Productivity, Performance and Technical Efficiency in Banking: The foreign Bank's Saga in the Context of Financial Reforms in India

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Abstract

This paper is an attempt to examine the total productivity growth of foreign banks for the period 2002-2003 to 2013-2014. Data of ten major foreign sector banks for twelve years were used for the analysis and interpretation. Malmquist Productivity Index and Input oriented CRS data envelopment analysis are being used to measure the productivity of these banks over the years. Along with the productivity of foreign sector banks, their performances were also determined through ratios. The results show that the foreign sector banks has obtained an excellent mean TFP of 1.06 and nine foreign sector banks has obtained an eligible score of one which depicts that foreign sector banks are doing well in the country. The excellent performance of foreign sector banks in the banking industry is further substantiated with the ratios. The study has revealed that by enlarging the scope of foreign banks will obviously bring growth, development and technological advancement in the Indian banking Sector.

Keywords: Malmquist Productivity Index, Data Envelopment Analysis, Total Factor Productivity, Spread and Burden Ratio, Reserve Bank of India

1. Introduction

The banking sector reforms in India were stimulated by the report of the Committee on financial system, popularly known as Narasimham Committee (RBI, 1991). This committee, which submitted its report in 1991, suggested various measures to improve the efficiency and health of banking sector by making it more competitive and vibrant (Ahluwalia, 2002). It affected the productivity, profitability and efficiency of the banks to a large extent (Mohan, 2005). During this scenario, the Reserve Bank of India (RBI) is planning to come out with major reforms in the banking sector that will allow foreign banks to enter India in a big way that will even enable them to take over domestic lenders. As two decade has elapsed, after the banking sector reforms, hence it is high time to analyze, how the new banking policy will affect the banking operations of the different banks.

2. Statement of the problem

The purpose of this paper is to analyse the productivity of the foreign sector banks in India. The proposed reforms in the banking sector by the central bank of India opens new avenues for the foreign sector banks, which could even contemplate in taking over of Indian banks and so on. Hence it is essential to check the productivity of foreign banks surviving in the Indian financial system.

3. Objectives of the study

The objectives for the study was focused on to find out the total factor productivity of foreign banks in India and to study the Technical Efficiency and performance of the same.

4. Research Methodology

The study is conducted in two phases. In the phase one, the first two objectives of the study are addressed through Malmquist Productivity Analysis (MPI) (Gebremichael, 2012) and Input oriented CRS data envelopment analysis (Charnes, and banker). Data from 2002-2003 to 2013-14 of major 10 foreign banks in India have been obtained for this study.

Malmquist Productivity Index was firstly used by (Malmquist, (1953). According to Grifell-Tatje (1996) this method has three main advantages. Firstly, it does not require the profit maximization or cost minimization assumption. Secondly, there is no need of input and output prices. Thirdly, the method allows the decomposition of productivity into two if there is panel data. The present paper uses the Malmquist productivity index as adopted by (Fare.R, 1998) as follows.

$$M_0(y_{t+1}, x_{t+1}, y_t, x_t) = \left\{ \frac{do^t(x^{t+1}, y^{t+1})}{do^t(x^t, y^t)} * \frac{do^{t+1}(x^{t+1}, y^{t+1})}{do^{t+1}(x^t, y^t)} \right\}^{1/2} \text{-----} (1)$$

The above equation represents the productivity of production points (xt+1, y t+1) relative to the production point (xt, yt), the value greater than 1 implies total productivity growth from period t to the next period t+1, however the index is the geometric mean of the two outputs based Malmquist indices .The index uses period t technology and the other period t+1 technology. The above Malmquist productivity Index can be decomposed, according to Fareet al (1989, 1992) (Fare.R, 1998) (Fare.R, 1998) as follows:

$$M_0(y_{t+1}, x_{t+1}, y_t, x_t) = \frac{do^{t+1}(x^{t+1}, y^{t+1})}{do^t(x^t, y^t)} \left\{ \frac{do^t(x^{t+1}, y^{t+1})}{do^{t+1}(x^{t+1}, y^{t+1})} * \frac{do^t(x^t, y^t)}{do^{t+1}(x^t, y^t)} \right\}^{1/2} \text{---}(2)$$

The above equation the term outside the brackets implies the measurement change in relative efficiency in the technical efficiency between periods of time i.e. between (t) and (t+1). On the other hand the terms inside the brackets indicates the geometry of the two ratios in the equation, which indicates the shift in technology of two units, in our case we refer to the commercial banks. This is to say the efficiency change is obtained by calculating the ratio of efficiency in (t+1) period in proportion to efficiency in (t) period. Again to obtain efficiency change and technological change we split the equation above, as shown below.

$$\text{Efficiency Change} = \frac{do^{t+1}(x^{t+1},\ y^{t+1})}{do^{t}(x^{t},y^{t})} \quad \text{---------- (3)}$$

$$\text{Technological change} = \left\{ \frac{do^{t}(x^{t+1},\ y^{t+1})}{do^{t+1}(x^{t+1},\ y^{t+1})} * \frac{do^{t}(x^{t},y^{t})}{do^{t+1}(x^{t},y^{t})} \right\}^{1/2} \text{------ (4)}$$

In case of no significant change between periods of time, which can be illustrated by xt=xt+1, as well as yt= yt+1, then the MPI is equal to 1. The Malmquist Total factor productivity can be obtained by solving a series of linear programming equations under a constant return to scale as shown below (Fare.R, 1998) (Worthington, 1999)

$$[D_0^t(x_t, y_t)]^{-1} = \max_{\theta \lambda} \theta$$

Subject to

    -yit +Yt $\lambda \geq 0$

    θx it – Xt $\lambda \geq 0$

    $\lambda \geq 0$ ------------------------   (5)

[D t+1 o(y t+1, x t+1)]-1 = max $\theta\lambda$ θ

    Subject to

$$-y_{i,t+1} + y_{t+1} \lambda \geq 0$$
$$\theta x_{i,t+1} - X_{t+1} \lambda \geq 0$$
$$\lambda \geq 0 \text{ -----------------------------} \qquad (6)$$

$$[D_{t+1} o(y_t, x_t)]-1 = \max \theta \lambda \ \theta$$
Subject to
$$-y_{it} + y_{t+1} \lambda \geq 0$$
$$\theta x_{it} - X_{t+1} \lambda \geq 0$$
$$\lambda \geq 0 \text{ -----------------------------} \qquad (7)$$

$$[D_{t+1} o(y_{t+1}, x_{t+1})]-1 = \max \theta \lambda \ \theta$$
Subject to
$$-y_{i,t+1} + y_{t+1} \lambda \geq 0$$
$$\theta x_{i,t+1} - X_{t+1} \lambda \geq 0$$
$$\lambda \geq 0 \text{ -----------------------------} \qquad (8)$$

In the both these methods it is very important to select appropriate inputs and outputs. Being a service industry, banking sector has different inputs and outputs as compared to other sectors. In the literature relating to this field, there is no consensus regarding the inputs and outputs that have to be used in the analysis of the efficiency of the activity of commercial banks (Humphrey, 1997).

In the studies in the field, five approaches for defining inputs and outputs in the analysis of the efficiency of a bank were developed, namely: the intermediation approach; the production approach; the asset approach; the user cost; the value added approach. The first three approaches are developed according to the functions that banks fulfil (Favero, 1995). The production and the intermediation approaches are the best known ones and the most used in the quantification of bank efficiency (Sealey, 1977).

In the production-type approach, banks are considered as deposit and loan producers and it is assumed that banks use inputs such as capital and labour to produce a number of deposits and loans. According to the intermediation approach, banks are considered the intermediaries that transfer the financial resources from surplus agents to the fund deficit ones. In this approach it is considered that the intermediation approach has been applied in selecting the inputs and outputs for the present study. Table 1 shows the inputs and outputs used in the present study.

Table 1: Inputs and Outputs

Inputs	Outputs
Deposits	Advances
Interest Expenses	Interest Income
Operating Expenses	Other Income

Based on this inputs and outputs, the productivity level benchmarks by Malmquist productivity analysis are furnished as follows:

Table 2: Malmquist Productivity Index

Malmquist Productivity Index	Productivity Level
M>1	Improvement in Productivity
M=1	No Change in Productivity
M<1	Deterioration in Productivity

The phase two focuses on proving the third objective of the study, with the help of ratio analysis method. The following ratios are analyzed to examine the performance of the 10 major foreign sector banks in India.

A. Labor Productivity Ratio

    i.   Deposits per Employee

    ii.   Advances per Employee

    iii.   Business per Employee

B. Branch Productivity Ratio

    i.   Deposits per Branch

    ii.   Advances per Branch

    iii.   Business per Branch

C. Profitability Ratio

    i.   Spread as percentage of working funds

    ii.   Burden as percentage of working funds

    iii.   Net profits as percentage of working fund

D. Ratio of non-interest income as percentage of total income

E. ratio of non-performance assets as percentage of net advances

5. Results and discussion

The analysis part of the study begins with determining the productivity and technical efficiency of foreign sector banks. This part of analysis is done under phase-1 and the performance of the foreign sector banks done through ratio analysis is executed under phase-2.

5 (a) Phase-1

Table 3: Productivity Analysis of Foreign Sector Banks

Bank Name	Effch	Techch	Pech	Sech	Tfpch
Bank of America	1.00	1.024	1.00	1.00	1.024
Bank of Tokyo	1.00	1.097	1.00	1.00	1.097
BNP Paribus	1.00	1.014	1.00	1.00	1.014
Citi Bank	1.00	1.036	1.00	1.00	1.036
DBS Bank	1.00	1.077	1.00	1.00	1.077
Deutsch Bank	1.00	1.015	1.00	1.00	1.015
Hong kong Shanghai Bank	1.00	1.019	1.00	1.00	1.019
Standard Chartered Bank	1.00	1.009	1.00	1.00	1.009
State Bank of Mauritius	1.00	1.049	1.00	1.00	1.049
Bank of Nova Schotia	1.00	1.040	1.00	1.00	1.040

Effch- Efficiency Change, Techch- Technological change, Pech- Pure Technical Efficiency, Sech-Scale efficiency, Tfpch- Total factor productivity change

Table 3 explains about total factor productivity performance of foreign sector banks in India. The role of foreign banks is increasing day by day in Indian banking sector. The table shows that bank of Tokyo is the top performer in the sector with highest score of 1.097. Bank of America, DBS Bank, Bank of Nova Schotia, Standard Chartered Bank and all other foreign banks are also good performers with score more than one which means improvement in overall productivity of these banks. The table 4 shows the result of technical efficiency of foreign sector banks in India. These scores are obtained by using input oriented CRS data envelopment analysis. According to the rule of Thumb, TE=1 means technically efficiency and TE<1 indicates technical inefficiency. The

result depicts that foreign sector banks contribute to the technological advancement of Indian banking sector.

Table 4: Technical Efficiency

Bank Name (Foreign Sector Bank)	TE
Bank of America	1.00
Bank of Tokyo	1.00
BNP Paribus	1.00
Citi Bank	1.00
DBS Bank	1.00
Deutsch Bank	1.00
Hongkong Shanghai Bank	1.00
Standard Chartered Bank	1.00
State Bank of Mauritius	1.00
Bank of Nova Schotia	.925

Table 5 shows year wise total factor productivity of foreign sector banks. The total factor productivity focuses on both the efficiency change and technological change. In the year 2010, foreign sector banks secured the highest score of 1.162 and the least score of 0.967 in the year 2011. Which states that the change in efficiency and the technology was highest in 2010, but afterwards for two consecutive years it was less than one. But in 2013 it again displayed a score of more than one, which signals a positive trend of foreign sector banks. Further the overall total factor productivity growth of Foreign Sector Banks witnesses a significant improvement in their performance and has increased their contribution in the banking sector.

Table 5: Year wise Total Factor Productivity of Foreign Banks in India

Year	TFP (Foreign Sector Banks)
2002	1.025
2003	1.144
2004	1.082
2005	1.174
2006	0.993
2007	1.018
2008	0.978
2009	1.091
2010	1.162
2011	0.967
2012	0.973
2013	1.114

5 (b) Phase-2

Under phase-2 the performance of foreign sector banks are judged through following ratios:

a. Labour Productivity Ratios

The labor productivity ratios of foreign sector banks are determined with the elements like: Deposit per Employees, Advance per Employees and Business per Employees.

Table 6: Labor Productivity Ratios (in Rs Lakh)

Items	2009-2010	2010-2011	2011-2012	2012-2013	2013-2014
Deposits Per Employee	723.67	828.57	858.27	1069	1134.57
Advances Per Employee	554.02	582.82	697.23	887.20	1038.76
Business Per Employee	128.27	141.14	155.55	195.62	217.33

Source: www.rbi.org.in

b. Branch Productivity Ratios

It highlights the branch productivity of the foreign sector banks, which depicts the capacity of a branch to produce.

Table 7: Branch Productivity Ratios

Items	2009-2010	2010-2011	2011-2012	2012-2013	2013-2014
Deposits Per Branch	72568.27	74870.80	75681.38	85742.32	86227.45
Advances Per Branch	56062.75	52664.64	61481.32	71160.62	78946.07
Business Per Branch	128630.71	127535.45	137162.70	156902.94	165173.53

Source: www.rbi.org.in

The branch productivity ratios are determined with the help of three elements like deposit per branch, Advances per Branch and Business per Branch. These three elements depict an increasing trend, which are a signal of positive contribution towards the growth of the economy and the prosperity of society.

Table 8: Profitability Ratios

Items	2009-2010	2010-2011	2011-2012	2012-2013	2013-2014
Spread as % of Working Funds	2.75	2.92	3.12	3.16	3.86
Burden as % of Working Funds	0.68	0.66	0.54	0.44	0.34
Net Profit as % of Working Funds	2.07	2.26	2.58	2.72	3.52

Source: www.rbi.org.in

The difference between spread percentage and burden percentage results in the net profit percentage of working fund. Higher the spread ratio better for the banks and lower the burden ratio beneficial for the banks. Table 8 depicts an increasing trend in the spread ratio which is a cushion for the firm and a declining trend in the burden ratio is better for the banks. This phenomenon resulted in the best utilisation of working fund by the foreign sector banks. This ultimately reflects on the efficient performance of banks.

c. Non-Interest Income and Non Performance Assets

Non-interest income ratio shows the banks' efficiency in earning income from fee based activities. The table 9 explains that foreign banks are not only concerned on improving the traditional functions of banks but focuses on those aspects that acts as a lubricant to the growth of the Indian financial system.

Table 9: Non-Interest Income as Percentage of Total Income (in %)

	2009-2010	2010-2011	2011-2012	2012-2013	2013-2014
Foreign Sector Bank	1.63	1.88	2.06	2.26	2.37

Source: *www.rbi.org.in*

Table 10: Net Non-Performance Assets of Net Advances

Bank Name	2009-2010	2010-2011	2011-2012	2012-2013	2013-2014
Foreign Sector Bank	1.81	1.40	1.28	.67	0.61

Source: *www.rbi.org.in*

The details of Net NPA to net advances, are exhibited in Table-8, this shows the actual burden of banks. Net NPA to net advances show decreasing trend for all the five years for the banks. Overall, it can be concluded that foreign sector banks show the least NPA with excellent rate of decrease as the time moves on.

6. Conclusion

The findings of the present paper are divided on the basis of phase-1 and phase-2. The results indicate that the top performer of foreign sector banks in terms of total factor productivity growth is Bank of Tokyo. There is also statistical evidence that foreign banks contribution has improved in the Indian banking sector during the period of study. The year wise total factor productivity performances reveal that eight foreign sector banks have obtained score more than one. The highest score of foreign (A Profile of Banks 2010 -2011, 2010-2011) sector banks in the year 2005 is 1.174. The mean productivity growth of

foreign banking sector from 2002-2003 to 2013-14 is 1.06. Which is good based on the Malmquist Productivity Index.

Technical efficiency of only one foreign sector bank is less than one which means that around nine foreign bank sector out of ten banks taken for the study is overall technically efficient. The mean score of foreign sector banks is 0.992. The performance of the foreign sector banks in India, determined through ratios depicts a good position for the foreign sector banks in Indian financial system.

Present study reveals the contribution of foreign sector banks over the defined study period. The study may be helpful in identifying the contribution of foreign sector banks to researchers and bankers and policy makers to assess the changing face of banking sector.

The productivity and performance of the foreign sector banks, analysed in this study reveals that the proposed reforms in banking sector, which would enable the foreign banks in enlarging their scope will bring growth, development and technological advancement in the Indian Banking Sector.

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