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Technical Efficiency of Foreign Banks in India – Dea Models

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ABSTRACT
Data Envelopment Analysis (DEA) is a methodology based upon an interesting application of linear programming. It was originally developed for performance measurement. It has been successfully employed for assessing the relative performance of a set of firms that use variety of identical inputs to produce a variety of identical outputs. DEA is Management concept. It measures the efficiency of organizations either public or private sectors. Here the organizations are set of schools, Colleges, Universities, Banks, Restaurants, Hospitals, Airports etc. The main aim of the research is to measure the Technical Efficiency of Foreign Banks in India by using Data Envelopment Analysis Models.

Keywords: *Data Envelopment Analysis(DEA), Techn ical Efficiency(T.E), Decision Making Units(DMUs).*

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I .INTRODUCTION:

The foreign banks in India are slowly but steadily creating a niche for themselves. With the globalization hitting the world, the concept of banking has changed substantially over the last couple of years. Some of the foreign banks have successfully introduced latest technologies in the banking practices in India. This has made the banking business in the country more smooth and interesting for the customers. The concept of foreign banks in India has changed the prevailing banking scenario in the country. The banking industry is now more competitive and customer-friendly than before. The foreign banks have brought forth some innovations and changes in the banking industry of the country. The survival of the banking system in India through the financial crisis has demonstrated its strengths and most foreign banks present in India believe that India is a market with undeniable potential. However, like their predecessors, they continue to look for the best possible role they can play amidst the challenging political economy, heightened competition and changing financial services regulations. The first phase of banking reforms, triggered by recommendations of the Narasimhan Committee in 1991 and the licensing of the new private sector banks through the next two decades inaugurated an era of change. Meanwhile, the opening-up of the economy to increased participation by foreign players created greater opportunities for foreign banks to work with their multinational clients in India. In the more recent past, foreign banks have followed Indian corporate entities in their outbound expansions.

Generally, the performance of a DMU is assessed with DEA and is obtained by using the concept of efficiency which is the ratio of weighted sum of outputs to a weighted sum of inputs. Efficiencies obtained by using DEA are relative to the best performance of a virtual DMU. The best performing DMU is assigned an efficiency score of unity and the performance of others varies between zero and one.

The DEA is a mathematical programming technique that finds number of practical applications to measure the performance of similar units, such as a set of hospitals, a set of schools, a set of industries etc. Thus, DEA is a methodology based upon an interesting application of linear programming technique and it was originally developed for performance measurement.

A producer who cannot vary his output enquires for possible reduction of inputs. If reduction is not possible he is efficient, otherwise inefficient. In this case the producer minimizes the total cost of production. Alternatively, if inputs cannot be varied, which is often in short run, the entrepreneur enquires for further output augmentation, if such augmentation is not possible he is efficient, otherwise inefficient. In this situation the implicit assumption is revenue maximization. However, in long run, inputs as well as outputs can be varied simultaneously, where the underlying optimization is profit maximization. If the producer neither reduces inputs nor augments outputs, production is profit efficient, otherwise inefficient. A production process can be inefficient in two ways. One of it can be detected by estimated production frontier. It can be technically inefficient, if it fails to produce maximum output from a given input bundle, technical inefficiency results in an equi-proportionate over utilization of all inputs. It can also be Allocatively inefficient in the sense that the

marginal revenue product of an input might not be equal to marginal cost of that input. Allocatively inefficiency results in utilization of inputs in the wrong proportions, given input prices. Schmidt and Lovell (1979) developed a method to estimate technical and Allocative Efficiencies of different forms by considering duality between production frontier and cost functions.

II.METHODOLOGY

Data envelopment analysis is a deterministic approach employed to measure input and output technical efficiencies. In a firm or production unit inputs are combined to produce one or more outputs subject to technology. The techniques of production vary from one unit to another. This kind of variation causes efficiency differences among the competing decision making units. Efficient measurement dates back to Farrell whose pioneering work sparked off interest in several researchers in producer's theory.

2.1 (a) Input technical efficiency-constant returns to scale:

The Linear Programming Problem to estimate the Technical Efficiency by using CRS is given by Max $\prod = \lambda$

$$\text{Subject to} \quad \sum_{i=1}^{n} \lambda_i x_i \le \lambda x_0 \qquad \ldots(2.1.1)$$

$$\sum_{i=1}^{n} \lambda_i y_i \le y_0,$$

$$\lambda_i \ge 0.$$

The above LP problem admits constant returns to scale.

(b) Input technical efficiency-non-increasing returns to scale:

The empirical production frontier that admits non-increasing returns to scale in one input and one output technology may be expressed as shown in the following figure (2.1)

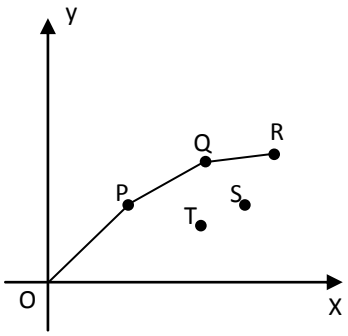

Fig. 2.1

The production units which operate at P,Q and R determine the non-increasing returns to scale empirical frontier. To estimate technical efficiency under this technology one solves the linear programming problem:

Min $\prod = \lambda$
such that $\lambda x_0 \in L^D(y_0)$
Equivalently, Min $\prod = \lambda$

$$\sum \lambda_i x_i \le \lambda x_0,$$

$$\text{Such that} \quad \sum \lambda_i y_i \ge y_0,$$

$$\lambda_i \ge 0, \qquad \ldots(2.1.2)$$

$$\sum \lambda_i \le 1.$$

The empirical frontier that admits constant, increasing and decreasing returns to scale may be expressed as shown in the fig. (2.2)

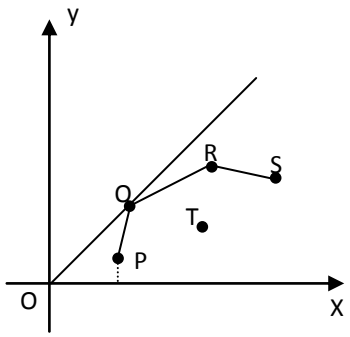

Fig. 2.2

The variable returns to scale frontier is determined by the decision making units P,Q,R and S and production unit is inefficient. The linear programming problems that identify the constant increases and decreases and returns to the scale are.

Min $\prod = \lambda$

Such that $\lambda x_0 \in L^v(y_0)$

Equivalently, we solve,

Min $\prod = \lambda$

Such that $\sum \lambda_i x_i \leq \lambda x_0$,

…(2.1.3)

$\lambda_i \geq 0$.

$\sum \lambda_i y_i \geq y_0$

$\sum \lambda_i \leq 1$.

III.SOURCE OF DATA

The secondary data collected from Price water house Cooper Private Limited (PWCPL) up to March 2023.Here one input and two output variables are used. They are Capital and reserve(input variable) ,Deposits and Advances(output variables).

IV.EMPIRICAL RESULTS

The Technical Efficiency reflects the ability of the firm to obtain maximum output from a set of inputs**.**

DMU	Technical Efficiency
AB Bank Limited	0.35(16)
Abu Dhabi Commercial Bank Ltd	0.42(13)
American Express Banking Corp.	0.49(9)
Antwerp Diamond Bank Nv	0.73(7)
Australia And New Zealand Banking Group Limited	0.46(10)
Bank of America N.T. And S.A.	0.37(15)
Bank of Bahrain and Kuwait B.S.C.	0.54(8)

Bank of Ceylon	0.16(26)
Bank of Nova Scotia	0.93(4)
Barclays Bank Plc	0.33(18)
BNP Paribas	0.73(7)
Chinatrust Commercial Bank	0.5(14)
Citibank N.A	1(1)
Commonwealth Bank Of Australia	0.25(21)
Credit Agricole Corporate and Investment Bank	0.4(19)
Credit Suisse Ag	0.09(30)
DBS Bank Ltd.	1(1)
Deutsche Bank Ag	0.75(6)
Firstrand Bank Ltd	0.3(24)
Hongkong and Shanghai Banking Corpn.Ltd.	0.97(2)
HSBC Bank Oman S.A.O.G.	0.15(27)
Industrial And Commercial Bank of China	0.17(25)
JPMorgan Chase Bank National Association	0.35(16)
JSC VTB Bank	0.23(22)
Krung Thai Bank Public Company Limited	0.76(5)
Mashreq Bank Psc	0.22(23)
Mizuho Corporate Bank Ltd	0.34(17)
Rabobank International	0.22(23)
Sberbank	0.2(28)
Shinhan Bank	0.49(9)
Societe Generale	0.45(11)
Sonali Bank	1(1)
Standard Chartered Bank	1(1)
State Bank of Mauritius Ltd	0.4(19)
The Bank of Tokyo-Mitsubishi Ufj Ltd	0.43(12)
The Royal Bank of Scotland N.V.	0.95(3)
UBS Ag	0.25(21)
United Overseas Bank Ltd	0.09(29)
Woori Bank	0.27(20)
MEAN	0.47

Note: The figures in paranthesis indicate the ranks of efficiencies

From the above table it has been observed that among 39 foreign sector banks 14 banks have consistently shown the Technical Efficiencies above its average Technical Efficiency. The remaining 25 banks registered its Technical Efficiencies below to its average technical efficiency. Among these 39 foreign sector banks Citibank N.A,DBS bank Ltd., Sonali bank and Standard charted bank stay in the first position where as Credit Suisse Ag. bank stay in the last position.

V.CONCLUSION:

By using Data Envelopment Analysis Models we observed that among 39 foreign banks in India Citibank N.A, DBS bank Ltd., Sonali bank and Standard charted bank stay in the first position where as Credit Suisse Ag. bank stay in the last position.

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