



How Does the Ownership Structure of a Bank Affect Its Performance?

(Evidence from Indian Banking System)

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Abstract:

Existing empirical evidence on the ownership-performance issue is weighted towards the property rights hypothesis that private enterprises are superior to public enterprises. However, not many attempts have been made to investigate the relationship between the Bank ownership and Efficiency in Indian Context, taking into account the segmentation of Banking Sector based on bank assets size and ownership status. Drawing upon the primary data of 39 Indian Commercial Banks from 2013-2018, this study aims to explore the extent to which a bank's performance is explained by its ownership, controlling for bank assets size. The Data Envelopment Analysis technique serves as the framework for this paper by calculating the annual efficiency scores of the Private and Public Sector Banks for measuring the relative efficiency of these banks. For this purpose, sample banks are classified based on the size of their assets into two size categories, namely small and big banks. A simultaneous equation regression model is attempted using several variables combined with the efficiency scores obtained, which signify that no matter whether a small-sized or big-sized bank, the private sector banks are more efficient than the PSBs.

Keywords: *Ownership Structure, Bank Performance, Indian Commercial Banks, Data Envelopment Analysis, Efficiency Scores, OLS Regression.*

Contribution/ Originality: This study contributes to the existing literature as it is based on the recent data and is strictly focused on Indian Commercial Banking System.

1. Introduction

The existing banking system in India has progressed to newer heights with the reforms in the financial sector that remarkably contributed to the escalation of its performance over the past few decades. However, there still exists a continuing debate in regards to how robust the country's banking structure is to stand up to the global competitive environment. (Saha & Das, 2016). India, the largest country in South Asia, has a banking system consisting of 20 public sector banks, 22 private sector banks, 49 foreign banks, 56 regional rural banks, 1,562 urban cooperative banks and 94,384 rural cooperative banks, in addition to cooperative credit institutions, as reported in the year 2018. The relationship between the ownership structure and the performance of a bank has always been ambiguous. On the ownership issues, it is advocated by the proponents of private sector banks that the government should reduce its ownership stake in the PSBs as they believe that private sector banks score over PSBs in terms of efficiency and profitability. However, broadly over the years, the performance of public sector

banks has converged with that of new private sector banks and foreign banks (Reserve Bank of India, 2013).

Of the total banking industry in India, Public sector banks constitute 72.9% share while the rest is covered by private players. A report of 'The Economic Times' dated March 5, 2018 states that the NPA of private banks for the recent year has been much lower than most of the PSBs, which were hit by the scams and RBI action. The combined market value of 22 PSU lenders could not match the market value of HDFC Bank. On one side, the preponderance of government-owned banks in India has contributed to financial stability. On the other, meeting their growing capital needs casts a very heavy burden on the Government. What is therefore needed, is an optimal ownership mix so that the balance between efficiency, equity and financial stability could be promoted. Going forward, there lies more inducement in enabling the PSBs to improve their performance while promoting private sector banks side by side (Reserve Bank of India, 2013).

Most of the existing studies are either associated with drawbacks in approach and research methodology followed or limited to historical time periods or any particular bank group. Thus, one cannot completely rely on these findings and needs to re-examine the performance dynamics of Indian Commercial Banking System coping up with the recent progress reforms and changes. (Wanniarachchi & Suzuki, 2011)

The present paper aims to assess whether the private sector banks perform better than the public sector banks in terms of efficiency, and if so, what could be the possible justification behind this. This study aims to estimate the performance of 39 Indian Commercial Banks over a time period of 6 years from 2013-2018 using Data Envelopment Analysis (DEA) taking bank size as a constant parameter. By supplementing the results obtained by DEA with regression estimation, this study attempts to fill the research gap prevalent in the existing studies conducted on the topic.

2. Literature Review

The issue concerning the association between the ownership and the performance of organization's has been extensively researched for. The property rights approach advocates a better performance of private firms when compared to the public enterprises because of the exercised corporate control and the possibilities of takeovers and reputation loss resulting therefrom (Akhian, 1965). The public choice approach as exemplified by Nicks Kamen W. (1971) also stresses that public enterprises are low performers, because of a major likelihood of inefficiencies creeping in. Being one of the first authors to conduct this research for banking institutions in non-US countries, Short (1979) based on his study of Canadian, Western European and Japanese banks concluded an underperformance of state-owned banks when compared to their counterparts in the private sector.

The high market share of the public sector banks in India which is supposed to increase their profitability (as compared to private banks), when combined with the conflicting observation of lower profits resulting from government ownership, makes an examination of the relationship between the ownership and performance levels of Indian banks quite interesting and has also drawn the interest of many research scholars Das (1997) examined technical, scale, allocative, and overall efficiencies of PSBs and observed a fall in overall performance in the year 1995-96 due to a major reduction in technical efficiency. Bhattacharyya et al. (1997) analyzed the impact of liberalization on the performance of 70 Indian Banks using data envelopment analysis (DEA) and stochastic frontier analysis. They observed that public sector banks have higher technical efficiency than foreign banks followed by the private banks in the country. Sarkar et al (1998) used return on assets and operating profit ratio as a profitability measure and net interest margin, as efficiency measures to evaluate the performance of public, private and foreign banks using analysis of covariance models. A shadow cost function was used by Kumbhakar and Sarkar (2003) to analyze the comparative patterns of total factor productivity growth of public and private sector banks over the period 1985-96. The study concluded that the private sector banks show improved performance through expanded output, but PSBs are not impacted

positively by deregulation. Shanmugam and Das (2004) evaluated the technical efficiency of Indian Banks during the reform period of 1992-99 with 4 distinct ownership structures. They claimed that banks are under-performing even after successful progress reforms in the banking system where domestic state bank groups prove to be more efficient than other banks in India.

Das, Nag and C Ray (2005) opted for a holistic approach by calculating technical, cost, revenue and profit efficiency with both input and output orientations using variables like cost of deposits, net advances, net interest margin, CRR, SLR, and bank rate. They reported that bank ownership has a positive impact on their profit and revenue efficiency. Sensarma (2005) observed that the profit efficiency of the banking industry has fallen off over time since deregulation even when the banks are doing well in terms of cost-efficiency. He concluded that foreign banks are less efficient than the PSBs. Varadi et al. (2006) stated that public sector banks are more efficient than other banks operating in India at that time. In their study, Bodla and Verma (2007) analyzed the possible determinants of bank profitability in India. They observed that due to increased competition and new reforms in the banking system, banks' profit margins face rigorous pressure with a decline in non-performing loans. They considered NPA, operating cost and net interest margin as major determinants of Indian banks profitability and concluded that private sector banks perform better than PSBs during the study period. Debnath et al (2008) also used an intermediation approach with outputs as PAT, interest income, operating profit, advances & NPAs and inputs as deposits & total assets to calculate the performance for the year 2004-05. They assumed variance returns to scale and used the BCC output-oriented model.

Sahoo et al (2007) found that the technical efficiency of Indian banks improved during the post-reforms period. Kumar and Gulati (2009) selected advances and investment as output variables and total assets, borrowings and no. of employees as inputs for a two-stage performance evaluation model under DEA methodology with intermediation approach and output-oriented CCR model. They concluded that there is a large scope of improvement for PSBs. Das and Ghosh (2009) observed that medium-sized public sector banks performed exceptionally well during the period 1992-2002. Their study also shows low non-performing loans contribute to the technical efficiency of banks. Malhotra et al (2011) evaluated the banks' performance for a short span of 2005-09 using t-test and panel analysis with various profitability and efficiency indicators. Wanniarachegi & Suzuki (2011) estimated the performance of banks for the period of 2002-09 using DEA with various inputs and outputs based on an intermediation approach with model-specific concepts of 'flow' and 'stock'. Further, they performed ANOVA taking DEA efficiency scores, ROA and NPA ratio as measures of bank performance. Saha and Das (2016) concluded their study mentioning that the efficiency performance of banks in various categories viz., public sector, the private sector and foreign banks taken as a whole indicates that big banks, in general, did perform more efficiently during the period under reference than the smaller banks in the Indian banking space.

Thus, the results yielded by the existing studies have been varied. However, based on the existing property rights and public choice approaches and the results produced by the recent prior studies, this research study hypothesizes that:

H1: Private sector banks perform better than the public sector banks

3. Data and Variables

3.1. Data

Data for this study has been taken from two different sources, Prowess - a large database for Indian companies and The Reserve Bank of India database, for the sample years 2013-2018. The sample comprises a total of 39 banks, which have been categorized into 2 sets: Small banks and Big banks based on the median value of the total assets size group of the banks. Depending upon the value of total assets of the bank for that particular year, this categorization has been renewed annually.

3.2 Empirical Methodology

This study employs 2 techniques for evaluating banks' efficiency and testing the hypothesis.

3.2.1 Data Envelopment Analysis (DEA)

Various approaches have been used in the evaluation of bank efficiency. Of the 130 studies reviewed by Berger and Humphrey (1997), 57 were based on DEA. Amongst 196 studies reviewed by Fethi and Pasiouras (2010), 151 used "DEA-like" techniques. Paradi and Zhu (2013) found 275 DEA applications into study efficiency in the banking sector (Saha& Das, 2016). In this study also, the non-parametric frontier approach of Data Envelopment Analysis (DEA) with the input-oriented model and Constant Returns to Scale (CRS) assumption has been adopted.

Viewing the banking pursuit as a conversion of a particular set of inputs such as deposits and capital into a particular set of outputs such as loans and securities, DEA can be used to calculate the relative efficiency of banks, i.e., performance of each bank relative to similar banks in the sample. DEA is a non-parametric linear optimization methodology employed to identify the relatively efficient production frontier, based on the empirical data of selected inputs and outputs of the banks under consideration.

Assuming all resources used and services provided, DEA compares the banks in the sample and determines the most efficient and inefficient banks whose performance can be improved (Titko & Jureviciene, 2014). By comparing the mix and volume of resources used and services provided by each bank with those of all the other banks in the sample, DEA forms two clusters: banks comprising efficient frontier and inefficient banks lying below the frontier, to evaluate the performance of the banks in the sample. In short, DEA is a very powerful benchmarking technique (Sherman & Zhu).

There are 3 considerations in DEA methodology: Approach, Assumption, and Orientation. DEA uses 2 approaches, Production approach and Intermediation approach. In the production approach, Banks are considered as service providers, whereas in the intermediation approach, they are considered as financial intermediaries between Business and Households. Since banks primarily play the role of intermediaries in modern times, it can be concluded that for banks, the **intermediation approach** is more relevant. Further, this study assumes that banks perform at their optimal level, therefore **constant returns to scale (CRS) assumption** is satisfied. Also, an **input-oriented model** is used in this study to determine the slacks and targets of bank efficiency using DEA.

This study has made use of DEA, giving it preference over other frontier efficiency measurement techniques of banking efficiency, especially its closest rival stochastic frontier analysis (SFA) because it has several advantages. First, it can simultaneously use several inputs and outputs, which is an attractive feature because production in the banking industry often involves multiple inputs and multiple outputs. Secondly, it does not require any assumptions about the functional form of the production function. At the same time, it calculates a maximal performance measure for each bank relative to all other banks in the sample with the sole condition that each bank lays on or below the efficient frontier. Also, it is particularly suitable for small sample studies like this and uses exclusively quantity information and, thus, demands neither problematic price information nor a restrictive behavioural assumption in its calculation.

3.2.2 Panel Least Squares Regression

This study investigates the research question of whether ownership status of banks affects the performance of a bank by using the following empirical specification namely,

$$\text{Bank Performance}_{it} = \alpha + \beta_1 * \text{Bank Ownership}_i + \beta_2 * \text{Operating profit}_{it} + \beta_3 * \text{Total Assets}_{it} + \beta_4 * \text{Size Dummy}_{it}$$

where i represents banks ($i = 1$ to 39) and t represents years ($t = 2013$ to 2018)

3.3 Variables

3.3.1 Data Envelopment Analysis

DEA considers certain input and output variables based on which efficiency scores are calculated. Any resource used by a bank is included as input and it is considered that the bank will transform these resources to produce outputs which include the amount of product or services produced by the bank with different quality levels. The number of factors selected (inputs and outputs) needs to be small compared to the total number of banks in the study to strengthen the discrimination power of DEA. Titko & Jureviciene (2014) observed in his research that the number of observations should be at least three times the number of variables while employing DEA. Since there are a total of 39 banks in this study, around 20 in each category: small and big size, a total of 6 input cum output variables can be taken under consideration for DEA calculation.

Since this study makes use of the intermediation approach, advances, investments and net interest margins are considered as outputs. To generate these outputs, operating expenses, net NPAs and fixed assets have been considered as inputs.

Table 1: DEA Variables

Input	Output
Operating Expenses	Advances
Net NPAs	Investments
Total Assets	Net Interest Margin (NIM)

Source: Author's Analysis

Quoting the existing literature, there were other inputs like net worth, deposits, interest income etc. as well as other outputs like total loans, operating non-interest income. But they could not be incorporated in the present study due to constraints of small sample size. However, the variables considered are the ones that have been extensively used in the existing studies.

3.3.2 Regression

3.3.2.1 Variable of Interest

The present study measures the impact of the ownership of a bank on its performance. Ownership being a categorical variable cannot be quantified. So, it is incorporated in this study by the introduction of dummy variables, where binary variable 1 denotes public sector banks whereas 0 has been used as a proxy for private sector banks.

3.3.2.2 Dependent Variable

There are 2 different variables that have been used to measure the performance of a bank in the estimation of the specified regression model. Firstly, the efficiency scores obtained from the employment of DEA have been considered. Secondly, the Return on Assets ratio, which measures the profitability of any organization, taking into account its scale of operations and thus, can be used to measure the performance of different banks, irrespective of size.

3.3.2.3 Control Variables

Performance of banks in different groups depends not only on their ownership status but also on other variables that reflect differences in their regulatory environment. The effect of these variables needs to be controlled for in order to isolate the ownership effect on the performance of the different bank groups. The variables incorporated in this study are total assets and operating profit. Total assets are introduced into the regression to account for possible scale effects in bank operations. The control

variable, namely the operating profit, is included to account for the extent of a bank’s profitability as its performance measure.

Models: In order to validate the hypothesis of our study, a total of 3 mathematical models have been used, as specified below:

Model 1	$ROA_{it} = \alpha + \beta_1 * \text{Bank Ownership}_i + \beta_2 * \text{Operating profit}_{it} + \beta_3 * \text{Total Assets}_{it}$
Model 2	$DEA \text{ Score}_{it} = \alpha + \beta_1 * \text{Bank Ownership}_i + \beta_2 * \text{Operating profit}_{it} + \beta_3 * \text{Total Assets}_{it}$
Model 3	$ROA_{it} = \alpha + \beta_1 * \text{Bank Ownership}_i + \beta_2 * \text{Operating profit}_{it} + \beta_3 * \text{Total Assets}_{it} + \beta_4 * \text{Size Dummy}_{it}$

4. Results

4.1 Efficiency Scores

Table 2 and Table 3 represent the efficiency scores calculated for small and large banks respectively using the DEA Technique for the 6-year period under consideration. All the banks considered to be efficient by the DEA model are allotted the maximal efficiency score of 1. It can be observed that among the small-sized banks, most of the public sector banks have low average efficiency scores, with only 2 banks having an average efficiency score above 0.5, whereas most of the private sector banks exhibit average high-efficiency scores. Similarly, in the big size banks category, all private sector banks and public sector banks showcase an upward trend in efficiency scores with private banks showcasing higher levels of efficiency.

Table 2: Efficiency Scores for Small Size Banks

DMU	Ownership	Bank	2013	2014	2015	2016	2017	2018	Average
1	Private	KARUR VYSYA BANK	1	1	0.95247	0.45114	0.34185	0.82052	0.76099
2	Private	KARNATAKA BANK LTD	1	1	0.92366	0.12736	0.40867	0.9269	0.73109
3	Private	TAMILNADU MERCANTILE BANK LTD	1	1	1	0.33376	0.6182	1	0.82532
4	Private	CITY UNION BANK LIMITED	1	1	0.88023	0.27234	0.5099	1	0.77707
5	Private	LAKSHMI VILAS BANK	0.86184	0.99908	0.80021	0.23907	0.48048	0.85768	0.70639
6	Private	DHANLAXMI BANK	0.65469	0.77198	0.6359	0.26082	0.48894	1	0.63538
7	Private	CATHOLIC SYRIAN BANK LTD	0.68496	0.77781	0.52775	0.21839	0.27593	0.66372	0.52476
8	Private	RBL BANK	1	1	1	0.59595	1	1	0.93265
9	Private	DCB BANK LIMITED	0.69174	0.81274	0.78094	0.52675	0.9596	1	0.79529
10	Private	NAINITAL BANK	1	1	1	1	1	1	1
11	Public	ORIENTAL BANK OF COMMERCE	0.21629	0.2885	0.08981	0.04857		0.92174	0.31298
12	Public	INDIAN OVERSEAS BANK					0.46262	0.59536	0.52899
13	Public	UCO BANK	0.02839				0.06032	1	0.36290
14	Public	CORPORATION BANK	0.76311	0.05736	0.09225	0.09657		1	0.40185
15	Public	ALLAHABAD BANK		0.05386	0.03984	0.03853	0.04446		0.04417
16	Public	INDIAN BANK	0.35799	0.16353	1	0.06916	0.04631		0.32739
17	Public	ANDHRA BANK	0.03026	0.05035	0.06361	0.06157	0.06294	1	0.21145
18	Public	BANK OF MAHARASHTRA	0.29547	0.62472	0.05528	0.0583	0.0348	0.78737	0.30932
19	Public	UNITED BANK OF INDIA	0.31803	0.24602	1	0.0804	0.057	0.8833	0.43079
20	Public	DENA BANK	0.10369	0.10144	1	0.06064	0.11505	0.74386	0.35411
21	Public	VIJAYA BANK	0.0584	0.09221	0.1657	0.07253	0.07537	1	0.24403
22	Public	PUNJAB AND SIND BANK	0.11149	0.42722	0.5258	1	1	1	0.67741

Source: DEA Frontier Output

The general observation from the figures is that with the changes in ownership, there is a change in efficiency level as well on an average. On close examination of all the obtained efficiency scores, one can observe that all the efficient banks for both the categories belong to the private sector, except for the UCO Bank which can be considered as an outlier. Many of the banks are efficient in 2018 with a perfect score irrespective of their size and ownership structures as compared to the entire interval of 2013-2018 which can be considered as an effect of an overall change in the entire banking industry. Thus, the average yearly score for most of those banks also increases.

Table 3: Efficiency Scores for Big Size Banks

DMU	Ownership	Bank	2013	2014	2015	2016	2017	2018	Average
1	Private	ICICI BANK	0.80345	0.82612	0.68416	0.91344	0.80881	0.78936	0.80422
2	Private	HDFC BANK	0.58678	0.73954	0.77102	1	1	1	0.84955
3	Private	AXIS BANK	0.74865	0.81105	0.83853	0.99354	0.87923	0.78289	0.84231
4	Private	YES BANK LTD.	1	1	1	1	1	1	1
5	Private	KOTAK MAHINDRA BANK LTD	0.90807	0.58177	0.74835	0.71629	0.73045	0.88112	0.761
6	Private	INDUSIND BANK	0.64257	0.64322	0.87278	1	1	1	0.85976
7	Private	JAMMU & KASHMIR BANK LTD	1	1	1	1	1	1	1
8	Private	FEDERAL BANK	0.97389	0.97486	1	0.99115	0.87549	0.88974	0.95085
9	Private	SOUTH INDIAN BANK	1	1	1	1	1	1	1
10	Public	STATE BANK OF INDIA	0.05204	0.03528	0.07583	0.05007	0.02175	0.99547	0.20507
11	Public	BANK OF BARODA	0.35956	0.36614	0.27912	0.12875	0.24495	1	0.39642
12	Public	PUNJAB NATIONAL BANK	0.06218	0.07539	0.3354	0.18221	0.15255	0.86809	0.2793
13	Public	BANK OF INDIA	0.21432	0.44009	0.11764	0.21178	0.18788	0.87781	0.34158
14	Public	CANARA BANK	0.03772	0.17071	0.30008	0.15979	0.16511	0.93467	0.29468
15	Public	UNION BANK OF INDIA	0.16572	0.36213	0.41741	0.48388	0.19564	1	0.43746
16	Public	CENTRAL BANK OF INDIA	0.8468	0.1689	0.22027	0.44385	0.58027	0.86758	0.52127
17	Public	INDIAN OVERSEAS BANK	0.38381	0.25602	0.35192	0.37824			0.34249
18	Public	SYNDICATE BANK	0.2441	0.28312	0.5812	0.55905	0.36302	0.92197	0.49207
19	Public	INDIAN BANK						1	1
20	Public	ORIENTAL BANK OF COMMERCE					0.9748		0.9748
21	Public	CORPORATION BANK					0.80562		0.80562
22	Public	UCO BANK		0.42328	1	1			0.80776
23	Public	ALLAHABAD BANK	0.22474					0.89368	0.55921

Source: DEA Frontier Output

However, in order to test the statistical significance of the results obtained, the research hypothesis has to be verified using the regression technique. The study makes use of White’s robust standard errors while estimating the Panel Regression Model to control for heteroscedasticity. Multicollinearity has been tested using the Variance Inflation Factor (VIF). At the same time, the values of DW-Statistic being close to 2 indicate an absence of autocorrelation in the regression models.

4.2 Descriptive Statistics

Table 4 and Table 5 present the summary statistics for variables used in the study for the small and big banks respectively. The small banks have an average efficiency score of 0.559 with values ranging from 0.028 to 1 whereas the big banks have an average efficiency score of 0.648 with values spread over a range of 0.022 to 1. This also indicated that on average, big banks are more efficient than small banks. This finding is supported by the average values for Return on Assets ratio as well.

Table 4: Summary Statistics for SMALL Banks

Variables	Mean	Median	SD	Min.	Max.
Efficiency Score	0.559	0.607	0.387	0.028	1
ROA	0.349	0.500	0.885	-2.330	2
Total Assets	5.793	5.877	0.483	4.635	6.394
Operating Profit	-0.177	-0.527	1	-1.318	-1.318

Source: MS-Excel Output

Table 5: Summary Statistics for BIG Banks

Variables	Mean	Median	SD	Min.	Max.
Efficiency Score	0.648	0.786	0.345	0.022	1
ROA	0.695	0.650	0.971	-2.040	2.020
Total Assets	6.491	6.495	0.408	5.697	7.538
Operating Profit	0.000	-0.356	1	-0.772	4.875

Source: MS-Excel Output

4.3 Empirical Results: Bank Ownership and Performance

The results obtained from the estimation of the regression model are reported in Table 6. In all the 5 models estimated, the coefficient of our variable of interest, ownership is negative, -0.7240 and -1.5180 in Model 1 for the small and big banks respectively; -0.2842 and -0.3471 in Model 2 for the small and big banks respectively; and -1.2359 in Model 3. Private Banks being our base category, the estimated differential intercept coefficient explains how the performance of public banks differs from the private banks. Consistent with the H1, these findings suggest that a private sector bank is more efficient than a public sector bank, on an average. The p-value of the F-Statistic for all the models is 0.000 which implies that the results obtained are statistically significant. Thus, it can be inferred that the results obtained by employing panel least squares regression are in lines with the Data Envelopment Analysis.

Table 6: Regression Results

Particulars	Combined	SMALL Banks		BIG Banks	
	Model 1	Model 2	Model 3	Model 4	Model 5
Dependent Variable	ROA	ROA	Efficiency Scores	ROA	Efficiency Scores
Intercept	-1.3871	0.2419	1.4089	-2.8412	2.9191
Ownership	-1.2359	-0.7240	-0.2842	-1.5180	-0.3471
Size (Dummy Var.)	-0.0789				
Total Assets	0.4210	0.8127	-0.1229	0.6679	-0.3216
Operating Profit	0.0349	0.0085	-0.0216	-0.0635	0.0574
Adjusted R-Sq	0.2999	0.1114	0.2895	0.4388	0.4981
F-Statistic	25.953	5.9800	17.168	30.460	38.393
Prob(F-Statistic)	0.0000*	0.0008*	0.0000*	0.0000*	0.0000*
DW-Statistic	1.7590	1.6792	1.6482	1.0679	1.2699

Source: E-Views Output

4.4 Correlation Analysis

The results obtained from the estimation of the Variance Inflation Factor for the independent variables of the regression model are presented in Table 7. All the values are less than 5, which indicate the absence of any multicollinearity that can arise because of incorporating these variables in our study.

Table 7: VIF Results

Variables	VIF	1/VIF
Total Assets	2.38	0.420
Operating Profit	1.95	0.514
Ownership	1.50	0.668
Mean VIF	1.94	

Source: E-Views Output

5. Conclusion

Stretching over a period of six years from 2013 to 2018 that witnessed a plethora of governance reforms in India with modifications in government policies and emphasizing on variables that have been found in prior literature to be important determinants of bank outcomes, the results of the present empirical analysis suggest widespread ownership inefficiencies across banks and years with private sector banks being superior to public sector banks in terms of efficiency levels for both the asset size groups. This difference in performance levels between the private and state-owned banks can be attributed to the fact that corporate governance mechanisms and the organizational goals of the two financial service providers are intrinsically different. While the profit maximization continues to be the ultimate aim of private sector banks, the state-owned banks form the backbone of financial architecture in India. Social welfare perusal being their primary objective, the ability of the PSBs to maintain sufficient liquidity determines our economic growth. Operating under the government-imposed restrictions; they are subjected to priority sector lending, extending loans to the risky part of the economy. Thus, the performance of state banks despite the financial autonomy available is quite impressive. This signifies that the results obtained might establish the private banks as better-performing financial institutions but this cannot be used as a parameter to judge the relative importance of these banks for the Indian economy. While the results for any one year may be affected by random variation in outputs and inputs, the majority of banks which are persistently found to be inefficient should be examined more closely to determine whether the bulk of being a public sector institution hinders their overall performance and thereby lowers efficiency.

References

1. Akhavein, J. D., Berger, A. N., & Humphrey, D. B. (1997, February). The effects of megamergers on efficiency and prices: evidence from a bank profit function. *Review of Industrial Organization*, 12(1), 95-130. doi:10.1023/A:1007760924829
2. Akhian, A. (1965, November). The Basis of some Recent Advances in the Theory of Management of the Firm. *Journal of Industrial Economics*, 30-44.
3. Berger, A. N., & Humphrey, D. B. (1997). Efficiency of Financial Institutions: International Survey and Directions for Future Research. *European Journal of Operational Research*, 98(2), 175-212.
4. Bhattacharyya, A., Lovell, C., & Sahay, P. (1997, April 16). The impact of liberalization on the productive efficiency of Indian Commercial Banks. *European Journal of Operational Research*, 98(2), 332-345. doi:10.1016/S0377-2217(96)00351-7
5. Bodla, B. S., & Verma, R. (2007, October). Determinants of Profitability of Banks in India: A multivariate analysis. *Journal of Services Research*, 7(1), 75-87.

6. Das, A. (1997). Technical, allocative and scale efficiency of public sector banks in India. Reserve Bank of India Occasional Papers, 18(2), 279-301.
7. Das, A. (1999). Profitability of public sector banks: a decomposition model. Reserve Bank of India Occasional Papers, 20(1).
8. Das, A., & Ghosh, S. (2009, December). Financial deregulation and profit efficiency: A non-parametric analysis of Indian Banks. *Journal of Economics and Business*, 61(6), 509-528. doi:10.1016/j.jeconbus.2009.07.003
9. Das, A., & Kumbhkar, S. (2012). Productivity and Efficiency Dynamics in Indian Banking: An input distance function approach incorporating quality of inputs and outputs. *Journal of Applied Economics*, 27(2), 205-234.
10. Das, A., & Shanmugam, K. (2004, June). Efficiency of Indian commercial banks during reform period. *Applied Financial Economics*, 14(9), 681-686. doi:10.1080/0960310042000233458
11. Das, A., Nag, A., & Ray, S. C. (2005, March 19). Liberalisation, Ownership and Efficiency in Indian Banking: A Non-Parametric Analysis. *Economic and Political Weekly*, 40(12), 1190-1197. Retrieved from URL: <https://www.jstor.org/stable/4416367>
12. Debnath, R. M., & Shankar, R. (2008, January). Measuring Performance of Indian Banks: An Application of Data Envelopment Analysis. *International Journal of Business Performance Management*, 10(1), 57-85. doi:10.1504/IJBPM.2008.015921
13. Kumar, S., & Gulati, R. (2009, January). Technical efficiency and its determinants in the Indian Banking industry: An application of DEA and Tobit analysis. *American Journal of Finance and Accounting*, 1(3), 256-296. doi:10.1504/AJFA.2009.026484
14. Kumbhakar, S. C., & Sarkar, S. (2003, July). Deregulation, Ownership, and Productivity Growth in the Banking Industry: Evidence from India. *Journal of Money, Credit and Banking*, 35(3), 403-424.
15. Malhotra, D., Poteau, R., & Singh, R. (2011). Evaluating the Performance Of Commercial Banks in India. *Asia Pacific Journal of Finance and Banking Research*, 5(5), 15-37.
16. Mittal, M., & Dhade, A. (2007). Profitability and Productivity in Indian Banks: A Comparative Study. *AIMS International Journal of Management*, 1(2), 137-152. *International Business & Economics Research Journal – March 2011 Volume 10, Number 3 © 2011 The Clute Institute* 81
17. Nicksamen, W. (1971). Bureaucrats and Politicians. *Journal of Law and Economics*, 18, 617-643.
18. Paradi, J. C., & Zhu, H. (2013, January). A survey on bank branch efficiency and performance research with data envelopment analysis. *Omega*, 41(1), 61-79. doi: 10.1016/j.omega.2011.08.010
19. Ram Mohan, T., & Ray, S. C. (2004, March). Comparing Performance of Public Sector Banks: A Revenue Maximisation Efficiency Approach. *Economic and Political Weekly*, 39(12), 1271-1276.
20. Ray, S. C. (2006, February). Are some Indian banks too large? An examination of size efficiency in Indian Banking. *Journal of Productive Analysis*, 27(1), 41-56. doi:10.1007/s11123-006-0022-6
21. Reserve Bank of India. (2013). *Banking Structure in India - The Way Forward*. Reserve Bank of India, 44-66.
22. Rezvanian, R., Rao, N., & Mehdian, S. M. (2008). Efficiency change, technological progress and productivity growth of private, public and foreign banks in India: Evidence from the post-liberalization era. *Journal of Applied Financial Economics*, 18(9), 701-713. doi:10.1080/09603100701222317
23. Saha, A., & Das, U. (2016, July). Consolidation in Indian banking: Does size matter? *Indian Institute of Management Calcutta*, 43(3), 223-238. doi:10.1007/s40622-016-0133-5
24. Saha, A., & Ravisankar, T. (2000, July). Rating of Indian commercial banks: A DEA approach. *European Journal of Operational Research*, 124(1), 187-203. doi:10.1016/S0377-2217(99)00167-8

25. Sahoo, B. K., Sengupta, J., & Mandal, A. (2007, January). Productive Performance Evaluation of the Banking Sector in India using Data Envelopment Analysis. *International Journal of Operations Research*, 4(2), 63-79.
26. Sanjeev, G. M. (2007). Does Banks' Size Matter in India? *Journal of Service Research*, 136-144.
27. Sarkar, J., & Sarkar, S. (1998). Does Ownership Always Matter? - Evidence from Indian Banking Industry. *Journal of Comparative Economics*, 26, 262-281.
28. Sathye, M. (2003). Efficiency of banks in a developing economy: The case of India. *European Journal of Operational Research*, 148(3), 662-671.
29. Sensarma, R. (2005). Cost and Profit Efficiency of Indian Banks during 1986-2003: A Stochastic Frontier Analysis. *Economic and Political Weekly*, 40(12), 1198-1200. doi:10.2307/4416368
30. Sherman, & Zhu. (n.d.). Chapter 2: Data Envelopment Analysis Explained.
31. Short, B. K. (1979). The relation between commercial bank profit rates and. *Journal of Banking & Finance*, 209–219.
32. Titko, J., & Jureviciene, D. (2014). DEA Application at Cross-Country Benchmarking: Latvian vs Luthianian Banking Sector. *Contemporary Issues in Business, Management and Education Conference* (pp. 1124-1135). Elsevier. doi: 10.1016/j.sbspro.2013.12.959
33. Varadi, V. K., Mavaluri, P. K., & Boppana, N. (2006). Measurement of Efficiency of Banks in India. MPRA Paper 17350 University Library of Munich, Germany.
34. Wanniarachegi, M. K., & Suzuki, Y. (2011). How Does Ownership Affect Bank Performance? - The Case of Indian Commercial Banks. *International Business & Economics Research Journal*, 71-81.