Technical Efficiency of Banks in India: an application of Data Envelopment Analysis

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Abstract: **Banking sector being backbone of the economy plays vital role in shaping the economy of a country. For the well functioning of banking sector, it has always been necessary to evaluate the performance and efficiency of banking industry. Traditionally, different ratios have been studied to check the performance and efficiency of banking industry but for a comprehensive view of performance and efficiency, Data Envelopment Analysis has been implemented in the present study. Data Envelopment Analysis has been used to estimate bank group wise technical efficiency of scheduled commercial banks operating in India during the years 2005-2014. The study results reveal that SBI& its associates have been technically efficient during the study period 2005-2014. As per the mean technical efficiency score, SBI and its associates has been the most efficient bank group followed by foreign banks during the study period 2005-2014. The results also depicts that technical efficiency of Indian banking industry has continuously increased during the study period.**

Keywords: Data Envelopment Analysis, DMU, BCC model, Efficiency, Performance.

I. INTRODUCTION

Banking sector being backbone of the economy plays vital role in shaping the economy of a country. Banks being the foremost source of financial intermediation plays a key role in a country's economic progress and expansion. In addition to their large financial importance, the pervasiveness of a very competitive market structure facilitates the significance of measuring the banks' performance to find possibility for improvement. The events of the worldwide financial meltdown in 2008–2009 have resulted stringent efficiency measurement requirements. Moreover, operational issues and policies are scrutinized more stringently in an attempt to prevent another series of problems. Despite the importance of the Indian banking sector to the domestic, regional, and international economies, there are only a few microeconomic studies performed in this area. Conventionally, measurement of financial performance was limited to financial ratios only but the ratios failed in capturing a comprehensive picture of performance of banks as the ratios do not focus on long term aspects of performance. Hence, the latest concentration of researchers headed for more sophisticated approaches like frontier efficiency. Among an assortment of frontier efficiency measurement techniques, DEA has emerged as a foremost tool due to its advantages and flexibility. The relative efficiency scores generated by DEA ranges between zero and one and comparable only within the sample.

II. LITERATURE REVIEW

Amit kumar Dwivedi, D.kumar charyulu(2011) In the present study an attempt has been made to determine the impact of market and regulatory initiatives on the efficiency of Indian banks. In this paper, efficiency has been measured in relative terms i.e , a firm's efficiency in relation to other firms in the sample. The author has applied Data Envelopment Analysis to mark the banks that lie on the efficient output frontier given various inputs. In the present study, author has divided Indian banking industry into four groups namely national banks, state-owned banks, new private banks and foreign banks. This study was confined to constant return to scale assumption of various decision making units varying from 2005-06 to 2009-10. Results of the study depicted that new private and foreign banks were found to be highly efficient during the period of study. Nand Kumar, Archana Singh (2014). The present study has been performed using Data Envelopment Analysis. DEA has been used in order to examine the technical efficiency of commercial banks operating in India over the period of 5 years from 2006 to 2010. As per the study results it has been observed that deregulation on banking sector has led to increment in efficiency of commercial banks in India. Results depicted that Allahabad bank, Canara bank, Kotak Mahindra bank, ICICI bank and Yes bank were found to be efficient whilst SBI, PNB and HDFC scored less than the standard efficient score. In nutshell, private sector banks were found to be more efficient than public sector banks. Various reasons like amount of deposits, operating expenses and excess number of employees were highlighted for the poor efficiency of banks. Aijit Ghosh et al (2014) the study investigated the efficiency and super efficiency of Indian banking sector by using DEA. Both CRS as well as VRS assumptions were employed to estimate the technical efficiency and scale efficiency of BSE enlisted banks for the period 2002-11. Then the super efficiency model was applied was applied to find the most efficient bank. For the study, three inputs namely; total deposits, fixed assets and operating expenses have been taken. The output vectors include total loans and investments. The study concluded that eight banks were not able to match their competitors in any of the 10 years included in the study. However, the trend has shown that the number the number of banks that attained efficiency score of unity, decreased over time. Furthermore, the results of super efficiency have shown that IDBI bank was most efficient for 9 out of 10 years of study period. Majid karimzadeh(2011) This paper attempted to examine

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the efficiency of Indian commercial banks during 2000-2010 by using Data Envelopment Analysis. The author has used intermediation approach to choose inputs and outputs. In this paper both CRS and VRS methods for calculating different efficiencies namely technical, allocative and cost efficiencies have been applied on the data set of eight banks. Results of present study revealed that as per VRS model the values came out to be 0.991, .995 and .991 for cost, technical and allocative efficiency respectively whilst as per CRS model the result values came out to be 0.936, 0.969, 0.958 respectively. Results depicted that Bank of India and ICICI bank were found to be more efficient. However, as per results public sector banks have been found more efficient than private sector banks during the period of study.

III. RESEARCH METHODOLOGY

The present study has been conducted by taking all the scheduled commercial banks in India except Regional Rural banks for the period 2005-2014. In this study, whole Indian banking industry has been divided in four bank groups taken as Decision Making Units (henceforth, DMUs) namely: SBI and its Associates, Public Sector banks, Private Sector banks, foreign banks. There exist two techniques for identification of inputs and outputs of financial intermediaries like banks namely, production approach and intermediation approach. In production approach bank are considered as an entity that produces deposits and loans by utilising its capital and labour whilst in intermediation approach banks are considered to be an intermediaries between savers and investors. Most of the reviews supported that in case of banking industry intermediation approach has been found suitable to select inputs and outputs. The efficiency of a DMU lies in utilizing its inputs to generate outputs in comparison to other DMUs depicted by the efficiency score of a DMU. In the present study, input oriented Data Envelopment Analysis (DEA) model is used, the main aim is to decrease the inputs while keeping the output either constant or increasing as much as possible. In this study the intermediation approach has been adopted in identifying inputs and outputs of the selected DMUs. The following inputs and outputs has been considered under this study.On the basis of inputs and outputs selected, secondary data from various sources like Reserve Bank of India, Moneycontrol.com has been collected.

IV. DATA ANALYSIS

Technical efficiency of selected scheduled commercial banks has been calculated using Data Envelopment Analysis technique. The technical efficiency score of the selected scheduled commercial banks discussed below:

Table 4.1Technical Efficiency of Scheduled Commercial Banks in India

Year/Bank Groups	SBI& Its Associates	Public Sector Banks	Private Banks	Foreign Banks
2004-05	1	0.69	0.45	0.6
2005-06	0.85	0.63	0.47	0.65
2006-07	0.88	0.51	0.53	0.65
2007-08	0.93	0.49	0.57	0.69
2008-09	1	0.58	0.61	0.71
2009-10	1	0.69	0.67	0.83
2010-11	1	0.84	0.68	0.84
2011-12	1	0.93	0.76	0.93
2012-13	1	0.98	0.83	1
2013-2014	0.88	0.95	0.8	1
Average	0.95	0.73	0.64	0.79

Source: Calculated using Data Envelopment Analysis

Table 4.2 Average Technical Efficiency Score

S. No	Period	Average
1	2005	0.68
2	2006	0.65
3	2007	0.65
4	2008	0.67
5	2009	0.72
6	2010	0.8
7	2011	0.84
8	2012	0.9
9	2013	0.95
10	2014	0.91

Source: Calculated using MS-Excel

Table 4.1 depicted the technical efficiency of selected Scheduled Commercial Banks during the period 2005-2014. The bank group with an efficiency score of one depicts that the inputs cannot be decreased further and it will negatively impact the output if it is decreased. The bank groups that have an efficiency score less than one indicate that there is scope for improvement and inputs can be decreased so as to increase the efficiency of the bank group while keeping the output constant. The input oriented technical efficiency of the different bank groups is depicted in Table 4.1. The analysis of 10 year time horizon is considered from (2004-05 to 2013-15) which reveals that SBI and its Associates

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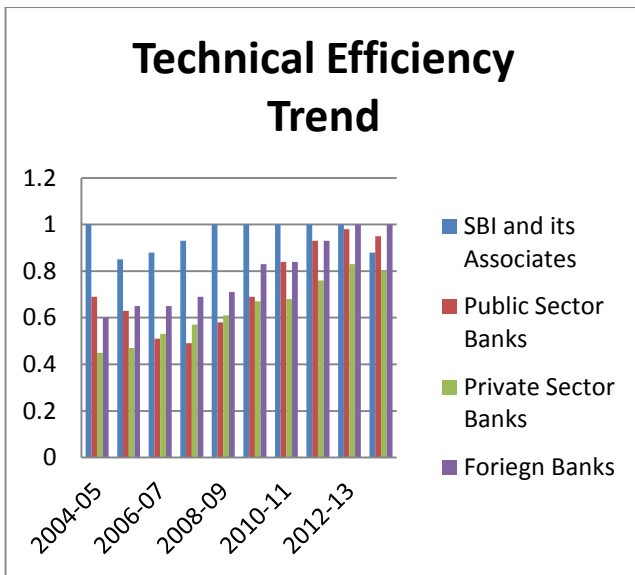**NCIETM - 2017 Conference Proceedings**

Figure 4.1 Efficiency trend graph

have proved to be efficient in 2005 while no other bank group is efficient in this year. It has been clear from the table 4.1 that SBI & Associates has been efficient during the period ranges from 2009 to 2012. However, in year 2013 foreign banks and SBI and its Associates has been found efficient. Foreign banks have been more efficient in comparison to SBI bank group in 2014 and come out to be the only efficient bank group in the year 2014. Private sector banks have not been able to compete with the efficient bank groups in the time period under study. It is depicted that they have been unable to fully utilize their inputs to generate their outputs. The three consecutive years starting from 2006 seems to be the worst out of whole wherein no bank group is efficient but the year 2013 can be considered as the best year wherein SBI& its Associates and foreign banks are completely efficient. It can be noticed that there has been decreasing trend in the number of bank groups that have attained the efficiency score one. It can be attributed to increased level of competition and availability of other avenues that provides loans very easily and customers has to face less tedious legal formalities while taking loan from those sources such as micro finance institutions and the private finance companies moreover, the inefficient bank groups are required to replicate their strategies adopted by the efficient bank groups in different years so as to convert their deposits into loans and investments. As per the table 4.2, the average technical efficiency score of Indian scheduled commercial banks has decreased during first three years of the study from 2005-2008. In year 2009, the average technical efficiency of scheduled commercial banks has increased to 0.71 percent. On the basis of average technical efficiency score, Indian banks have been found more efficient during the year 2013.

V. CONCLUSION

In nut shell, it can be concluded that SBI & its Associates has been able to set an example for other bank groups and has been able to convert most of its deposits into loans and investments during 2005 and from 2009-2013 whilst foreign banks have been found efficient than public sector banks and private banks during the study period. It has also been observed that private banks have been found least efficient among other bank groups. The major factors for such inefficiency could be attributed to huge deposits and operating expenses. Being major bank players, these banks should be paid a better attention by the regulators.

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