
Efficiency of Banks in India : A DEA Approach

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Abstract

Measuring Bank efficiency has always been an important concern for policy makers and researchers. An understanding of a bank's relative efficiency is important for analysts, practitioners and policymakers alike. The objective of this paper was to measure the operational efficiencies of Indian commercial banks. In this paper, we analyze bank efficiency in India using **Data Envelopment Analysis (DEA)**. We found that foreign-owned banks are on an average most efficient, that the new generation banks are more efficient than the old ones. The study recommends that the Indian nationalized and private sector banks are required to put more efforts to enhance their operational efficiencies.

1. Introduction

Measuring Bank efficiency has always been an important concern for policy makers and researchers. Efficiency of financial system of any country largely depends on the efficiency of banking system. Indian banking industry has witnessed a series of reforms in post 1991 era. From regulated banking system to deregulated banking system. Having spread their wings haphazardly during the days of controlled regime, Indian banks started focusing on the lines of their operational efficiencies, competence and competitiveness. This process has been hastened by the arrival of foreign competitors and emerging new generation banks. Naturally, this requires banks to grow and expand in businesses that they understand well. Since 1991, the process of liberalization, privatization and globalization initiated by the Government of India has influenced the functioning and governance of Indian banks, which has forced Indian banks to refocus their strategies. In the emerging economies like India, the relative comparison of banks of different groups, foreign, private and nationalized banks, by size, type of ownership or date of appearance has at some point been an issue. Therefore, an understanding of a bank's

relative performance compared to the market, or over a period, is important for analysts, practitioners and policymakers alike.

In this paper, we analyze bank efficiency in India using Data Envelopment Analysis (DEA). Data Envelopment Analysis is a methodology for analyzing the relative efficiency and managerial performance of productive (or response) units, having the same multiple inputs and multiple outputs. It allows us to compare the relative efficiency of banks by determining the efficient banks, which span the frontier. The most important advantage of DEA over traditional econometric frontier studies is that it is a non-

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parametric, deterministic method and therefore does not require a priori assumptions about the analytical form of the production function. Therefore, the probability of a misspecification of the production technology is zero. The disadvantage is that, being a non-parametric method, it is more sensitive to possible mis-measurement problems. The objective of this paper is to measure the operational efficiencies of Indian commercial banks. Similar kind of studies has been done in US and other developed countries. In the Indian context earlier, Tyagarajan (1975), Rangrajan and Mampilly (1972) and Subramanyam (1993) have investigated the various issues related with banking industry in India. Milind Sathye (1997) has done a similar kind of study. He developed two models, used DEA technique to measure the efficiency of different groups of banks, foreign banks, and private banks, and nationalized banks. The methodology used in the study is similar but the period of study is 2005, which was a 1997 in the study of Milind Sathye.

The paper is organized as follows. Section two deals with data and methodological framework. Empirical analysis of data and conclusion are in section three and four respectively.

2. Methodological Framework And Data Specification

2.1 Data Envelopment Analysis (DEA)

DEA is a methodology for analyzing the relative efficiency and managerial performance of productive (or response) units, having the same multiple inputs and multiple outputs. It allows us to compare the relative efficiency of banks by determining the efficient banks as benchmarks and by measuring the inefficiencies in input combinations (slack variables) in other banks relative to the benchmark. Since the mid-eighties, DEA has become increasingly popular in measuring efficiency in different national banking industries, for example in Sherman and Gold (1985), Rangan et al. (1988), Ferrier and Lovell (1990), Aly et al. (1990), Elyasiani and Medhian (1990), Berg et al. (1993), Brockett et al. (1997), and in many other papers. Leibenstein and Maital (1992) argue that DEA is the superior method for measuring overall technical inefficiency. Data Envelopment Analysis is a non-parametric, deterministic methodology for determining the relatively efficient production frontier, based on

the empirical data on chosen inputs and outputs of a number of entities called Decision Making Units (DMUs). From the set of available data, DEA identifies reference points (relatively efficient DMUs) that define the efficient frontier (as the best practice production technology) and evaluate the inefficiency of other, interior points (relatively inefficient DMUs) that are below that frontier. Data Envelopment Analysis provides an alternative approach to regression analysis. While regression analysis relies on central tendencies, DEA is based on extremal observations. While the regression approach assumes that a single estimated regression equation applies to each observation vector, DEA analyzes each vector (DMU) separately, producing individual efficiency measures relative to the entire set under evaluation. The main advantage of DEA is that, unlike regression analysis, it does not require an a priori assumption about the analytical form of the production function. Instead, it constructs the best practice production function solely based on observed data, and therefore the possibility of misspecification of the production technology is zero. On the other hand, the main disadvantage of DEA is that the frontier is sensitive to extreme observations and measurement errors (the basic assumption is that random errors do not exist and that all deviations from the frontier indicate inefficiency). Among the number of DEA models, we used the two most frequently used: the CCR-model (after Charnes, Cooper, Rhodes, 1978) and the BCC-model (after Banker, Charnes and Cooper, 1984). The main difference between these two models is the treatment of returns to scale while the latter allows variable returns to scale, the former assumes that each DMU operates with constant returns to scale.

2.2 Specification of the Data

As a statistical basis for input and output data, the end-of-year balance sheets and financial statements of the Indian commercial banks were used. The period of the study was 2005. These data are procured from the Reserve Bank of India publication. Different sets of input and output data were used for the two approaches in estimating efficiency.

For the intermediation approach, the input data were:

- Input1 – interest expenses,
- Input2 – non-interest expenses,

While the output data were:

- Output1 – interest revenue
- Output2 – non-interest revenues

For the production approach, two inputs were chosen for each bank:

- Input1 – deposits
- Input2 – number of employees

Outputs considered were

- Output1 – Net advances
- Output 2 - Investments
- Output 3 - Non interest income

3. Results

The efficiency scores of each bank included in the sample are shown in Appendix I. In table two, some descriptive statistics about the banks in the sample have been presented:

The mean efficiency score of Indian banks was 0.2399 as per production approach and 0.4509 as per intermediation approach of the study. The efficiency score does not fit within the range of the scores found in other overseas studies but is lower than the world mean efficiency. "The mean efficiency value was 0.86 with a range of 0.55 (UK) to 0.95 (France)" (Berger and Humphrey, 1997, p. 17). When analyzed individually group wise then the mean efficiency score of foreign banks in both the approaches (.4411 & .19207) is more than Indian public sector banks (.1233 & .4300) and private sector banks (.1593 & .4383).

4. Conclusion

A mean efficiency score that is lower than the world mean implies that there is a need for Indian banks to further improve efficiency to achieve world best practice. Although the efficiency of public sector banks is less than private and foreign banks but when we look back into literature then the efficiency scores suggest that over the period of time the efficiency of public sector banks has also improved. If we keep the factor of social welfare, size of operations and Government control with the public sector banks then one can clearly conclude that even after so many controls and regulations public sector banks are not performing as bad as they were performing in the

past. Although if we look at the geographical penetration of these banks then these foreign or private sector banks are operating into urban areas whereas these public sector banks are equally operating in rural areas also. So the study concludes that although Indian banks are having less efficiency score than foreign banks but even then over the period of time performance of these Indian banks have improved. The government also needs to help banks by creating an appropriate policy environment that promotes efficiency.

6. References

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ANNEXURE - I**Table - 1****Efficiency Scores of Banks**

	Score Production Approach	Ranking	Score Inter- mediation Approach	Ranking
ABN AMRO	0.38	15	1.00	2
ABU DHABI COMMERCIAL BANK	0.98	4	0.34	79
ALLAHABAD BANK	0.11	62	0.43	36
AMERICAN EXPRESS	0.14	37	0.29	83
ANDHRA BANK	0.10	75	0.38	66
ANTWERP DIAMOND	1.00	2	0.47	23
ARAB BANGLADESH	0.21	30	0.54	10
BANK INTERNATIONAL INDONESIA	0.75	7	0.50	17
BANK OF AMERICA	0.52	9	0.40	54
BANK OF BAHRAIN & KUWAIT	0.22	27	0.34	76
BANK OF BARODA	0.11	66	0.42	38
BANK OF CEYLON	0.13	41	0.68	6
BANK OF INDIA	0.10	76	0.39	63
BANK OF MAHARASHTRA	0.11	57	0.40	53
BANK OF NOVA SCOTIA	1.00	3	0.47	26
BANK OF PUNJAB	0.09	86	0.27	86
BANK OF RAJASTHAN	0.09	80	0.36	72
BANK OF TOKYO MITSUBISHI	0.26	23	0.58	9
BARCLAYS BANK	1.00	1	1.00	3
BHARAT OVERSEAS BANK	0.11	60	0.42	40
BNP PARIBAS	0.27	21	0.28	84
CALYON BANK	0.51	10	0.28	85

	Score Production Approach	Ranking	Score Inter- mediation Approach	Ranking
CANARA BANK	0.10	73	0.44	32
CATHOLIC SYRIAN BANK	0.09	85	0.40	50
CENTRAL BANK OF INDIA	0.11	55	0.41	48
CENTURION BANK	0.12	47	0.29	82
CHINATRUST COMMERCIAL BANK	0.18	33	0.41	45
CHO HUNG BANK	0.44	12	0.61	7
CITI BANK	0.29	18	0.40	52
CITY UNION BANK	0.14	36	0.49	19
CORPORATION BANK	0.11	51	0.46	28
DBS BANK	0.33	17	0.52	12
DENA BANK	0.11	54	0.40	57
DEUTSCHE BANK	0.42	13	0.38	67
DEVELOPMENT CREDIT BANK	0.13	39	0.26	87
DHANALAKSHMI BANK	0.08	87	0.36	71
FEDERAL BANK	0.10	70	0.45	29
GANESH BANK OF KURUNDWAD	0.09	82	0.38	68
HDFC NBANK HONGKONG & SHANGHAI	0.21	29	0.42	42
BANKING CORPORATION	0.23	25	0.37	70
ICICI BANK	0.27	22	0.35	73
IDBI LTD	0.94	6	0.44	31
INDIAN BANK	0.12	48	0.41	44
INDIAN OVERSEAS BANK	0.10	68	0.44	30
INDUSIND BANK	0.19	32	0.47	25
ING VYSYA BANK	0.16	35	0.35	75
JAMMU & KASHMIR BANK	0.14	38	0.50	15
JP MORGAN CHASE BANK	0.39	14	0.84	5

	Score Production Approach	Ranking	Score Inter- mediation Approach	Ranking
KARNATAJKA BANK	0.11	53	0.47	24
KARUR VYSYA BANK	0.09	79	0.43	34
KOTAK MAHINDRA BANK	0.12	45	1.00	1
KRUNG THAI BANK	0.28	19	0.54	11
LAKSHMI VILAS BANK	0.09	81	0.40	55
LORD KRISHNA BANK	0.10	72	0.39	65
MASHREQ BANK	0.95	5	0.50	18
MIZUHO CORPORATE BANK	0.36	16	0.40	56
NAINITAL BANK	0.10	74	0.41	46
OMAN INTERNATIONAL BANK	0.28	20	0.38	69
ORIENTAL BANK OF COMMERCE	0.13	40	0.50	16
PUNJAB & SIND BANK	0.11	58	0.32	80
PUNJAB NATIONAL BANK	0.12	49	0.39	62
RATNAKAR BANK	0.09	84	0.39	64
SANGLI BANK	0.10	69	0.34	78
SBI & ITS ASSOCIATES	0.12	43	0.41	43
SBI COMM. & INTL. BANK	0.12	44	0.39	60
SOCIETE GENERALE	0.70	8	0.32	81
SONALI BANK	0.16	34	0.41	47
SOUTH INDIAN BANK	0.10	71	0.44	33
STANDARD CHARTERED BANK	0.20	31	0.42	39
STATE BANK OF BIKANER & JAIPUR	0.11	61	0.39	61
STATE BANK OF HYDERABAD	0.12	46	0.43	37
STATE BANK OF INDORE	0.11	64	0.43	35
STATE BANK OF MAURITIUS	0.45	11	0.60	8
STATE BANK OF MYSORE	0.11	65	0.35	74
STATE BANK OF PATIALA	0.12	50	0.51	13

	Score Production Approach	Ranking	Score Inter-mediation Approach	Ranking
STATE BANK OF SAURASHTRA	0.11	56	0.51	14
STATE BANK OF TRAVANCORE	0.11	63	0.48	21
SYNDICATE BANK	0.11	67	0.40	58
TAMILNADU MERCANTILE BANK	0.11	59	0.49	20
UCO BANK	0.10	78	0.40	51
UFU BANK	0.22	26	1.00	4
UNITED BANK OF INDIA	0.12	42	0.40	59
UNITED WESTERN BANK	0.09	83	0.42	41
UNION BANK OF INDIA	0.10	77	0.46	27
UTI BANK	0.25	24	0.41	49
VIJAYA BANK	0.11	52	0.47	22
YES BANK	0.21	28	0.34	77

Table - 2
Descriptive Statistics Of Efficiency Scores By Bank Group

	N	Min	Max	Mean	SD	Min	Max	Mean	SD
Public Sector	27	.10	.45	.1233	.06575	.32	.60	.4300	.05691
Private Sector	31	.08	.94	.1593	.15942	.26	1.00	.4383	.16643
Foreign Banks	29	.13	1.00	.4411	.30137	.28	1.00	.4896	.19207
All Banks	87	.08	1.00	.2399	.24149	.26	1.00	.4509	.14945