Productivity and efficiency at public and private sector banks in India

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Abstract

India's public sector banks (PSBs) are compared unfavourably with their private sector counterparts, domestic and foreign. This comparison rests, for the most part, on financial measures of performance, and such a comparison provides much of the rationale for privatisation of PSBs.

In this paper, we attempt a comparison between PSBs and their private sector counterparts based on measures of efficiency and productivity that use quantities of outputs and inputs. Efficiency measures a firm's performance relative to a benchmark at a given point in time; productivity measures a firm's performance over time. Both measures are relevant in attempting a comparison between the private and public sectors.

We employ three measures: Tornquist total factor productivity growth, Malmquist efficiency and revenue maximisation efficiency. We attempt these comparisons over the period 1992-2000, comparing PSBs with both domestic private and foreign banks.

Out of a total of six comparisons we have made, there are no differences in three cases, PSBs do better in two, and foreign banks in one. To put it differently, PSBs are seen to be at a disadvantage in only one out of six comparisons. It is difficult, therefore, to sustain the proposition that efficiency and productivity have been lower in public sector banks relative to their peers in the private sector.

1. Introduction

India's public sector enterprises, in general, tend to be unfavourably compared with their private sector counterparts. Apart from ideological and theoretical considerations, it is such comparisons that provide much of the impetus for the current privatization drive in India.

While public sector banks (PSBs) are not yet candidates for privatization- the objective at present is merely to lower the government's holdings to 33 per cent-, there is a vocal section that would favour a push towards privatization at PSBs as well, based on their perceived inefficiency relative to the private sector. At least in popular debate, such perceptions rest on conventional financial indicators of performance.

In this paper, we attempt a comparison between PSBs and their private sector counterparts based on measures of efficiency and productivity that use quantities of outputs and inputs. Efficiency measures a firm's performance relative to a benchmark at a given point in time; productivity measures a firm's performance over time. Both measures are relevant in attempting a comparison between the private and public sectors.

There are several reasons why such an exercise might be meaningful. One, it helps validate results obtained through financial analysis. Two, given that accounting norms may vary across firms and over time within a firm, measures of efficiency based on output-input quantities may be more reliable.

Most importantly, however, measuring efficiency or productivity using quantities may enable us to understand what exactly underlies differences in financial performance. Is it a difference in technical efficiency, that is, the maximum output that can be realized from

a given input? Or are there differences in allocative efficiency, which reflects the ability of firms to use inputs in optimal proportions, given the prices of these?

The rest of this essay is organized as follows. Section 2 briefly discusses the measures of performance. In Section 3, we review studies that compared efficiency and productivity in the Indian context and outline the empirical procedures we have used. In section 4, we present our results. Section 5 concludes.

2. Performance measures

2.1 Tornquist and Malmquist indices of total factor productivity

2.1.1 Productivity

Productivity of a firm is measured by the quantity of output produced per unit of input. In the single-output, single-input case, it is merely the ratio of the firm's output and input quantities. Thus, if, in period 0, a firm produces output y_o from input x_o , its productivity is

$$\Pi_0 = \frac{y_0}{x_0}. \qquad (1a)$$

Similarly, in period 1, when output y_1 is produced from input x_1, the productivity is

$$\Pi_1 = \frac{y_1}{x_1}. \qquad (1b)$$

Moreover, the productivity index in period 1, with period 0 as the base, is

$$\pi_1 = \frac{\Pi_1}{\Pi_0} = \frac{y_1/x_1}{y_0/x_0} = \frac{y_1/y_0}{x_1/x_0}. \qquad (2)$$

This productivity index shows how productivity of the firm has changed from the base period. The rate of productivity growth is the difference in the growth rates of the output and input quantities respectively.

When multiple inputs and/or multiple outputs are involved, one must replace the simple ratios of the output and input quantities in (2) above by quantity indexes of output and input. In this case, the index of *multi-factor productivity (MFP)* is

$$\pi_1 = \frac{\Pi_1}{\Pi_0} = \frac{Q_y}{Q_x}, \qquad (3)$$

where Q_y and Q_x are, respectively, output and input quantity indexes of the firm in period 1 with period 0 as the base. Different measures of the multi-factor productivity index are obtained , however, when one uses alternative quantity index numbers available in the literature.

2.1.2. Tornquist index of total factor productivity

By far the most popular quantity index number is the Tornquist index measured by a weighted geometric mean of the relative quantities from the two periods. Consider the output quantity index first. Suppose that *m* outputs are involved. The output vectors produced in periods 0 and 1 are, respectively, $y^0 = (y_1^0, y_2^0, ..., y_m^0)$ and $y^1=(y_1^1, y_2^1, .., y_m^1)$. The corresponding output price vectors are $p^0= (p_1^0, p_2^0, ..., p_m^0)$ and $p^1= (p_1^1, p_2^1, ..., p_m^1)$ respectively. Then, the Tornquist output quantity index is

$$TQ_y = \left(\frac{y_1^{\,1}}{y_1^{\,0}}\right)^{v_1}\left(\frac{y_2^{\,1}}{y_2^{\,0}}\right)^{v_2} \ldots \left(\frac{y_m^{\,1}}{y_m^{\,0}}\right)^{v_m}; \sum_1^m v_j = 1.$$

Here,

$$v_j = \frac{p_j y_j}{\sum_1^m p_k y_k}$$

is the share of output *j* in the total value of the output bundle. Of course, the value shares of the individual outputs are, in general, different in the two periods. In practical applications, for v_j, one uses the geometric mean of v_j^0 and v_j^1, where

$$v_j^0 = \frac{p_j^0 y_j^0}{\sum_1^m p_k^0 y_k^0} \text{ and } v_j^1 = \frac{p_j^1 y_j^1}{\sum_1^m p_k^1 y_k^1}.$$

It may be noted that in the single output case, the Tornquist output quantity index trivially reduces to the ratio of output quantities in the numerator of (2). This is also true when the quantity ratio remains unchanged across all outputs.

Similarly, let the input vectors in the two periods be $x^0=(x_1^0, x_2^0,...,x_n^0)$ and $x^1=(x_1^1, x_2^1,...,x_n^1)$. The corresponding input price vectors are $w^0=(w_1^0, w_2^0,...,w_n^0)$ and $w^1=(w_1^1, w_2^1,...,w_n^1)$. Then, the Tornquist input quantity index is

$$TQ_x = \left(\frac{x_1^1}{x_1^0}\right)^{s_1}\left(\frac{x_2^1}{x_2^0}\right)^{s_2}....\left(\frac{x_n^1}{x_n^0}\right)^{s_n}; \sum_1^n s_j = 1.$$

Here,

$$s_j = \frac{w_j x_j}{\sum_1^n w_k x_k}$$

is the share of input *j* in the total cost of the input bundle. Again, in practice, one uses the average of the cost share of any input in the two periods.

The Tornquist productivity index is the ratio of the Tornquist output and input quantity indexes. Thus,

$$\pi_{TQ} = \frac{TQ_y}{TQ_x}.$$

When $TQ_y > TQ_x$, output in period 1 has grown faster (or declined slower) than input as a result of which productivity has increased in period 1 compared to what it was in period 0.

It may be noted that the Tornquist productivity index can be measured without any knowledge of the underlying technology so long as data are available for the input and output quantities as well as the shares of the individual inputs and outputs in the total cost and total revenue, respectively**.**

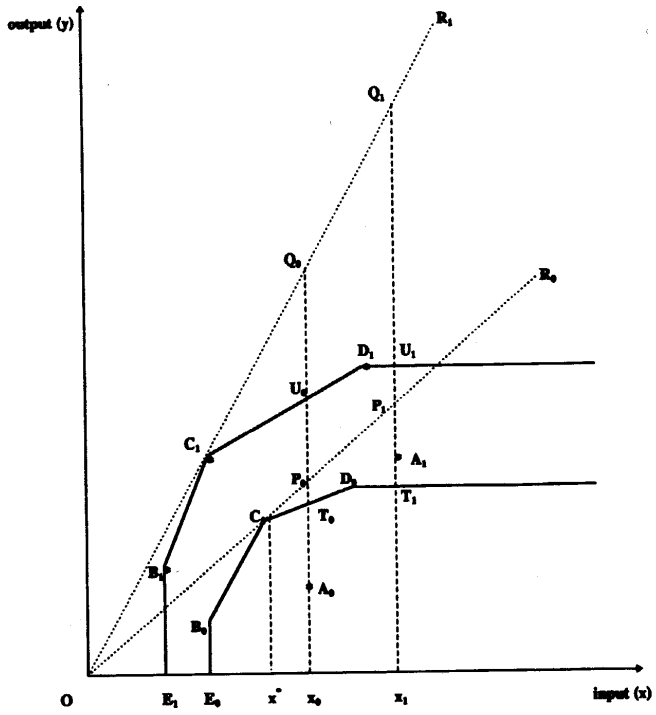
2.1.3 Malmquist index of total factor productivity

Unlike the Tornquist index, the Malmquist productivity index is a normative measure based on a reference technology underlying the observed input-output data. It was introduced by Caves, Christensen, and Diewert (CCD) (1982) and was empirically applied first by Färe, Grosskopf, Lindgren, and Roos (FGLR) (1992).

They also identified technical change and change in technical efficiency as the two components of productivity change. Like CCD, FGLR also assumed constant returns to

scale. Subsequently, Färe, Grosskopf, Norris, and Zhang (FGNZ) (1994) considered technologies characterized by variable returns to scale and offered an extended decomposition of the Malmquist productivity index with another factor capturing changes in scale efficiency.

Ray and Desli (RD) (1997) provide an exposition of the Malmquist total factor productivity index and an alternative decomposition. Their exposition is briefly summarized here.



Source: Ray and Desli (RD) (1997)

Figure 3-1

Consider an industry consisting of four firms-A, B, C and D- as in figure 1. Points A_0 through D_0 in figure 1 show the observed input-output levels of these firms in period 0. Similarly, A1 through D1 show their input-output levels in period 1. Firm A uses input $0x_0$ to produce output A_0x_0 in period 0 and input $0x_1$ to produce A_1x_1 in period 1. Thus, the productivity index for firm A in period 1 is:

$$\prod_A = (A_1x_1/0x_1)/ (A_0x_0/0x_0)$$

The free disposal convex hull is the set of points bounded by the horizontal axis and the broken line $E_0B_0C_0D_0$- extension. Under VRS, all points in this region represent feasible input-ouput combinations in period 0. Under CRS, however, all radial expansion and (nonnegative contraction) of feasible input-output bundles are also feasible. Thus, the CRS production possibility set in period) is the cone formed by the horizontal axis and the ray OR_0 through the point C). Similarly, the VRS frontier in period 1 is the broken line $E_1B_1C_1D_1$ –extension and the CRS frontier is the ray OR_1 through the point C1. In period 0, the maximum producible output from input $0x_0$ is P_0x_0 under the CRS assumption and T_0x_0 under the VRS assumption .

Suppose that the production function

$$y= f(x)$$

exhibits CRS and is of the form

$$f(x)= ax, a >0$$

Then, the production possibility set is

$T = \{(x,y): y \leq ax\}$

Shephard defined the output-oriented distance function as:

$D(x,y) = \min \lambda: (x, 1/\lambda y) \in T$

Evaluated at (x_0, y_0),

$D(x_0, y_0) = y_0/a\ x_0$

This distance function is the same as technical efficiency as defined by Farrell.

The distance functions are:

$D^0_c\ (x_0,y_0) = A_0x_0/P_0x_0$

$D^0_c\ (x_1,y_1) = A_1x_1/P_1x_1$

under CRS, and

$D^0_v\ (x_0,y_0) = A_0x_0/P_0x_0$

$D^0_v\ (x_1,y_1) = A_1x_1/P_1x_1$

under VRS. The productivity index of firm A can be expressed alternatively

$\prod^0_A = D^0_c\ (x_1,y_1)\ /D^0_c\ (x_0,y_0)$

$\prod^1_A = D^1_c\ (x_1,y_1)\ /D^1_c\ (x_0,y_0)$

We have used the Data Envelopment Analysis (DEA) method for computing the relevant distance functions and hence the Malmquist total factor productivity growth.

2.2 Revenue maximization

Suppose that the competitive output and input price vectors are P= (P_1, P_2, ..Pn) and W= (W_1,W_2… Wn). Then, the profit maximization problem of a firm in this industry is:

Max Π = p'y- w'x, s.t. (x,y) $\in$ T.

Here, both input and output price bundles are choice variables and the only constraint is that the selected input-output bundle must be in T.

In many cases, the output bundle y^0 may be a pre-assigned task. The objective of the firm is to select the input bundle that minimizes the cost of producting y^0. Here, the problem is:

Min C (w, $y^{0)}$ = w'x,

s.t. x $\in$ V(y^0)

In some other situations, the input bundles x^0 is exogenously determined and the firm seeks to produce the output that maximizes the revenue. Now the problem is:

Max R (p,x^0) = p'y

s.t. y $\in$ P (x^0)

The DEA LP problem for revenue maximization is :

Max p'y

s.t. $\sum_{j=1}^{N} \lambda_j y_j \geq y^o$

$\sum_{j=1}^{N} \lambda_j x_j \leq x^0$

$\sum \lambda_j = 1, \lambda_j \geq 0$

3. Literature review and our methodology

Bhattacharyya et al (1997) studied the impact of the limited liberalization initiated before the deregulation of the nineties on the performance of the different categories of banks, using DEA. Their study covered 70 banks in the period 1986-91. They constructed one grand frontier for the entire period and measured technical efficiency of the banks under study.

The authors use advances, investments and deposits as outputs and interest expense and operating expense as inputs. They found public sector banks had the highest efficiency among the three categories, with foreign and private banks having much lower efficiencies. However, public sector banks stated showing a decline in efficiency after 1987, private banks showed no change and foreign banks showed a sharp rise in efficiency. The main results accord with the general perception that in the nationalized era, public sector banks were successful in achieving deposit and loan expansion. It should be noted, however, that the use of one grand frontier for the entire period implies that technical change is not separately accounted for.

Das (1997) analyses overall efficiency- technical, allocative and scale- at PSBs. In the period 1990-96, the study found a decline in overall efficiency. This occurred because there was a decline in technical efficiency, both pure and scale, which was not offset by an improvement in allocative efficiency. The study, however, pointed out that the deterioration in technical efficiency was mainly on account of four nationalised banks.

As mentioned earlier, we use three measures for our comparisons: Tornquist total factor productivity growth (TFP), Malmquist TFP growth and Revenue maximization efficiency.

For the comparison based on quantities, it is necessary to be clear about what we should regard as outputs and inputs. As Mukherjee et al (2001) point out, there is no consensus on what best measures these in the case of banks. In the production approach, banks produce loans and deposit account services, using labor and capital as inputs. (Berger and Humphrey (1992) refer to this as the 'value-added approach'.) The number of accounts measures outputs and production costs include only operating costs (although, in the literature, there are instances of the dollar value of accounts being used as outputs in the production approach.)

In the intermediation approach, banks collect funds and, using labor and capital, transform these into loans and other assets. This approach treats the dollar value of accounts as outputs and production costs include both operating and interest costs.

As Wykoff (1992) points out, the issue of whether deposits are to be regarded as inputs or outputs remains unresolved. If bank deposits are regarded as inputs and there are no associated outputs, then it is not clear why depositors spend so much time and effort to

travel to banks to give them these free inputs. If deposits are outputs, then it has to be explained why their nominal prices have been comparatively stable and even falling in real times over the years. This would imply that banks have undertaken to make these outputs cheap- it is not clear why.

Mukerjee et al (2001), adopting the intermediation approach, use as outputs the following: consumer loans, real estate loan, investments, total non-interest income. As inputs they use the following: transaction deposits, non-transaction deposits, equity, labor and capital (measured by non-labor, non-interest expense).

In the Indian context, we need to be clear about which approach is most appropriate. Using deposits and loans as outputs would have been appropriate in the nationalized era when maximizing these was indeed the objective of bank but they are, perhaps, less appropriate in the reforms era. Banks are not simply maximizing deposits and loans, they are in the business of maximizing profit. Maximizing loans and deposits may not necessarily be consistent with profit maximization because the quality of bank loans, not just quantity, is crucial to profit.

Keeping in mind the above considerations, we compute Tornquist and Malmquist total factor productivity growth for the three categories of banks, public sector, domestic private sector and foreign, using as outputs the following: loan income, investment income and non-interest income. For inputs, we use: interest cost and operating cost (which includes labor and non-labor, non-interest costs). Thus, both outputs and inputs will comprise flow items. Both inputs and outputs are deflated by the price index.

(We also compute Tornquist TFP growth using loans, investments and other income as outputs and deposits and operating costs as inputs.)

The period covered is 1992-2000. For the Tornquist TFP computation, we have data for 27 PSBs, 21 old private sector banks and 14 foreign banks (Where data for some banks was available for most of the period, data for the relevant years was included in the computation.) For the Malmquist TFP computation, we have a slightly smaller sample of banks: 27 PSBs, 20 private sector banks and 11 foreign banks.

Further, we compute revenue maximization efficiency for the three categories of banks (for which we have the same data set as in the Tornquist TFP computation). Profit maximization might seem the logical objective to focus on, except that Indian banks have thus far had not much freedom in trimming costs, especially the cost of labor. Closing branches and retrenching staff remains an emotive issue, although very recently there have been moves towards reducing staff through voluntary retirement schemes. It would seem that revenue maximization best describes the objective that banks have been focusing on in recent years and this is what we will use in our study

In order to validate our preference for revenue maximization as the objective function, we looked at the variability in revenues and costs at PSBs over the period under study. We use interest spread and interest spread net of provisions (both as proportions of total assets) as measures for revenue. For costs, we use the intermediation cost to total assets ratio. Table 1 gives the results for variability, measured as standard deviation and coefficient of variation. The variability in revenue measures is seen to be greater in either measure. Thus, for instance, in the case of one revenue measure, interest spread minus

provisions, the standard deviation is 0.69 per cent and the coefficient of variation 0.46. In contrast, the variability in costs is 0.15 per cent in terms of standard deviation and 0.06 in terms of coefficient of variation. Over the period, therefore, it would have made more sense to improve revenues than to attempt to control costs.

Table 1: Variability in revenues and costs

(As % of total assets)	91-92	92-93	93-94	94-95	95-96	96-97	97-98	98-99	99-00	SD	Coeff of Var
Interest spread	3.22	2.39	2.36	2.92	3.08	3.16	2.91	2.8	2.7	0.31	0.11
Intermediation cost	2.61	2.63	2.65	2.83	2.99	2.88	2.66	2.66	2.52	0.15	0.06
Provisions & Contingencies	1.57	1.92	2.14	1.16	1.56	1.03	0.81	0.95	0.89	0.48	0.36
Spread-provisions	1.65	0.47	0.22	1.76	1.52	2.13	2.1	1.85	1.81	0.69	0.46

For the purpose of computing revenue maximization efficiency, loans, investments and other income are outputs and deposits and operating costs are inputs. Revenues are then the sum of two products: the product of loans and the prices of loans and the product of investments and investment prices. Similarly, costs are the product of deposits and deposit prices.

4. Results

4.1 Tornquist total factor productivity growth

Table 2 presents the results for Tornquist TFP growth in the three categories of banks- public sector, domestic private sector and foreign banks-, using interest income, investment income and other income as outputs and interest cost and operating cost as inputs. Table 3 compares growth in the three categories, while table 4 provides the average frequency distribution of the TFP growth over the period for the different categories.

Table 2: Comparison of Tornquist TFP growth, using income as outputs

Year	Growth rate-PSU(%)	Growth rate-Pvt(%)	Growth rate-Foreign(%)
1992-93	-8.16	-3.63	1.90
1993-94	5.69	6.76	11.27
1994-95	5.79	4.89	- 1.90
1995-96	-0.16	-1.71	-20.19
1996-97	2.22	-0.70	1.00
1997-98	1.58	0.99	-2.62
1998-99	-3.00	-8.78	-14.24
1999-00	2.99	7.18	4.06
Average	0.77	0.49	-3.07

Note: figures in the three columns represent the average for each category for a given year.

Table 3: Comparison of Tornquist TFP growth in Indian banking

	Sample size	Mean growth rate	t-statistic (Public and pvt)	t-statistic (Public and foreign)
Public sector	27	0.77%	0.11	0.94
Private sector	21	0.49%	(0.46)	(0.18)
Foreign	14	-3.07%		

Note: 1. Means are for the period 1991-92 to 1999-00

2. Figures in brackets indicate levels of significance

Table 4: Average distribution of banks in Tornquist TFP growth range

	PSB	% of total	Private	% of total	Foreign	% of total
<-20%	0	0.00%	0	0.00%	2	11.76%
-20-15%	0.75	2.78%	0.5	2.38%	0.75	4.41%
-15-0%	10.125	37.50%	9.875	47.02%	5.75	33.82%
0-10%	14.25	52.78%	7.5	35.71%	3.875	22.79%
10-20%	1.75	6.48%	2.75	13.10%	3.375	19.85%
>20%	0.125	0.46%	0.375	1.79%	1.25	7.35%

It can be seen from table 3 that there is no significant difference in Tornquist TFP growth either between public and private sector banks or between public sector and foreign banks. We computed but do not report here the results for private sector banks after including new private sector banks for the limited period for which the latter have been in existence. The comparison remains unaffected although the growth rate for private sector banks rises slightly with the inclusion of new banks.

Table 5 presents the Tornquist TFP growth for three categories of banks- public sector, domestic private sector and foreign banks- using loan, investment and other income as output and deposit and operating cost as output.

Table 5: Growth rates of Tornquist TFP growth, using alternative method

Year	Growth rate(PSU)	Growth rate(Pvt)	Growth rate(Foreign)
1992-93	-3.49%	-1.96%	14.35%
1993-94	-1.16%	2.13%	-8.96%
1994-95	1.31%	5.82%	-1.47%
1995-96	-4.61%	0.13%	10.19%
1996-97	-0.56%	-1.33%	-10.25%
1997-98	0.61%	-2.51%	-2.64%

1998-99	0.69%	0.79%	0.22%
1999-00	2.75%	2.98%	0.17%
Average	-0.58%	0.72%	-0.11%

Note: figures in the three columns represent the average for each category for a given year

Table 6: Comparison of Tornquist TFP growth in Indian banks

	Mean	t-statistic (Public and pvt)	t-statistic (Public and foreign)
Public sector	-0.58%	-0.99	-0.34
Private sector	0.72%	(0.17)	(0.37)
Foreign	-0.11%		

Note:1. Means are for the period 1991-92 to 1999-00
2. Figures in brackets indicate levels of significance

Once again, as can be seen from table 6, there is no significant difference in Tornquist TFP growth either between public and private sector banks or between public sector and foreign banks. This also applies when the results for private sector banks are computed after including new private sector banks.

However, it will be noticed that the public sector shows the highest growth in TFP among the three categories in the first approach and the lowest growth in the second approach. This accords with the fact that, in the period since deregulation, PSBs' focus has been on asset quality rather than asset growth. Not surprisingly, TFP growth turns out to be low when we use loans and investments as output. However, PSBs have, as we have seen, managed to improve profitability, which means they have seen growth in revenues relative to costs. This shows up in a positive TFP growth when loan income and investment income are treated as output.

4.2 Malmquist TFP growth

Table 7 below gives the results of Malmquist TFP growth for the bank categories for each year. Table 8 compares growth among the categories, while table 9 provides the frequency distribution. As can be seen from table 10, PSBs are seen to do better than private banks at a 10 per cent level of significance and worse than foreign banks at an 8 per cent level of significance. The foreign bank category's average productivity growth rate has been boosted by an unusually high increase in productivity at one bank in 2000. We would, therefore, interpret our results are pointing to no significant differences in Malmquist TFP among the three categories.

Table 7 Year- wise averages for Malmquist TFP growth for bank categories

	Growth(PSB)	Growth(Pvt)	Growth(Foreign)
1992-93	-5.14%	-6.59%	1.97%
1993-94	-1.02%	3.26%	13.65%
1994-95	-1.05%	2.86%	4.59%
1995-96	3.92%	0.83%	14.06%
1996-97	5.20%	-0.25%	-13.03%
1997-98	-0.35%	-7.13%	-1.80%
1998-99	2.71%	-5.99%	15.97%
1999-00	2.10%	-1.11%	38.37%
Average	0.80%	-1.76%	9.22%

Table 8 Comparison of Malmquist TFP growth in Indian banks

	Sample size	Mean growth rate	t-statistic (Public and pvt)	t-statistic (Public and foreign)
Public sector	27	0.80%	1.35	
			(0.1)	
Private sector	20	-1.76%		
Foreign	11	9.22%		-1.45
				(0.08)

Note:1. Means are for the period 1991-92 to 1999-00
2. Figures in brackets indicate levels of significance

Table 9 Distribution of banks by Malmquist TFP growth ranges

	PSB	% of total	Private	% of total	Foreign	% of total
<-20%	0.5	1.85%	1.5	7.50%	2	18.18%
-20-15%	0.625	2.31%	1.375	6.88%	0.75	6.82%
-15-0%	12.75	47.22%	8.875	44.38%	2.625	23.86%
0-10%	9	33.33%	5	25.00%	1.75	15.91%
10-20%	2.75	10.19%	2	10.00%	1	9.09%
>20%	1.375	5.09%	1.25	6.25%	2.875	26.14%

4.3 Revenue maximization efficiency

Table 10 below gives the results for revenue maximization efficiency. Table 11 presents the comparison among the three bank categories and table 12 summarizes the frequency distribution across the three categories.

PSBs are clearly superior to private sector banks but there is no difference between them and foreign banks. The results accord with known facts about the financial performance of PSBs. PSBs have higher costs than private sector banks but they do better on a key revenue parameter such as spread. The question we ask in revenue maximization is: how well is a bank doing, given its cost base? Not surprisingly, PSBs are seen to do better than private sector banks.

However, as we have seen earlier, foreign banks do better than PSBs on spread. So, we would not expect to see PSBs fare better on revenue maximization than foreign banks. The interesting result, though, is that PSBs have a better score than foreign banks although this is not significantly superior.

Table 10: Year wise revenue max efficiency for bank categories

	PSB	Pvt	Foreign
1991-92	0.74	0.36	0.71
1992-93	0.69	0.25	0.46
1993-94	0.81	0.44	0.73
1994-95	0.72	0.52	0.70
1995-96	0.82	0.54	0.73
1996-97	0.76	0.49	0.66
1997-98	0.80	0.52	0.65
1998-99	0.86	0.64	0.87
1999-00	0.33	0.24	0.49

Table 11 Comparison of banks on revenue maximization efficiency

	Sample size	Mean	t-statistic (public and private)	t-statistic (public and foreign)
Public sector	27	0.73	4.05 (0.00)	
Private sector	22	0.44		
Foreign	17	0.67		0.88 (0.19)

Note:1. Means are for the period 1991-92 to 1999-002.
2. Figures in parantheses indicate levels of significance

Table 12 Average distribution of banks in efficiency range in 1992-00

Eff range	PSBs	% of total	Private	% of total	Foreign	% of total
0-0.25	1.67	6.20	2.78	16.45	2.33	15.79
0.25-0.5	1.22	4.55	7.00	41.45	2.22	15.04
0.5-0.75	10.33	38.43	5.67	33.55	3.11	21.05
0.75-1.0	13.67	50.83	1.44	8.55	7.11	48.12

4.4 Summary of comparisons between bank categories

We are now in a position to summarize the results obtained in the comparison of the three categories of banks using both financial measures and input-output quantities. These are summarized in table 13 below.

Table 13 Summary of comparison of performance in bank categories

Measure/comparison	Result
1. Tornquist TFP growth	
i. PSBs and old private sector banks	No difference
ii. PSBs and foreign banks	No difference
2. Malmquist TFP growth	
i. PSBs and old private sector banks	PSB better at 10 per cent level of significance
ii. PSBs and foreign banks	Foreign better at 8 per cent level
3. Revenue maximization efficiency	
i. PSBs and old private sector banks	PSB better at 5 per cent level
ii. PSBs and foreign banks	No difference

Out of a total of six comparisons we have made, there are no differences in three cases, PSBs do better in two, and foreign banks in one. To put it differently, PSBs are seen to be at a disadvantage in only one out of six comparisons. It is difficult, therefore, to sustain the proposition that efficiency and productivity are lower in public sector banks relative to their peers in the private sector.

5. Concluding remarks

We have compared efficiency and productivity of PSBs relative to private sector banks, both domestic and foreign. This comparison is attempted over a nine year period (1992-00), out of which eight years belong to what might be called the post-deregulation period, if we use the generally accepted year of 1992-93 as the cut off date for the big push in bank deregulation. Our results are interesting given the general belief that deregulation would expose the inefficiencies inherent in government ownership and result in a huge gap between private banks and PSBs. This has not happened. We are unable to uncover any significant differences in productivity growth and efficiency between the public and private sectors in the period under study.

It is possible to speculate on why this is so. One explanation could be that there has been a change in orientation in PSBs from social objectives towards an accent on profitability, especially given that some of these have come to be listed on the exchanges and have private investors. Another is that PSBs enjoy a huge advantage in terms of scale of operations over private sector banks and these advantages offset any inefficiencies that could be ascribed to government ownership.

Those who advocate privatization of PSBs could contend that a transfer to private control could improve efficiency and productivity at PSBs even further. But that is quite different from arguing that there is a performance differential between PSBs and their private sector counterparts today that justifies privatization.

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