ISSN : 2349-7165

Chronological Efficiency Assessment of Public Sector Banks of India (2013 to 2017)

Dharmendra Mehta
Reader, FMS, Pt. JNIBM, Vikram University, Ujjain

Hitendra Trivedi
Research Scholar, FMS, Pt. JNIBM, Vikram University, Ujjain

N. K. Mehta
Associate Professor, SUBIS, Barla, Raisen

ABSTRACT

A competent banking system is foundation to substantial economic growth of any nation. Therefore, studies related to banking efficiency are considered quite significant for all the concerned individuals and organizations that are reliant on the banking sector. In particular, the researches undertaken in the last decade is more important because it has faced continuous transition in technology, regulation, up gradation of competitive financial market etc. In this paper, an attempt has been made to analyze the efficiency of public sector banking institutions. For this purpose, the Data Envelopment Analysis (DEA) model has been used with the help of selected input and output variables. This paper is descriptive in nature based on secondary data related to efficiency calculation. The research has covered varied studies relating to efficiency assessment of banking industry (Shanmugam and Das 2004; Sanjeev, 2006; Rajeev and Mahesh, 2007, Kumar and Gulati 2008). This paper also makes an attempt to explore the future measures for improvising efficiency of banking operations in India.

Keywords: Banking Industry, Financial System, Banking Efficiency, Data Envelopment Analysis (DEA)

INTRODUCTION

Banking in India is an important area of research among the bankers and economists primarily because of the continuous changing environment and resultantly change in banking practices. After the financial deregulation in India, the efficiency became an important concern for banks operating in the country. Besides the global economic environment, the political environment of country deciding financial reforms involving trade, taxation and micro financial activities have affected banking business to a large extent. The increasing competition due to global trade liberty has shifted the focus of banks from their primary role of channelizing funds from household to the real sector. These changing scenarios have created arduous situations for public sector banks where the banks have to amalgamate social welfare and profitability of the banks simultaneously.

India is the largest nation in South Asia with a complex banking structure of varied financial instruments and institutions operating in India with the central bank as a regulatory body i.e. Reserve Bank of India. The financial institutions are mainly categorized as scheduled and non-scheduled banks. The structure of banking system also gets complex due to multilayer categorization like Commercial Banks, Cooperative Banks, Foreign Banks, Regional Rural Ranks, Special Banking Institutions, etc. With the liberalization and continuous financial reforms, the banking industry is witnessing a quick growth and increase in competition among public sector banks. Strong competition from private sector banks, capital market, mutual fund industry, and other financial institutions persuaded the public sector banks to work on efficiency and profitability analysis.

REVIEW OF LITERATURE

Throughout the past decade, hundreds of articles and paper have been developed and published who have addressed the question of efficiency and profitability analysis of banks; in contrast, there are only a few papers studies efficiency and profitability analysis in the context of developing economies. The major portion of available research is comprised of work done in the context of developed economies. Sathye (2005)measured and compared the performance of the banks done through measuring the standard financial performance such as returns on assets, etc. The present study measured the efficiency of banks through"accounting ratios, e.g., deposits per employee, etc."The impact of privatization on firm performance was evaluated using synchronic and historical approaches which revealed that financial performance of partially privatized banks and their efficiency were found significantly higher as compared to fully public banks. Seshadri, Kumar, and Reddy (2014) observed the efficiency of Public and Private commercial banks considering interest income to total asset ratio, Total Income to Total asset ratio, Interest expended to Total asset ratio and Total expenditure to total asset ratio taken as input and output for the banks DEA approach to evaluate efficiency of bank through multiple output and input. In his work, it was found that the small size banks benefited from the reduction of the total expenditure and total interest paid on their deposits.

Dash and Charles(2012) investigated the technical efficiency of the banks operating in India, categorized in terms of ownership. This study employed DEA model with "five input variables (borrowings, deposits, fixed assets, net worth, and operating expenses) and four output variables (advances & loans, investments, net interest income, and non-interest income)". The outcome of the work revealed that foreign banks operating in India are found slightly efficient as compared to public and private banks. Further, it was also reported that there was no substantial difference in the efficiency levels of public and private banks operating in India. Mohan T. T. R. (2003) in his paper has compared banks on the basis of three basic categories as Public, Private and Foreign banks. The sample period for comparison was considered from the year 1992 to the year 2000. In his paper, the revenue maximization efficiency of the banks was measured using physical quantities of inputs and outputs.

Rajput, Chopra, and Oberoi (2014) exhibited that foreign banks operating in India has been consistently showing optimum efficiency throughout the period of study. The scheduled commercial banks were found less competent in terms of efficiency as compared to the foreign banks. Sanjeev, G. M. (2006) in his work explained that the reforms focused on the deregulation of policies, the recommendation of prudential capital adequacy norms, asset classification income recognition and provisioning for impaired assets. These changes has facilitated opening of new private sector banks and also encouraged the entry of foreign banks which subsequently increased the competitiveness within the Indian banking industry. Whereas a study conducted by Rajeev and Mahesh (2007) discussed the role of non-performing assets in the efficiency of banks. Kumar and Gulati (2008) examined technical, pure technical, and scale efficiencies in Indian public sector banks using DEA.In the context of developing economies such as India where the public sector banks are very sensitive towards any economics and social interventions which affect their efficiency. Therefore, the objective of the present work is to analyze the chronological performance of Indian public sector banks through efficiency evaluation and report the present status of their efficiency.

RESEARCH METHODOLOGY

The banking sector in transition economies of South Asia has experienced major transformations throughout the 1990s. In the context of emerging economies like India which have been going through a consistent phase of reforms, it has emerged as an important area of study for the industry and researchers to assess the efficiency of banks in the relative time to update the policy and strategic reviews.

Studies on performance and efficiency in banking sector usually base their analysis on cost ratio comparisons. The basis of comparison is ratio of multiple inputs which are employed by the banking industry to produce multiple outputs. But the aggregation of all inputs and outputs faces various problems during calculation resulting to make this process complex for researchers.

Data Envelopment Analysis

DEA is defined as"a linear programming technique that converts multiple incommensurable inputs and outputs of each decision-making unit (DMU) into a scalar measure of operational efficiency, relative to its competing DMUs". The DEA methodology estimates an optimum benchmark decision-making unit among

the various units undertaken for analysis to estimate the efficiency of the other units in relation to the derived optimum DMU. The efficiency scores are calculated with various assumptions including selection of scales which are popularly classified as constant returns to scales (CRS) and variable returns to scales (VRS). The present study has undertaken both the assumptions to derive the efficiency scores and compared for the public sector banks to measure and compare the efficiency level of banks during the undertaken sample period.

OBJECTIVES

The research objectives can be postulated as follows:

1. To investigate the overall performance of 'Public Sector Banks' operating in India in comparison with the sample time period.
2. To compare and analyze the efficiency of public sector banks through different scales under DEA for the sample time period.

Selection of Data and Variables

Considering the case of India where the banking sector is comprised of four categories of the institutions which are termed as public, private, cooperative and foreign banks operating in the country. The dominance of the public sector banks can be understood by the fact that more than 80 percent of the market share in the total deposit and advances of the industry is possessed by the public sector banks (Das and Dutta, 2014). Therefore, the public sector banks were considered as an overall representative of the banking sector of the country.

It is vital to decide the variables to be considered for the analysis of the financial data related to the banking industry is available in various classifications covering diverse significant aspects of the industry. This availability of various genera of data set has raised the empirical issue of variable selection for data envelopment analysis. The complexity of the model is also proportional to the number of variables included in the model as with the increase in variables more and more production units become efficient (Galagedera & Edirisuriya, 2005). The presently available literature also does not provide and standardized approach for selection of variables.

Therefore, for this research purpose, 2 input variables (Interest Expense and Operating Expense) whereas 3 output variables(Advances, Investment, and Deposits) were considered to keep the model intact. A sample of 26 banks from the public sector (Excluding Bhartiya Mahila Bank) was undertaken for the analysis of the efficiency scores.

The data undertaken for analysis for this study was collected from the publicly available database of Reserve Bank of India and the database of Indian Banking Association. Compilation of data was done from the various reports published by banks, RBI and IBA. The sample period of study was considered for a period of five years (2012-13 to 2016-17).

RESULTS AND DISCUSSION

The Indian public sector banks are characterized by their scale of operations as the coverage of the banks is aimed to integrate the entire demographic population while sustaining the efficiency to sustain the business. There are results available of the works carried out by the researchers earlier which majorly reported the efficiency status of the banks during or post financial reforms of the late 19th century. The outputs vary in results as the ingredient variables and examined durations of the studies were different. Some of the researches reported that the public sector banks were performing better as compared to the other categories while some of the studies reported the contrary (Sathye, 2003; Mohan and Ray, 2004; Debanath and Shankar, 2008).

Similarly, the present study results differs from the above mentioned studies in the context of the variables considered and the sample period considered for the examination of efficiency scores. With the help of Data Envelopment Method, the efficiency score of different public sector banks were calculated for the undertaken sample period of five years. The efficiency of the public sector banks being reflected by the trend of overall average efficiency computed through DEA approach is shown in the table 01 also accompanied by the figure 01 for graphical representation as mentioned below:

Table 1:"Average Efficiency Scores of Public Sector Banks for duration of 2012-13 to 2016-17

S No.	Name of the Public Sector Banks	Efficiency Score (VRS Approach)	Efficiency Score (CRS Approach)
1	Allahabad Bank	0.92	0.91
2	Andhra Bank	0.91	0.87
3	Bank of Baroda	1.00	1.00
4	Bank of India	0.97	0.97
5	Bank of Maharashtra	0.96	0.92
6	Canara Bank	0.98	0.89
7	Central Bank of India	0.93	0.91
8	Corporation Bank	0.96	0.95
9	Dena Bank	0.98	0.94
10	Indian Bank	0.94	0.91
11	Indian Overseas Bank	0.85	0.84
12	Oriental Bank of Commerce	0.91	0.90
13	Punjab & Sind Bank	1.00	0.90
14	Punjab National Bank	0.99	0.99
15	Syndicate Bank	0.99	0.97
16	UCO Bank	1.00	1.00
17	Union Bank of India	0.91	0.91
18	United Bank of India	0.99	0.99
19	Vijaya Bank	0.98	0.91
20	State Bank of India (SBI)	1.00	1.00
21	State Bank of Bikaner & Jaipur	0.99	0.85
22	State Bank of Hyderabad	0.88	0.82
23	State Bank of Mysore	1.00	0.85
24	State Bank of Patiala	0.92	0.81
25	State Bank of Travancore	0.92	0.83
26	IDBI Ltd.	0.96	0.95

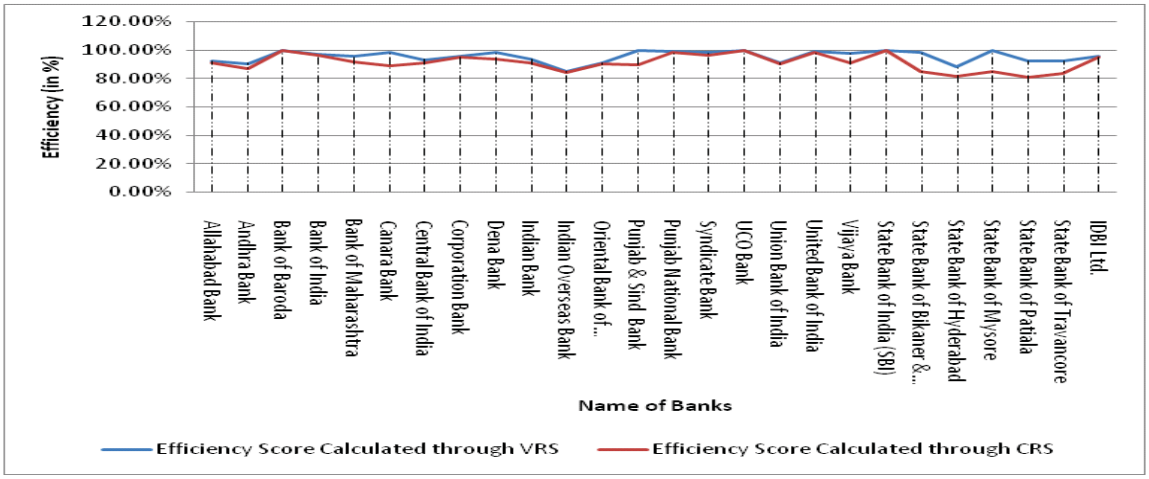

Figure 1: Average Efficiency Scores of Public Sector Banks for duration of 2012-13 to 2016-17"

It can be inferred through the average efficiency score table and subsequent graph represented through figure that the majority of the public sector banks are operating at relatively efficient level maintaining efficiency above eighty percent irrespective of the efficiency calculation method. The data envelopment method is a linear programming technique developed to calculate the efficiency scores of the underlying units which are typically termed as decision-making units (DMU). However, the algorithms proposed and employed in the various versions of the DEA are similar in nature but there are two scale assumptions which are generally employed are mentioned as constant returns to scale (CRS), and variable returns to scale (VRS). While observing the individual bank performances for both the approaches it was observed as five banks namely Bank of Baroda, Punjab &Sind Bank, UCO Bank, State Bank of India, and State Bank of Mysore were found consistently efficient at 100 percent for the VRS approach while for the CRS approach 3 banks namely Bank of Baroda, UCO Bank, and State Bank of India were found 100 percent efficient.

The differences in the assumptions of these efficiency calculation scales for calculating scores may cause a little difference in the output efficiency score but the results do not differ substantially. Therefore,Table1 mentions about the average efficiency scores for all the banks undertaken for this study for the sample period. Besides the year wise efficiency calculation of the banks for the respective years can be understood with the following tables and subsequent figures reporting about the efficiency scores for the individual years as follows:

Table 2: Efficiency Scores of Public Sector Banks Calculated through VRS Scale

S No.	Name of the Public Sector Banks	Year				
		2013	2014	2015	2016	2017
1	Allahabad Bank	0.90	0.87	0.89	0.96	0.99
2	Andhra Bank	0.93	0.85	0.91	0.92	0.93
3	Bank of Baroda	1.00	1.00	1.00	1.00	1.00
4	Bank of India	0.97	0.99	0.89	1.00	1.00
5	Bank of Maharashtra	1.00	0.88	0.94	1.00	0.99
6	Canara Bank	1.00	1.00	1.00	0.98	0.93
7	Central Bank of India	0.88	0.88	0.91	1.00	1.00
8	Corporation Bank	1.00	1.00	1.00	0.92	0.87
9	Dena Bank	1.00	0.99	0.97	1.00	0.97
10	Indian Bank	0.92	0.88	0.92	0.98	1.00
11	Indian Overseas Bank	0.85	0.80	0.85	0.88	0.87
12	Oriental Bank of Commerce	0.88	0.84	0.91	0.94	0.99
13	Punjab & Sind Bank	1.00	1.00	1.00	1.00	1.00
14	Punjab National Bank	0.95	1.00	1.00	1.00	1.00
15	Syndicate Bank	0.96	0.98	1.00	1.00	0.98
16	UCO Bank	1.00	1.00	1.00	1.00	1.00
17	Union Bank of India	0.90	0.84	0.85	0.95	1.00
18	United Bank of India	0.97	1.00	1.00	1.00	1.00
19	Vijaya Bank	0.99	0.99	0.96	0.97	0.96
20	State Bank of India (SBI)	1.00	1.00	1.00	1.00	1.00
21	State Bank of Bikaner & Jaipur	1.00	1.00	1.00	0.96	0.98
22	State Bank of Hyderabad	0.87	0.83	0.90	0.94	0.86
23	State Bank of Mysore	1.00	1.00	1.00	1.00	1.00
24	State Bank of Patiala	0.92	0.84	0.91	0.99	0.96
25	State Bank of Travancore	0.97	0.83	0.87	0.96	0.98
26	IDBI Ltd.	1.00	1.00	1.00	0.93	0.86

The microscopic year wise efficiency calculation also shows similar results as represented by the aggregated efficiency scores represented through tabled 01. The Table2 represents the efficiency scores of the banks for the five years calculated individually through DEA by employing the variable to returns scale assumption for calculating individual scores. The results can be observed as consistent in measures of efficiency as the first sample year has 11 banks operating at the optimum efficiency level while 6 other banks are operating at on or above 95 percent efficiency level. The similar results follow for the next consequent years with a very minor change in the numbers of the efficient banks and their efficiency scores. The same can be understood with the figure 02 as follows:

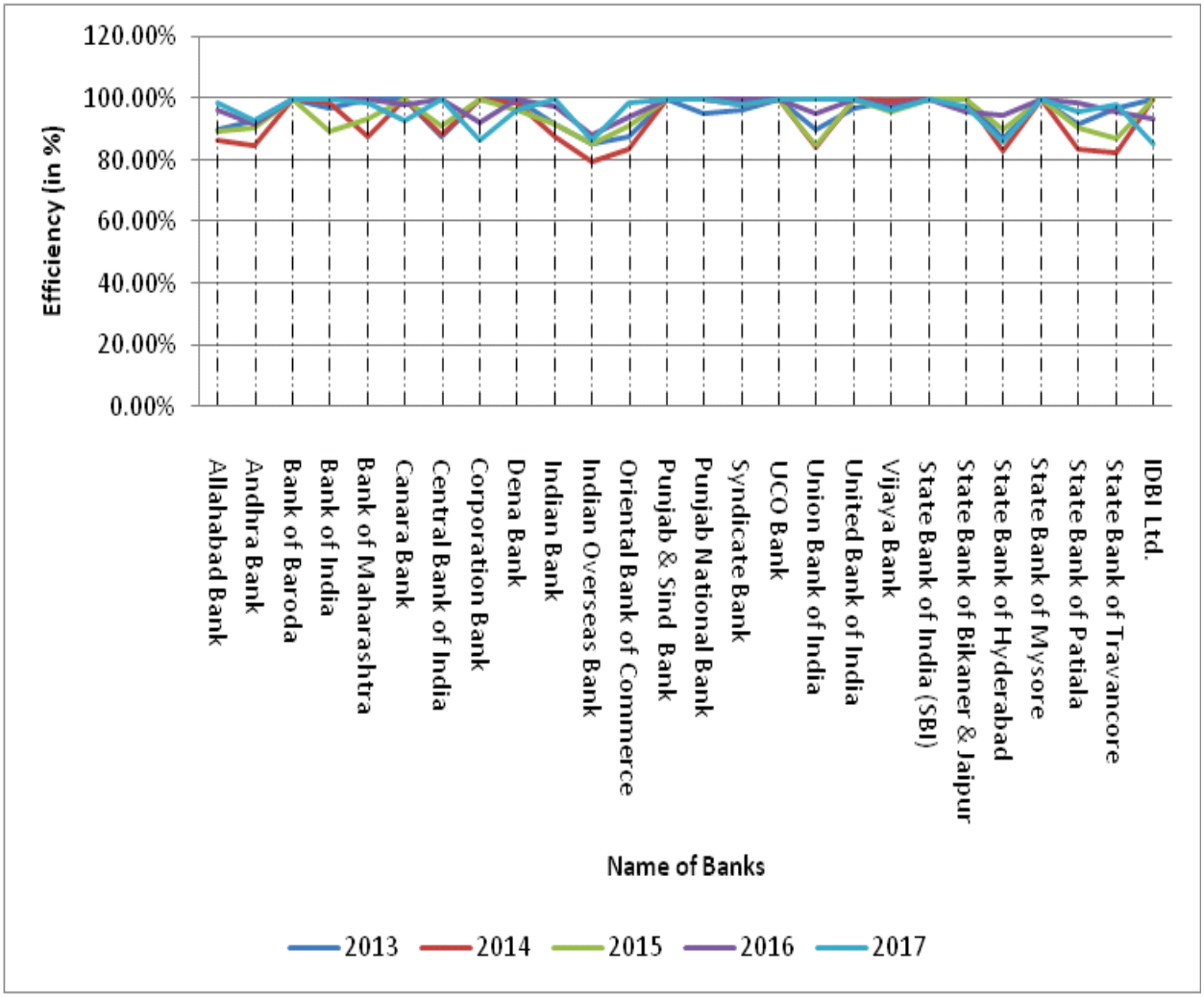

Figure 2: Efficiency Scores of Public Sector Banks Calculated through VRS Scale

The Table 3 represents the efficiency scores of public sector banks calculated through DEA by employing the assumption of CRS Scale. The change in the assumption of efficiency calculations has reported minor differences as compared to the results represented by the previous approach while the overall efficiency levels do not differ substantially. While if the number of banks working at full efficiency is observed then the numbers are reduced in the CRS approach which can be easily observed as the banks operating at optimum efficiency were 11 in VRS approach whereas CRS approach reported only 06. However, the number of banks operating at optimum efficiency increases till 11 in the upcoming years.

Table 3: Efficiency Scores of Public Sector Banks Calculated through CRS Scale

S No.	Name of the Public Sector Banks	Year				
		2013	2014	2015	2016	2017
1	Allahabad Bank	0.89	0.86	0.87	0.95	0.97
2	Andhra Bank	0.85	0.80	0.85	0.92	0.93
3	Bank of Baroda	1.00	1.00	1.00	1.00	1.00
4	Bank of India	0.97	0.97	0.89	1.00	1.00
5	Bank of Maharashtra	0.93	0.82	0.87	1.00	0.95
6	Canara Bank	0.90	0.85	0.86	0.91	0.93
7	Central Bank of India	0.87	0.87	0.90	0.93	0.99
8	Corporation Bank	1.00	0.99	1.00	0.92	0.86
9	Dena Bank	1.00	0.89	0.86	1.00	0.94
10	Indian Bank	0.87	0.85	0.87	0.95	1.00
11	Indian Overseas Bank	0.83	0.79	0.85	0.87	0.85
12	Oriental Bank of Commerce	0.88	0.82	0.91	0.94	0.97
13	Punjab & Sind Bank	0.79	0.83	0.85	1.00	1.00
14	Punjab National Bank	0.93	1.00	1.00	1.00	1.00
15	Syndicate Bank	0.92	0.93	1.00	1.00	0.98
16	UCO Bank	1.00	1.00	1.00	1.00	1.00
17	Union Bank of India	0.90	0.83	0.85	0.95	1.00
18	United Bank of India	0.95	1.00	1.00	1.00	1.00
19	Vijaya Bank	0.88	0.91	0.87	0.97	0.94
20	State Bank of India (SBI)	1.00	0.99	1.00	1.00	1.00
21	State Bank of Bikaner & Jaipur	0.84	0.82	0.83	0.87	0.89
22	State Bank of Hyderabad	0.78	0.74	0.83	0.90	0.82
23	State Bank of Mysore	0.80	0.85	0.85	0.88	0.87
24	State Bank of Patiala	0.79	0.71	0.76	0.93	0.85
25	State Bank of Travancore	0.83	0.73	0.76	0.91	0.94
26	IDBI Ltd.	1.00	1.00	1.00	0.92	0.84

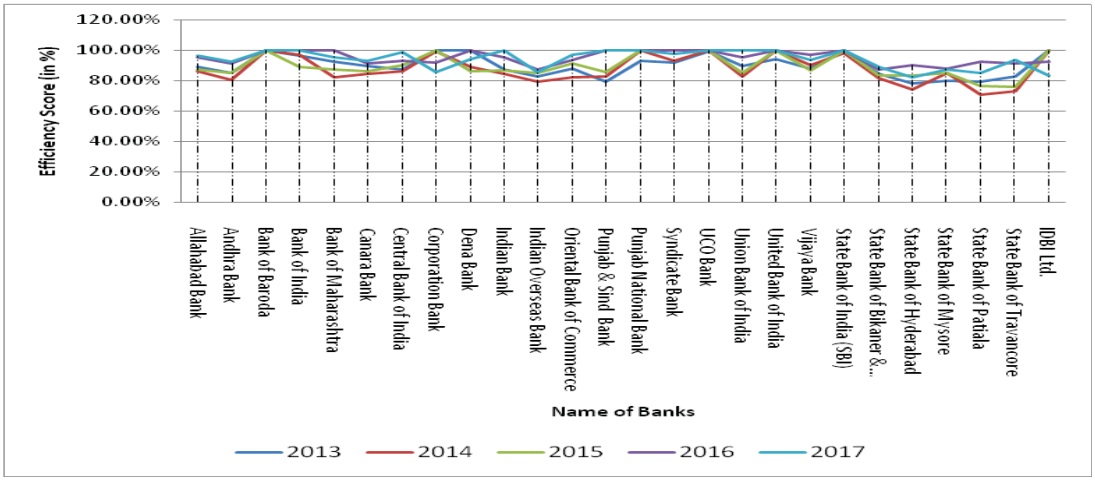

Figure 3: Efficiency Scores of Public Sector Banks Calculated through CRS Scale

The efficiency scores calculated through CRS also differ in terms of the efficacy score outputs, which are found relatively low as compared to the scores derived through VRS approach. The lowest efficiency level in CRS is reported at 0.71 as compared to 0.8 the VRS approach.

However, we can summarise the above efficiency output of public sector banks on the basis of their efficiency scores for categorizing the efficiency levels in smaller segments and the overall aggregate average of all the public sector banks can be considered as the representative of the entire group of the banks which is mentioned as follows:

Table 4: Categorization of Banks on Efficiency Score through VRS Scale

S No.	Efficiency Score (in %) (VRS)	Number of Public Sector Banks (26)				
		2013	2014	2015	2016	2017
1	100	11	11	12	12	11
2	95-99.99	6	4	2	8	9
3	90-94.99	5	0	7	5	2
4	85-89.99	4	5	5	1	4
5	80-84.99	0	6	0	0	0
6	75-70.99	0	0	0	0	0

Table 5: Categorization of Banks on Efficiency Score through CRS Scale

S No.	Efficiency Score (in %) (CRS)	Number of Public Sector Banks (26)				
		2013	2014	2015	2016	2017
1	100	6	5	8	10	9
2	95-99.99	2	3	0	4	5
3	90-94.99	5	2	2	9	5
4	85-89.99	6	6	12	3	5
5	80-84.99	4	6	2	0	2
6	75-70.99	3	4	2	0	0

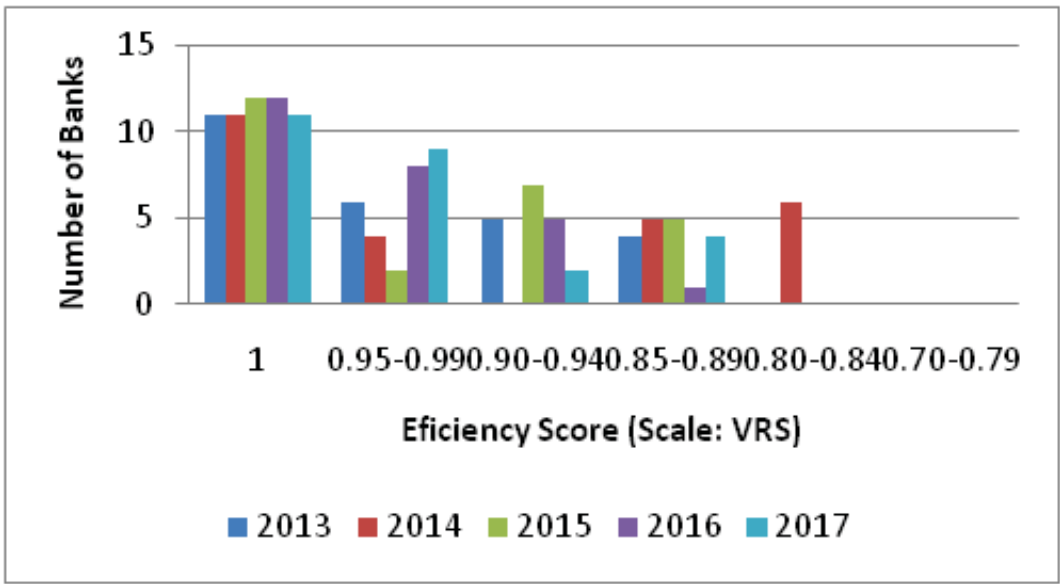

Figure 4: Categorization of Banks on Efficiency Score through VRS Scale

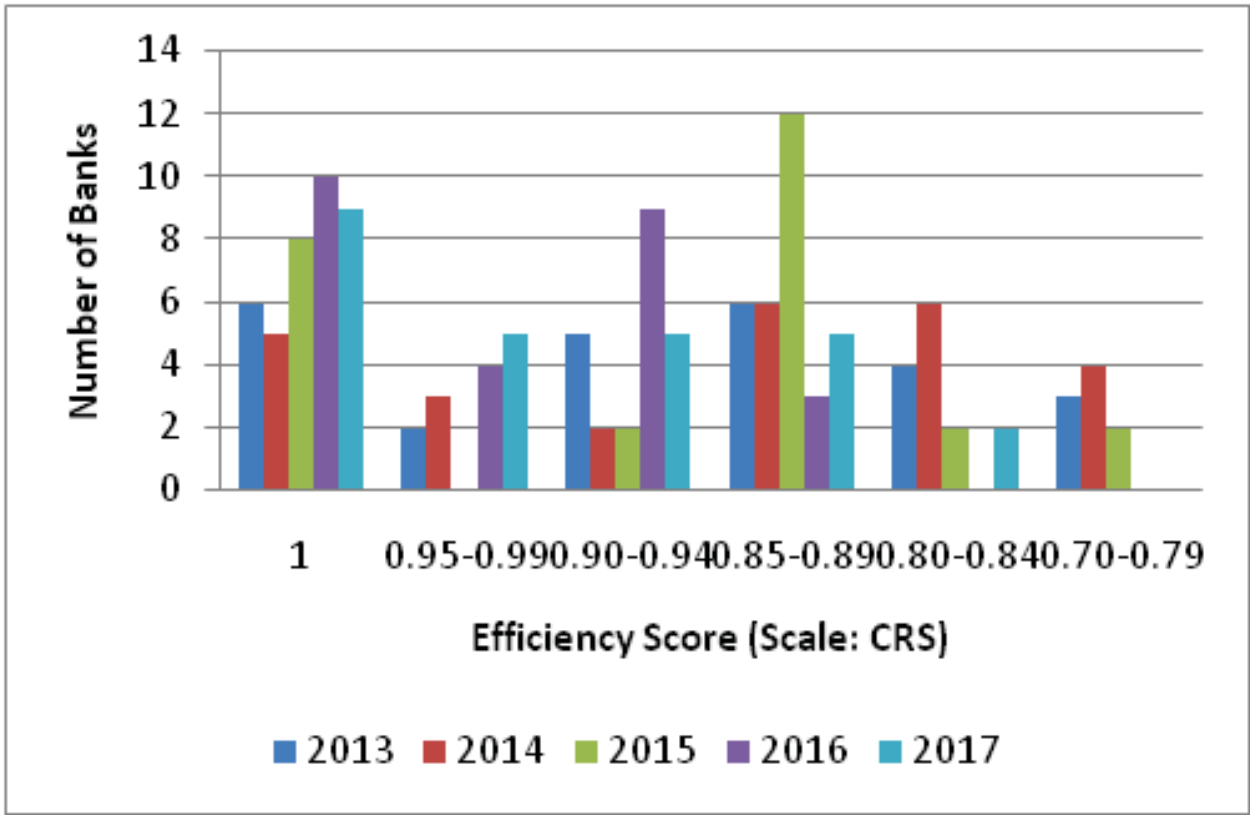

Figure 5: Categorization of Banks on Efficiency Score through CRS Scale

The above-mentioned results exhibit the consistency in the banking industry for the observed sample years in spite of the various reforms were proposed during the period. While analyzing the score calculated through the different approaches it can be inferred that the public sector banks are on their way to improvise the efficiency as the CRS approach mentions the number of banks on optimum efficiency of 100 percent has manifested an ameliorate trend overall for the sample period, while the results calculated through VRS has shown a consistent efficiency at a higher level as compared to the CRS approach.

CONCLUSION

The banking industry in India has been subject to a number of changes due to the deregulatory measures and the last three years have witnessed various financial changes because of change in political environment of the country. The implementation of Basel III norms has been also affecting operational productivity of banks which was an eminent step after the 2008 financial crisis. These norms stabilized the banking economy substantially while also affected in the financial practices by the banks towards risk averseness and leading decrease in efficiency. The higher capital adequacy ratio (CAR) as compared to the global market with maintaining complex compliance of higher liquidity levels has led the industry to reduce the leverage.

In light of the changes of international market environments and pressure of parallel industries competing with banks like mutual fund industry and capital market instruments has forced the banking system to be efficient. It can be observed that the deregulation and financial reforms have been positively taken by the public sector banks and the consistent improvement in their efficiency can be attributed to this. Besides the fact that, the major portion of the banking industry is predominated by the public sector banks which primarily focus role of social welfare also been working efficiently to compete with the other sectors.

While the influence any change in the efficiency score of the banks can be understood with two approaches. The first approach is to understand the influence on income of the banks through the average efficiency score which is aggregate of entire sample period for all the sample banks. The aggregate performance of the public sector banks was found as 96 percent represented by the average efficiency score calculated through VRS scale for all the 26 banks considered for the study and during the sample period of five years whereas the average efficiency score calculated through CRS scale as 91 percent. The influence of efficiency in simple

words can be understood considering the total income of the public sector banks for the year 2017 which is INR 7938.51 billion. Therefore, any change in the efficiency will directly influence the earning of the banking system which will be in multiple hundred billion rupees for even one percent change in the efficiency.

Secondly, the reason attributed to the inefficiency of banks can be easily understood through the relationship between input and output variables which describes the role of non-performing assets. As the banks raise the deposit by offering interest rate which is a cost to the banks while earns profit by lending it into loans. If the assets are allocated inefficiently then it not only incurs loss but also negatively affects the future flow of profits. Besides the profitability, higher NPAs require higher provisioning, which in turn blocks a large amount of the earning needs to be kept aside as provision against bad loans (Rajeev, M. and Mahesh, H. P., 2010).

The public sector banks specifically in the developing economies have various roles to play to implement economic policies and the scale of operations in a country such as India makes it difficult for the public sector banks to implement the changes swiftly for efficiency improvisation. Therefore, the problem of efficiency is not concerned with the banking profitability while it is a concern for the policy formulation to sustain the growth of the economy of the nation.

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