

Measuring the Efficiency of Private Sector Banks: Evidence from India

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Received: July 6, 2015

Accepted: July 17, 2015

Online Published: August 22, 2015

doi:10.5539/ijbm.v10n9p207

URL: <http://dx.doi.org/10.5539/ijbm.v10n9p207>

Abstract

This study examines the profitability of Indian private sector banks using a non-parametric test namely Data Envelopment Analysis (DEA). The study uses Malmquist total factor productivity to examine the shift (inward or outward) of banks' efficiency frontier during the study period 2011-2013. Only secondary data has been used from the Bankscope database for this study. In this study, emphasis has been given on consolidating the efficiency of Indian private sector banks which is much more expected to the management point of view than the profitability. This study uses three input variables and three output variables to measure bank efficiency. The specific findings of this research shows that the private sector of Indian banks did not achieve progress in all respect during the study period, the banks with higher loan loss reserve and large liquidity reserve have been found as the most regressed banks, and the banks with higher progress have diversified the profit successfully from both interest and not-interest income. The limitations and policy implications of this study have been presented. The scope of future studies has also been addressed.

Keywords: data envelopment analysis, Malmquisttotal productivity index, banks, India

1. Introduction

Private sector banks are of immense need for facilitating the continuity of sustainable economic development (Chowdhury & Ahmed, 2009; Rezvanian, Rao, & Mehdian, 2008). Banks are now offering a wide range of both financial (e.g., deposits, loans, etc.) and non-financial (e.g., locker services, counseling etc.) services. Nowadays, banks may also differ in terms of their objectivity and nature of business operations (e.g., poverty alleviation, facilitating to special community or industry, for any bilateral reasons with international cooperation etc.). Taking care of all these classification, private sector banks possess a unique characteristic which is profit maximization or wealth maximization for the investors (Chowdhury & Ahmed, 2009; Rezvanian et al., 2008). Such issue of maximizing profit, in some cases, scroll to unwanted shutdown of some banks due to their undue operations and business transactions (Brockett, Cooper, Golden, Rousseau, & Wang, 2004). However, a strong contribution of private sector banks in Indians national economy is absolute (Bhattacharyya, Lovell, & Sahay, 1997; M. Kumar & Vincent, 2011). In this study, focus has been given on the bank profitability using a non-parametric test. Also, the focus of this study remains on consolidating the efficiency of the banks which is much more expected than only focusing on the profitability of Indian private sector banks.

Efficiency analysis of Indian private sector banks is the arduous research field since India has ensured its economic growth, financial exposure and deregulation in foreign ownership (Saha & Ravisankar, 2000). The effect from globalization introduces a good number of foreign ownership in the private sector banks in India and as a consequence, the second most important contributor of Indian financial system is now the private sector banks (Min & Smyth, 2014; Sufian & Habibullah, 2012). Research on developed countries is common in recent literature on efficiency (Paradi, Yang, & Zhu, 2011; Rezvanian et al., 2008). However, due to the regional importance, a deeper discussion of Indian bank efficiency is of great requirement for the possible guidelines and policy implications.

The current study presents a brief discussion on Indian banking sector and discusses the previous studies on profitability and bank performance. A special consideration is given to disclose the Indian cases in brief. Finally, the study attempts to measure the efficiency of the sample banks. Policy implications and limitations are also discussed in this paper.

1.1 Overview of Indian Private Sector Banks

A numbers of transitions are observed in Indian banking sector under the Financial Sector Reform by the central government in last seven decades or less. The latest framework is known as “Narasimhan Committee (1991)” (Saha & Ravisankar, 2000). In 1996, the committee addressed the globalization issue in their policy implication and decided as “*to chart a program of banking sector reforms necessary to strengthen Indian’s banking system and make it internationally competitive....*” (Narasimhan Committee, 1996, p. 261). The performance and efficiency of banking sector can easily be traced from the market perception of premium charged by the banks and their involvement in public issues (Saha & Ravisankar, 2000). However, the Indian banking sector is over saturated by the public banks and hence the efficiency analysis of the private sector banks is essential to examine banks’ performance in a restricted and highly regulated condition.

Indian banking system consists of both commercial and cooperative banking where the commercial banking channel operates more than 90% of total banking business in the country (Ray, 2007; Ray & Das, 2010). Again, commercial banks can be classified into three main categories based on the ownership. They are state owned banks, domestic private banks and foreign banks. The major banks (roughly 27-30) contain 70% of total banking assets.

2. Literature Review

Examining the banks’ profitability is always a concern to the policy makers (Meslier, Tacneng, & Tarazi, 2014; Min & Smyth, 2014). Earlier studies have mostly concentrated on ratio analysis and panel data (Chen & Yeh, 1998; Ray, 2007). In recent bank related studies, the nonparametric study of data envelopment analysis is found as heavily condensed and popular (Min & Smyth, 2014; Paradi et al., 2011; Saha & Ravisankar, 2000). The prominence of private sector banks in an economy is enormous for a number of reasons. The top priority goes to maintain competitive environment in order to be able to provide better customer services and to ensure a sustainable economic development (S. Kumar & Gulati, 2008; Rezvanian et al., 2008). Moreover, globalization effect the privatization of national banking system and boost the private banking sector as an easy access to flourish and growth (Chowdhury & Ahmed, 2009; M. Kumar & Vincent, 2011). However, in many countries like India, private banks have been operating under restricted condition while government wishes to make the banking sector sustainable.

The Malmquist total factor productivity is a popular instrument for analyzing bank efficiency (Bassem, 2014; Bi, Ding, Luo, & Liang, 2011; Bjurek, 1996; Färe, Grosskopf, Lindgren, & Roos, 1989; Grifell-Tatjé & Lovell, 1995; Oh, 2010; Parchikolae, Jahanshahloo, & Iotf, 2012; Sozen & Alp, 2013; Worthington, 1999). Such a reputation has even been increasing for the following reasons.

- a) The use of variables is univariates and hence researchers can use any unit of data where the result will not differ.
- b) The ability to benchmark one bank with the best performer bank or banks.
- c) The ability of indexing the efficiency scores.
- d) Notwithstanding, technological gap and pure efficiency explain the major characteristics of the banks which is more explicit than a simple efficiency score.

Banks’ profitability mainly depends on the total loans and asset management (Atzori, Tedeschi, & Cannas, 2013; Dietrich & Wanzenried, 2014; Kuo & Yang, 2012; Lu & Hung, 2009; O'Donnell, 2010). Masum, Azad, and Beh (2015) examined human resource management practices and its implications in banks’ performance. However, in this study, we only concentrated on banks profitability from both account of interest income and non-interest income. As we know that banks’ ability of making profit is largely dependent on the ability of diversification of income (Lien & Li, 2013; Lin, Chung, Hsieh, & Wu, 2012; Meslier et al., 2014; Nguyen, Skully, & Perera, 2012), this study examines and distinguishes Indian private sector banks based on their income diversity.

3. Methodology

If the input and output vectors of a production unit are presented by x^t and y^t and (t) stands for time period. A production distance function for the output set can be designed as follow:

$$D^t(x^t, y^t) = \min(\theta: (y^t/\theta) \in P^t(x^t)) \quad (1)$$

Considering two consecutive time frames, e.g. t and t+1, and combining the distance function of Eq. (1), for the Malmquist total productivity index can be shown as follow:

$$MI(y^t, x^t, y^{t+1}, x^{t+1}) = \left[\frac{D^t(x^{t+1}, y^{t+1})}{D^t(x^t, y^t)} \times \frac{D^{t+1}(x^{t+1}, y^{t+1})}{D^{t+1}(x^t, y^t)} \right]^{\frac{1}{2}} \quad (2)$$

Now, Eq. (2) can be transformed into;

$$MI = \left[\frac{D^{t+1}(x^{t+1}, y^{t+1})}{D^t(x^t, y^t)} \right] \left[\frac{D^t(x^{t+1}, y^{t+1})}{D^{t+1}(x^{t+1}, y^{t+1})} \times \frac{D^t(x^t, y^t)}{D^{t+1}(x^t, y^t)} \right]^{\frac{1}{2}} \quad (3)$$

$$\text{So, } MI = TEC \times TCH \quad (4)$$

Output oriented Malmquist index, as shown above in Eq. (2) can be decomposed as a product of technical efficiency change (TEC) and technical change (TCH) as presented in Eq. (4). Keeping the input vector constant for the period t, the distance function explains the major changes until the period t+1. Here, D is used as distance function by taking the decision-making unit in the assessment to desired frontier.

Again,

$$TEC = \left[\frac{D^{t+1}(x^{t+1}, y^{t+1})}{D^t(x^t, y^t)} \right] \left[\frac{D^{t+1}(x^{t+1}, y^{t+1})}{D^t(x^t, y^t)} \times \frac{D^t(x^t, y^t)}{D^{t+1}(x^{t+1}, y^{t+1})} \right] = PE \times SE \quad (5)$$

Here, the first part of the Eq. (5) is named as pure efficiency (PE) that describes pure change in technical efficiency in a relative form of defined consecutive time period. And, remaining part of Eq. (5) stands for describing change in effect due to economics of scale and denoted by SE. A value of MI more than one defines productive growth and less than one indicates productivity decline in a given adjacent time. A value of 1 for all MI, TEC and TCH explains that the company efficiency remains equal compared to period (t) in (t+1). Again, a value of more than 1 (one) represents improvement and less than 1 (one) explains regress in efficiency as a relative measure. The Malmquist technology is graphically presented in figure 1 below.

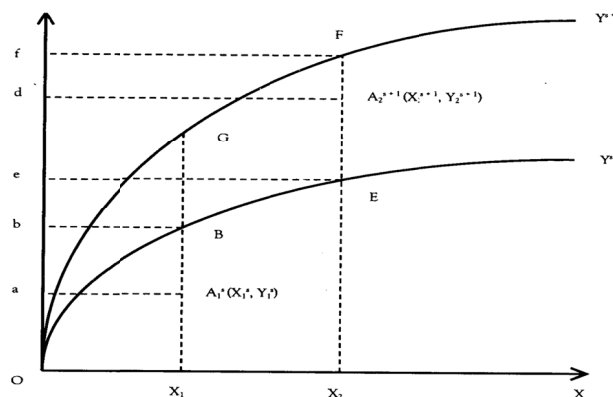


Figure 1. Malmquist technology of total productivity

In figure 1, Y^t is the production frontier for time t and Y^{t+1} is the changed frontier in t+1. The changes in productivity are also seen in the figure.

3. Data and Variables

The main source of bank level data is Bankscope database. The sample period is for three years from 2011 -2013. In compliance with the above mentioned methodology, three inputs namely X_1 : interest expense, X_2 : total earning assets and X_3 : total equity have been selected. The three outputs that have been chosen are Y_1 : Interest margin, Y_2 : interest income and Y_3 : fees and commissions. Interest margin and interest income have similarity in nature but explicitly differentiate in meaning as well as application. The study has considered both the ideas of interest income and interest margin as a proxy of amount value and management capacity of transforming total assets (e.g. loans) to income. The fees and commission which are not the prime objective of a bank business, has also been taken into consideration as the private sector heavily rely on profit diversification. The above mentioned variables have been selected and taken into consideration based on previous literature survey (Bhattacharyya et al., 1997; Chen & Yeh, 1998; Chowdhury & Ahmed, 2009; S. Kumar & Gulati, 2008; Paradi et al., 2011; Ray, 2007; Rezvanian et al., 2008; Saha & Ravisankar, 2000). Table-1 presents the summary statistics of the used variables. The values are in US dollar for real time estimation and from authors' own

calculation. The associated correlation among the used variables has been measured and presented in table-2. The Pearson correlation matrix presents some significant information regarding the suitability of using the selected variables.

Table 1. Summary statistics

		Interest Expense	Total Earning Assets	Total Equity	Interest Margin	Interest Income	Fees and Commissions
2013	Mean	17907.01	300123.85	25367.03	4.00	10211.62	4020.80
	Standard Deviation	8201.72	124285.85	11944.17	1.29	2692.51	2597.67
	Minimum	8870.60	156152.60	6821.90	0.89	4578.30	1409.80
	Maximum	38205.10	565525.20	56123.30	5.88	14477.10	11253.90
2012	Mean	9544.03	137956.67	13887.59	4.40	5825.82	2060.73
	Standard Deviation	4003.69	29937.37	4195.39	1.54	2649.06	833.01
	Minimum	4284.90	76050.50	5705.50	1.45	1421.60	593.20
	Maximum	21172.00	192986.90	21939.60	7.39	12335.90	3567.40
2011	Mean	13933.53	236617.48	21425.36	4.55	9198.25	3571.77
	Standard Deviation	7601.82	130926.45	10907.73	1.07	3254.49	2600.62
	Minimum	5438.60	80183.20	8331.20	1.84	3433.30	593.20
	Maximum	33844.60	473894.60	56123.30	6.31	14477.10	11253.90

Source: Bankscope database.

The Pearson correlation has been shown in table 2.

Table 2. Pearson moment correlation

	Interest Expense	Total Earning Assets	Total Equity	Net Interest Margin	Net Interest Income	Net Fees & Commissions
Interest Expense	1.00					
Total Earning Assets	0.48	1.00				
Total Equity	0.42	0.30	1.00			
Net Interest Margin	-0.27	-0.33	-0.43	1.00		
Net Interest Income	0.43	0.44	0.42	0.72	1.00	
Net Fees & Commissions	0.36	0.32	0.38	-0.43	0.30	1.00

Source: Authors' own calculation.

4. Results and Findings

The estimated results as seen in Table 3 and Figure 2 depict a holistic idea of present profitability condition among the private sector banks in India. In 2011, a total 5 banks are found as unit efficient. The number of efficient units in 2012 is six. Last but not least, in 2013, only 3 banks are found as unit efficient. Interesting finding of this paper is that not a single bank has been found to have consistent efficiency during the study period. However, the most catching performance is seen in case of South Indian Bank and the lowest performance is viewed for Development Credit Bank. Overall in 2011, 2012 and 2013, the average efficiency is recorded as 80%, 66% and 78.8% respectively. In the three years average, the highest performer banks are Catholic Syrian Bank and South Indian Bank with yearly average efficiency of 94.3% and 94.1% respectively. Lastly, the lowest result is found for Development Credit Bank which is 54.9%.

Table 3. Efficiency statistics

	Bank name	2011	2012	2013	Mean
1	Axis bank	1.000	0.620	0.417	0.637
2	Catholic Syrian Bank	1.000	0.838	1.000	0.943
3	City Union Bank	0.669	0.958	0.754	0.785
4	Development Credit Bank	0.707	0.420	0.558	0.549
5	Dhanlaxmi Bank	0.879	0.370	0.876	0.658
6	Federal Bank	0.666	0.411	0.944	0.637
7	HDFC Bank	0.877	0.541	0.906	0.755
8	ICICI Bank	1.000	0.366	0.656	0.622
9	IndusInd Bank	0.627	0.567	1.000	0.708
10	INGVysya Bank	0.666	1.000	0.757	0.796
11	Karnataka Bank	0.527	0.626	1.000	0.691
12	KarurVysya Bank	0.756	0.641	0.681	0.691
13	Kotak Mahindra Bank	1.000	0.713	0.809	0.832
14	Lakshmi Vilas Bank	1.000	1.000	0.615	0.850
15	Nainital Bank	0.666	1.000	0.905	0.845
16	RBL Bank	0.879	0.834	0.779	0.830
17	South Indian Bank	0.834	1.000	1.000	0.941
18	Tamilnad Mercantile Bank	0.834	0.477	0.899	0.709
19	YES Bank	0.877	0.913	0.741	0.840
	Geometric Mean	0.800	0.660	0.786	0.746

The results as seen in table-3 are presented graphically in figure-2 below.

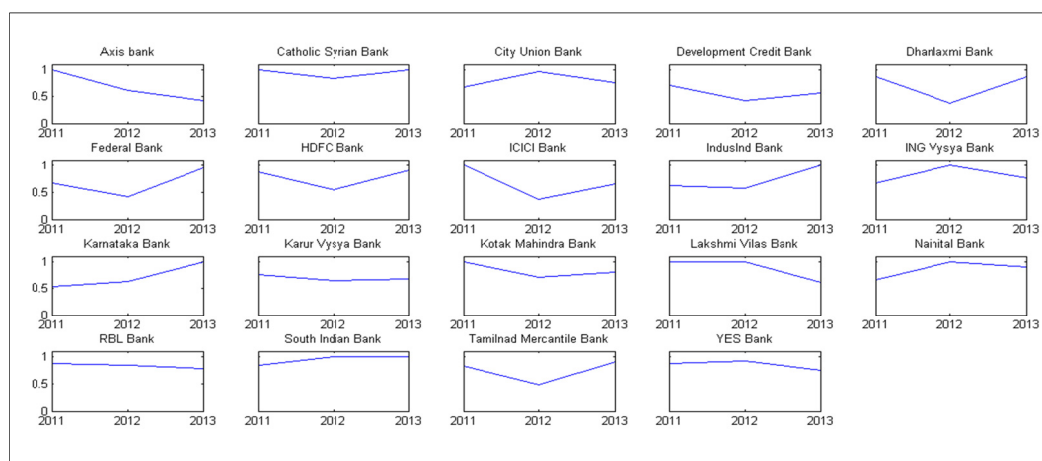


Figure 2. Bank wise efficiency changes from 2011-2013

The Malmquist index results and related technological change in total productivity analysis have been presented in Table 4. The three major findings of this study are:

- i) All the private sector banks are in major crisis in performing profitable business during the study period in all respect (empirical results have been presented in Table 3 and Table 4. As this is seen that all the private banks are in a state of struggling to carry out the business with a sustainable profitability. Majority of the banks are having a rough and unstable growth considering efficiency.
- ii) Banks with higher loan loss reserve and liquidity reserve are in the lowest efficiency group. A further consideration into the situation also grants that both the indicators (loan loss and liquidity) have influenced the banks' performances negatively over the study period. The findings of this segment advocate for a strong positive influence of loan loss reserve and higher liquidity reserve on banks profitability which has similarity to the findings of Lien and Li (2013), Meslier et al. (2014) and Nguyen et al. (2012).

iii) The ability of profit diversification is found to have strong influence on total profitability among the high perform banks in this study. The diversification of income through non-interest bearing income has largely contributed to the ability of income generation which is similar to the previous studies of Lin et al. (2012); Meslier et al. (2014) and Nguyen et al. (2012).

Table 4. Malmquistindex

Bank	Efficiency _Global (2012)	Efficiency _Global (2013)	Efficiency Change (2011- 2012)	Efficiency Change (2012 -2013)	Technolo -gical Change (2011-2012)	Technolo -gical Change (2012 -2013)	Malmquist Index (2011 -2012)	Malmquist Index (2012- 2013)
Axis bank	0.592	0.417	0.620	0.673	0.954	1.048	0.592	0.705
Catholic Syrian Bank	0.800	1.000	0.838	1.194	0.955	1.048	0.800	1.251
City Union Bank	0.888	0.623	1.431	0.787	0.991	0.891	1.418	0.702
Development Credit	0.420	0.419	0.594	1.326	1.104	0.751	0.656	0.996
Dhanlaxmi Bank	0.370	0.770	0.421	2.367	1.379	0.879	0.581	2.081
Federal Bank	0.411	0.781	0.618	2.294	1.310	0.828	0.809	1.898
HDFC Bank	0.538	0.725	0.617	1.675	1.198	0.803	0.739	1.346
ICICI Bank	0.366	0.548	0.366	1.790	1.000	0.835	0.366	1.496
IndusInd Bank	0.533	1.000	0.904	1.764	0.946	1.064	0.855	1.877
INGVysya Bank	1.000	0.480	1.501	0.757	1.310	0.634	1.966	0.480
Karnataka Bank	0.626	0.843	1.188	1.597	1.258	0.843	1.495	1.347
KarurVysya Bank	0.641	0.501	0.848	1.062	1.061	0.737	0.899	0.783
Kotak Mahindra	0.712	0.596	0.713	1.135	1.000	0.738	0.712	0.837
Lakshmi Vilas Bank	1.000	0.443	1.000	0.615	1.202	0.721	1.202	0.443
Nainital Bank	1.000	0.576	1.501	0.905	1.310	0.637	1.966	0.576
RBL Bank	0.832	0.536	0.949	0.935	1.376	0.689	1.306	0.644
South Indian Bank	1.000	0.637	1.200	1.000	1.067	0.637	1.280	0.637
Tamilnad Mercantile	0.477	0.729	0.572	1.885	1.067	0.811	0.610	1.529
YES Bank	0.913	0.509	1.040	0.812	1.204	0.686	1.252	0.557

Source: Authors' own calculation.

5. Conclusions

Banks are the most usable intermediary in the transition of a country's economic development. This paper examines the Indian private sector banks to analyze the recent development in Indian banking sector. To be more specific, bank efficiency has been examined by considering the banks' profitability only. The study has considered both the interest based and non interest based income for the banks and unleashes the true banks efficiency based on the ability to convert banks asset in loans and eventually in income. This research did not perform any comparative study considering the diversity of bank. For instance, public banks' hidden motive is to promote citizens financial security, financial awareness and to participate in overall national development. In contrast, private sector banks heavily relay on banks profitability that eventually attract the investors' attention.

The empirical findings of this study consist of three major issues. First, the Indian private sector banks are found as less inefficient in profitability. Second, the banks with higher loan loss reserve and liquidity reserve are found as the lowest efficiency performers. Lastly, the ability of profit diversification is found to have strong influence on banks' total profitability.

The notable limitations of this study are: short year choice is the major one due to unavailability of long term dataset and not examining the long tenure Malmquist study considering the crisis issue in India during 2008. Further study is proposed to examine the contextual issues (e.g., globalization, national development, inflation etc.) in the second stage analysis of DEA. Moreover, examining the long term MI of Indian banks comparing the public sector and private sector can explore the issue with most of its importance.

The major policy implications of this study are in two dimensions. First, for the internal mangers and shareholders, the results of his study would be of strategic help in order to bench mark the better performer and to set the right short-term or long-term planning to overcome such performance issues. Second, as the findings are suggesting, private sector banks must concentrate in attracting more and more investors as well as customers

by diversifying the total business operation.

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