets Management System, commercial banks in the country have not given much importance to the technology-based management of their fixed assets in their offices and thousands of their branches in the country.

Many researchers have studied the interrelatedness between firms' size and profitability. The current literature available on the firm size and profitability is predominantly related to manufacturing sector and no significant research has been carried out in India to analyze the financial sector, especially banking industry, from micro-economic view point. Considering commercial banks as firms, the present study attempts to analyse the relationship between size of banks in terms of fixed assets' investment, branch network size in terms of number of bank branches and profitability of commercial banks in India. The study will throw light on the probability of reviving the weak banks by merging the fixed assets, among other assets, with other banks.

REVIEW OF LITERATURE

Commonly available literature highlights the significance of financial variables such as capital base, loans and advances, deposits and return on assets (ROA), return on equity (ROE) and/or return on sales (ROS) while indicating the relationship between the variables involved. One of the most basic objectives of commercial banks is to create credit due to which numerous studies have examined the performance of the banks in terms of accounting variables and a variety of financial ratios.

To analyse the improvement in the performance around 700 banks of Europe for the period of mid 1990s by making investment in tangible as well as intangible assets, Beccalli (2009) found that investment in IT did not have much positive effect on the profitability of the banks under study. Holden and Bannany (2006) investigated the effect

of concentration ratio, ratio of size of market, growth in market size, size of bank, market share of bank and number of ATMs for bank on the profitability of 10 UK banks during the period 1976-1996. By including other significant independent variables, they found a positive relationship between number of ATMs installed by banks and its profitability. Kosmidou (2008) examined the influence of internal and external factors on the profitability (ROA) of 23 Greek commercial banks over the period of 1990-2002. He found the size of the bank to be positively related in all cases but it was statistically significant when macro-economic and financial structure variables such as annual change in GDP, inflation rate, growth of money supply, concentration measure etc. were added to the models. Dong, *et al.* (2011) used the data on investment in fixed assets, type of ownership, profitability and debt ratios, etc. for 1218 Chinese companies to examine whether companies over-invest in fixed assets and also to highlight the effect of tax favour policy on fixed asset investment in these firms. The study found investment in fixed assets to have negative as well as statistically significant relation with systematic risk. The study highlighted tax favour policy as a major reason which encouraged firms to make more investments is fixed assets. Svetlana and Aaro (2012) used the data set covering 6 countries of European Union for the period 2001-2009. They collected data on Return on Assets, investment intensity in terms of fixed assets and ratio of fixed assets to total assets for 8,074 companies to study if investment intensity and firms' profitability were interrelated. The study could not find any major strong effect between the sample variables. Abubakar, M. *et al.* (2013) used random effects model and found a positive impact of ICT on the profitability of 11 commercial banks in Nigeria during the period 2001 to 2011.The study recommended to efficiently utilize the ICT equipment rather than, making additional investments. Ani (2014) analysed the structure of assets of firms (fixed as well as current) in Oman using content analysis from 2008-2017. He did not find any significant effect of asset structure on profitability in terms of ROE and also confirmed that only ROE to be affected by fixed assets. Considering various components of fixed assets such as land, building, fixtures and fittings, investment in computers and leasehold premises as explanatory variables to find their effect on profitability of thirteen commercial banks in Nigeria, a study undertaken by Olatunji and Adegbite (2014) found that investment in fixed assets has significant positive relationship with profitability measured in terms of net profits. Kawshala and Kushani (2017) analysed the effect of bank size, among other variables such as capital ratio, deposits ratio, and rigidly ratio, on ROA as profitability measure. They found size, capital ratio and deposit ratio as significant determinants of profitability among 12 Sri Lanka commercial banks from the year 2011-15 using regression analysis. Veni and Negash (2019) analysed whether managing assets and liability components of banks influence the profitability of eleven Ethiopian banks for the period between 2010-2017. The study undertook deposits and placing on other banks, loan and advances, short term investments, long term investments, other assets and fixed assets as independent variables. The study found that all assets except fixed assets, affect the profitability (ROA) of entities under study. Jiang, *et al.* (2003) mentioned high rate of efficiency as a result of amalgamation and reorganization of banks and also due to increased use of e-banking. While analyzing the determining factors of banks' profitability in Hong Kong, they found operational efficiency as the dominating factor affecting profitability and indicated cost controlling as the vital component of bank management. The study highlighted the absence of any major cost gains to banks with large number of branches due to the expenditure involved in attracting deposits.

Hirtle (2007) revealed that even during the challenging times of 1980s, introduction of technology enabled revolutionary inventions, regulatory era of 1990s and recession of 1990-91, the banks and thrift institutions in the US expanded their number of bricks-and-mortar branches to more than twelve percent between 1993 and 2004. To analyse the effect of increased number of bank branches on their performance, she found that number of bank branches and size of assets are correlated. The study did not find any systematic association between the size of network and profitability of banks in the 682 US banks and thrift organizations having more than ten branches in year 2003. The study also empirically differentiated between the asset size and size of bank branch network as special contribution to literature. For measuring the efficiency of a big US bank with more than 762 branches, Berger *et al.* (1997)

revealed that half the number of branches would have minimized the costs of the bank but the larger bank network might result in increased revenue due to greater reach to the customers. The study provided insights for the mergers and acquisition activity among banks and expansion of interregional bank branches. While estimating the demand function in banking sector in USA for the time period 1993 to 1999, Dick (2003) found that apart from charges, a number of other factors affect the decision of consumers to choose a particular bank. Among other reasons, availability of number of branches and presence of bank in more and more regions affects consumer behavior positively. To examine the diverse levels of bank management, Anthanassopoulos (1998) carried out a multivariate analysis on a sample of 580 bank branches in the UK and proposed a methodology for analyzing the efficiency of banks with larger number of branches. The paper confirmed the occurrence of high-level technical inefficiencies and economies as well as diseconomies of scale at the branch level from production and cost viewpoint. Hensel (2003) defined economies occurring out of expanded network and differentiated between the benefits that accrue due to increased scale and density of banks. He examined inter-relationship between size, profitability and economies that might result from large-scale amalgamations in the second half of 1990 for various kinds of banks in Japan. The study found no evidence of efficiency gains occurring to banks with large network after merging. Even after a decade of introduction of e-banking facilities in the US banking sector during late 1990s, majority of the Americans preferred visiting banks over e-banking (Federal Reserve Bulletin, 2006). Despite the availability of advanced level of e-banking services, customers did not consider e-banking to provide perfect substitutability with a bank office. Out of thirty-one factors, fifty percent respondents reported location of a bank as one of the most important factors determining the choice of a bank in the US (Robbins, 2006). Also banks with greater number of branches increased returns and lower expenses (FDIC Surveys, 2004).

DATABASE AND METHODOLOGY

The data on capital base, loans and advances and customer deposits for the sample size were found to be highly correlated implying the multicollinearity constraint. Also fixed assets and number of branches being the only variables in the banks' balance sheet representing size in tangible form, these two variables have been considered to measure size for the present study. To analyse the relationship between size and profitability of commercial banks under study, data in terms of investment in fixed assets and number of branches of respective banks were collected and figures of total assets, total income, total operating expenses have been retrieved so as to find return on assets (Hannan and Prager, 2004; Kondo, 2017). Top twelve commercial banks belonging to public sector as well as private sector (see Appendix) were selected on the basis of total assets. As per the online data availability, the balance sheets as well as profit and loss statements of various banks were analysed for the time period of ten financial years, i.e., 2011 to 2020 so as to cover major banks. The data on number of bank branches does not include administrative offices of the banks. The method of Ordinary Least Squares (OLS) has been used to estimate the parameters.

The linear relationship between Y_i and X_{1i} and X_{2i} can be expressed as:

$$Y_{i=} \beta_0 + \beta_1 X_{1i} + \beta_2 X_{2i} \quad (1)$$

where Y_i = Return on Assets of i^{th} bank

X_{1i} = Fixed Assets of i^{th} bank

X_{2i} = Number of Branches of the bank

β_1 and β_2 are regression coefficients of independent variables (i=1 to 12).

In the above case, β_1 is expected to have positive sign given the strong dependence of commercial banks on the fixed assets traditionally to carry out their routine operations in an efficient manner whereas β_2 should also be considered to have a positive sign as there has always been a tendency of the government to increase the number of bank branches so as to cover more and more percentage of population under the banking system and to encourage the banking habits and hence to achieve the targets of financial inclusion in the country. The observations gathered on X_{1i} and X_{2i} during the study period and scatter plots obtained indicate that there are many factors omitted from the function and there may exist other errors also. To take into account the influence of all such factors, a random variable 'μ' is introduced in the function, which becomes stochastic and is represented as:

$$Y_{i=} \beta_0 + \beta_1 X_{1i} + \beta_2 X_{2i} + \mu_i \quad (2)$$

After specifying the model, sample observations were used to obtain the estimates of true parameters β_0, β_1 andβ_2:

$$\hat{Y}_{i=} \hat{\beta}_0 + \hat{\beta}_1 X_{1i} + \hat{\beta}_2 X_{2i} + \hat{\mu}_i \quad (3)$$

where $\hat{\beta}_0$, $\hat{\beta}_1$ and $\hat{\beta}_2$ are estimates of the true parameters of the model.

In the light of above model, the study aims to analyse whether:

- Return on assets of banks under study are affected by investment in fixed assets.
- Increase in bank branches affect returns on assets of banks under study.

ANALYSIS OF RESULTS

Table1 indicates that mean values of both the independent variables are almost same for size. Also, there are no differences between the values of fixed assets and number of branches. From the total 120 observations, the average performance of banks under study in terms of ROA is 0.659 and the standard deviation is 0.01728 which implies that there are no significant differences among the values of ROA.

Table 1: Description of Statistics

	Average	Dispersion	Number of Observations
Return on Assets	.0659	.01728	120
Fixed Assets	3.5762	.36171	120
Number of branches	3.5556	.36713	120

Table 2: Correlation between Return on Assets, Fixed Assets & Number of Branches

		Return on Assets	Fixed Assets	Number of Branches
Return On Assets	Pearson Coefficient	1	-.216*	-.327**
	Two-Tailed Significance		.018	.000
	Number of Observations	120	120	120
Fixed Assets	Pearson Correlation	-.216*	1	.786**
	Two-Tailed Significance	.018		.000
	Number of Observations	120	120	120
Number Of Branches	Pearson Correlation	-.327**	.786**	1
	Two-Tailed Significance	.000	.000	
	Number of Observations	120	120	120

* shows significant correlation at 0.05 level (two-tailed)
** shows significant correlation at 0.01 level (two-tailed)

As opposed to the general perception, the Pearson correlation coefficient for ROA and fixed assets as well as for number of branches come out to be negative (Table 2) and the figures are statistically significant at five percent and one percent respectively. The negative correlation between ROA and fixed assets indicates that with increase in profitability in terms of assets, the banks may go in for diversification of their activities thereby investing in other assets, increasing their advances and other investment activities of capital market so that the increased profits are used efficiently. Decrease in profitability measured in terms of assets may lead to acquisition of fixed assets to compensate the bad debts.

Table 3: One-sample Kolmogorov-Smirnov Test

		Return on Assets	Fixed Assets	Number of Branches
N		120	120	120
Normal Parameters [a,B]	Mean	.0659	3.5762	3.5556
	Std. Deviation	.01728	.36171	.36713
Most Extreme Differences	Absolute	.276	.101	.129
	Positive	.138	.101	.113
	Negative	-.276	-.091	-.129
Kolmogorov-Smirnov Z		3.019	1.103	1.412
Asymp. Sig. (2-Tailed)		.000	.175	.037

a indicates normal distribution
b shows data calculations

To test normality of the data Kolmogorov-Smirnov test was conducted. In Table 3, the asymptotic significance values (0.175 and 0.37 respectively) confirmed the normality of data to be analyzed. To diagnose the problem of multi collinearity, variable inflation factor (VIF) has been calculated:

$$VIF = \frac{1}{1-R^2}$$

Table 4 shows VIF values for FA as well as number of branches come out to be less than 5, thereby indicating the absence of any significant correlation between the independent variables. While other variables namely, capital base, customer deposits, loans and advances were found to be highly correlated, fixed assets and number of branches showed absence of multicollinearity fulfilling an important assumption of OLS method.

Table 4: Coefficients[a]

Model		Collinearity Statistics	
		Tolerance	VIF
	Fixed assets	.382	2.618
	Number of branches	.382	2.618

a. Dependent Variable: Return on Assets

Table 5: Summary of the Model

Model	Multiple Correlation Coefficient (R)	R^2	Adjusted R^2	Standard Error of the Estimate
	.333[a]	.111	.096	.01643

a. Regressors: constant, number of branches, fixed assets

When the independent variables are more than one, we find multiple correlation and the square of correlation coefficient is known as the coefficient of multiple determination, denoted by R^2. R^2 shows the proportion of variation in dependent variable explained by the regressors X_1 and X_2. In Tables 5, coefficient of multiple determination indicates that 11.1 per cent of the variance in ROA can be predicted from fixed assets & number of branches of the banks under study. Due to relatively large size of number of observations as compared to independent variables, the value of R^2 and adjusted R^2 are very close. Table 6 depicts whether the explanatory variables can explain the changes in dependent variables accurately or not. Whereas value of R^2 indicates weak relationship between return on assets and fixed assets of sample banks, analysis of variance in Table 6 significant value of (0.001 <0.05) implies that the dependent variable is reliably predicted by the independent variables when used together.

Table 6: Analysis of Variance[b]

Model		Sum of Squares	Df	Mean Square	F	Significance Level
	Regression	.004	2	.002	7.310	.001[a]
	Residual	.032	117	.000		
	Total	.036	119			

a. Predictors: (Constant), number of branches, fixed assets
b. Dependent Variable: Return of assets

Table 7: Regression Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
	(Constant)	.116	.016		7.423	.000
	FA	.005	.007	.106	.754	.452
	BRANCHES	-.019	.007	-.410	-2.910	.004

a. Dependent Variable: ROA

Table 7 depicts the ability of each of the independent variables to individually predict the dependent variable. As per the log transformed values, the percentage change in ROA due to a unit change in fixed assets comes out to be -5.1271 percent. Similarly, for number of branches, the value is 1.88 percent. The regression equation can be expressed in term of the variables as follows:

$$Y= 0.116 + (-5.127)\ X_1 + 1.882\ X_2$$

It implies that for every unit increase in fixed assets 5.13 per cent unit decrease in ROA is predicted, holding number of branches as constant whereas the relationship between ROA and number of branches has come out to be positive i.e., a unit increase in number of branches predicts 1.88 per cent increase in ROA, fixed assets remaining constant. The negative relationship between FA and ROA is not statistically significant whereas the relationship between number of branches and ROA is statistically highly significant.

Table 8 shows identical distribution of residuals with zero mean and equal variance, thereby indicating that the random variables are homoscedastic fulfilling the heteroscedasticity assumption of OLS.

Table 8: Residuals Statistics[a]

	Minimum	Maximum	Mean	Std. Deviation	N
Predicted Value	.0529	.0826	.0659	.00576	120
Residual	-.07518	.02045	.00000	.01629	120
Std. Predicted Value	-2.249	2.910	.000	1.000	120
Std. Residual	-4.576	1.245	.000	.992	120

a. Dependent Variable: ROA

CONCLUSION

Traditionally the relationship between firm size and profitability is a micro-economic concept. The commercial banks are the indispensable independent business entities wherein size matters a lot. In pursuit of raising efficacy thereby increasing profitability, banks are motivated towards continuous investments in fixed assets (Okobo and Ikpor, 2017). Unlike manufacturing firms, the core business of commercial banks revolves around credit creation and fixed assets have relatively small share as a part of total assets but their value and depreciation charges in the balance she*et al*so appear in thousands of crores of rupees (for instance see annual reports of SBI, various issues). Moreover, fixed assets form the base of all banking activities and with the technological advancements that have taken place during the post-reforms time period in India, Information Technology & Telecom assets such as desktops, laptops, servers, IP phones; Security and Office Equipment comprising televisions, CCTV

cameras, photocopy machines fixed and other technology-based assets have become part of fixed assets. As the Indian banking system needs to reach the global standards, sophisticated technological gadgets and information and communication technology driven equipment are being used as basic infrastructure. This study is an attempt to analyse the extent to which fixed assets affects the performance of twelve domestic banks over the period of 2011-2020. The study concluded that per unit investment in fixed assets does not bring positive change in returns on assets (ROA) of the banks under study.

Although the results are statistically insignificant but there is an indication that the concerned banks are required to make optimal use of fixed assets to harness the gains of highly advanced technology, given the accounting operations being their core business. Further, the results show a positive and statistically significant relationship between the number of bank branches and ROA. A unit increase in bank branches predict 1.88 percent increase in ROA implying that the extension of bank branches may bring positive changes in banking habits of the people. Only opening up of branches does not bring the desired outcome as the large number of people in India do not operate their accounts even when banks are accessible.

According to Global Findex Database released by World Bank, eleven percent of world's unbanked adults live in India (2018) and around fifty percent of the bank accounts remained inactive. World Bank figures revealed that percentage of adults with an account increased by more than double after 2010 to 80 percent (Jha, 2018). Bank account usage is considered as one of the important indicators of economic growth and development of a country. India is a country with largest banking network in the world. Bank branches in India are evenly distributed in rural as well as urban areas (Jain, 2014). But still number of bank branches in India are very less in comparison to its population size. With only 14.7 bank branches for one lakh adults in 2019, India's rank is 84th out of 200 countries (IMF, 2020). In present times, when Indian banks are being merged and their business operations amalgamated, the fixed assets of a weak bank when adds up to that of a transferee bank, it is critical to manage and make efficient use of fixed assets to make the merger successful. The problem of massive non-performing assets facing the Indian banking system, mergers may weaken even the huge transferee banks, given the risk of underutilization of the shifted fixed assets.

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APPENDIX

The banks undertaken for the study:

1. State Bank of India
2. Punjab National Bank
3. Bank of Baroda
4. Canara Bank
5. Bank of India
6. Union Bank
7. HDFC Bank
8. ICICI Bank
9. Kotak Mahindra Bank
10. Axis Bank
11. IndusInd Bank
12. IDBI