CHAPTER III

ECONOMIES OF SCALE

This chapter relates to scale economies of the banks and has been divided into four sections. The first part discusses economic theory of the economies of scale of the firms. The second part relates to the measurement of economies of scale. The third section analyzes the empirical findings. The last section concludes with summary.

3.1 Introduction:

Efficient and effective utilization of resources are key objectives of every firm. Economic theory argues that, as production increases, there are economies of scale up to a certain point, and that thereafter diseconomies of scale set in. This is the economic law of variable returns to factors of production. That is, economies of large-scale production lead to a fall in average cost as output expands. The optimum size of the firm (i e, the minimum average cost) is reached when these economies disappear and diseconomies of large-scale production are about to set in. The concept of economies of scale describes the relationship between the scale of operation and its costs. Economies of scale are the marginal reduction in the costs of production as the firm increases in size while staying in the same line of business (Ang & Lin 2001). To sum up, the theory of economies of scale examines the relationship between size and average total cost of production cost of per unit of output, with size as the cause and cost as the consequence (Sandesara, 1979).

If the industry is subject to economies of scale, larger institutions would be more efficient and could provide services at lower cost, ceteris paribus (Benston, 1972). Research has established the existence of scale economies, but many of these studies suggest that, in a wide range of industries, minimum efficient scale, or the level of output or production necessary to operate at the lowest point on the average cost curve, occurs at relatively modest levels of output (Scherer, 1980). The empirical literature on bank scale economies generally concludes that the average cost curve is relatively flat, with some evidence of scale inefficiencies for both the smallest and largest banks (Clark, 1996). Conceptually, economies of scale permit larger firms to

ovide their services at lower average costs per unit than
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3.2 Measurement of Economies of Scale

3.2.1 Definition of Variables

As is well known, one of the main problems to solve before estimating the form of banks' costs function is to define bank outputs/inputs and to choose measures for them. Since financial institutions produce multiple products in terms of services rather than easily identifiable physical products, it is not clear how to define and measure output. Benston (1965; 1970) and Bell & Murphy (1968) measured total output in terms of number of deposit accounts and loans produced. Greenbaum (1967) estimated real value of output, i.e. gross bank income. In the Indian context, Rangarajan and Mampilly (1972) used total deposits as the measure of output in the analysis of cost and size relationship of banks. In a study of Canadian banks, Allen & Liu (2005) used the intermediation approach to output, taking different forms of loans as a measure of output. In most of the cost-size relationship studies number of deposits is taken as a measure of output. However, in the present study, intermediation approach is used to define output of the banks, taking the amount of loans produced as measure of output/size because the ultimate product of banks is total loans and the deposits being intermediary factor. Costs are defined to include both the interest costs and operating costs. Operating costs comprise all expenses related to the use of physical and labor factor inputs. The cost-output relationship is also carried out for specified cost items of the total operating cost variable. Interest costs comprise interests paid to all depositors and to other creditors of the bank. Since interest cost accounted more than 70 per cent of the total costs for each bank group in 1991-92 and more than 67 per cent in 2006-07, interest cost is also taken as a measure of cost along with other opportunity cost.

3.2.2 Cost function

In the present study, linear form of cost function is used to analyze the type of cost relationship with output. It is the simplest form of cost function from a mathematical viewpoint and also important empirically.

The Cost function can be written as:

$$C = \mathbf{a} + \mathbf{b}\, Q, \qquad (3.1)$$

C is the total costs,

Q is the total output (Total Advances)

a is the intercept (fixed cost)

b is the marginal cost.

A linear cost function implies a constant marginal cost and falling average cost curve if the intercept term is positive. To measure the extent of these economies, output (Total Advances) elasticities of total cost would be computed at their mean value by the formula:

$$\mathbf{e = b\ Q'/C'},$$

where, e is the elasticity

Q′ is the mean output (Total Advances), and

C′ is the mean total cost.

The value of e where it is less than 1 indicates economies of scale and when it is more than 1 it shows diseconomies of scale. Arbitrarily, the values of e in the range of 1.049 or 0.951 suggest the minimum point on the average cost curve.

Similarly, the mean average cost would be worked out by the formula:

$$\mathbf{AC' = a/Q' + b},$$

where,

AC′ is the mean average cost.

The same formula would be used to work out the cost elasticity and **AC′** for the cost components.

The nature of relationship between the cost function will be subject to the empirical verification in terms of the estimated values of marginal cost (**b**), mean average cost (**AC′**) and mean elasticity of output (Total Advances) with respect to specified cost items and total cost, i.e. the value of **e**.

In the present study, the hypothesis to be tested is whether scale or size has any impact on the performance of the banks.

3.2.3 Data and Methodology

For the cost analysis of the banks, the data on total cost, other cost components, total output (Total Advances), were taken from the time series data of the Reserve Bank of India. Cost function of the linear form mentioned in equation (3.1) is applied for each bank group in each financial year to check out the scale

s divided into five benchmarks of study period. The first 2, the second period is 1995-96, the third benchmark period is 1999-00, the fourth period is 2003-04 and the fifth period being 2006-07. [**Table 3-1**]

Before proceeding for the regression analysis, an overview of the data on the average size of bank in each bank-group is analyzed and reported in **Table 3-2**. The average size of total advances of SBI and its associated group was Rs. 6739 crore and for the other 19 public sector group, it was Rs. 4691 crore in the financial year 1991-92. In the financial year 1999-00 the average size of SBI and its associated banks was Rs. 16129 crore and for the other public sector bank groups it was Rs. 11741 crore. Further, in the financial year 2006-07, the average size of total advances of SBI bank group was more than doubled to Rs. 60284 crore from Rs. 27564 crore in 2003-04. The increase in the size of the total advances was also visible for other PSBs groups. The average size of total advances of the other PSBs, which was Rs. 21696 crore in 2003-04 jumped to Rs. 47126 crore in the financial year 2006-07, almost more than doubled.

Table 3-1

by bank-group for selected years, 1991-92 to 2006-07

(Rs. in Crore)

Bank-Group	Minimum	Maximum	Aggregate Advances	Average Size
(1)	(2)	(3)	(4)	(5)
		1991-92		
SBI & its Associates	826	44344	53911	6739
Other PSBs	1011	12572	89126	4691
All Banks	826	44344	143037	5298
		1995-96		
SBI & its Associates	1470	59826	78126	9766
Other PSBs	2442	16013	129414	6811
All Banks	1470	59826	207540	7687
		1999-00		
SBI & its Associates	2842	98102	129034	16129
Other PSBs	4563	25231	223076	11741
All Banks	2842	98102	352110	13041
		2003-04		
SBI & its Associates	5240	157934	220516	27564
Other PSBs	6030	47639	412224	21696
All Banks	5240	157934	632740	23435
		2006-07		
SBI & its Associates	11081	337336	482426	60284
Other PSBs	11738	98506	895406	47126
All Banks	11081	337336	1377832	51025

Source: Appendix D.

3.3 Regression Results

3.3.1 Marginal Cost and Mean Average Cost:

ve equation (3.1) is performed for specified cost items lvances) for selected years 1991-92, 1995-96, 1999-00, 2003-04 and 2006-07 separately for each bank group and also all banks together. All the estimated values of '$\mathbf{b_s}$' are found to be significant in all the cases of cost variables at the 1 per cent level in each year for each bank group and all banks together.

The marginal cost (**MC**) and mean average cost (**AC′**) of the SBI and its associates group tends to be higher than that of the other 19 PSBs group in all the analysis period. For the SBI group, the **MC** is still high till the financial year 1999-00 (**b** = 22.01), and declined marginally from the financial year 2003-04 onwards with a coefficient value of (**b** = 18.26). Likewise, the decline in **MC** is also visible for other 19 PSBs from 2003-04. In all, all the banks have high marginal cost till 1999-00 and in the later period 2003-04 onwards the **MC** declined marginally. Among the specified cost items, interest cost is followed by payments and provisions to employees, general expenses and depreciation on banks' assets.

Although the **MC** and **AC′** for the banks were high, over time it tends to decline marginally, showing the increase in the efficiency of the firms with time. The details of cost item-wise marginal cost and mean average cost of the banks can be seen from **Table 3-2** in this section.

3.3.2 Economies of Scale:

The values of '**e**' in the range of 1.05 or 0.95 may be treated as close to 1. And the value of '**e**' which is less than 0.95 or more than 1.05 exhibited economies of scale or diseconomies of scale in the industry respectively. As mentioned above, the values of scale operation in the industry can be obtained from the elasticity of specified cost item with respect to output. The computed values of the mean elasticity of specified cost items with respect to the total advances for each bank group and all banks together for specified time period is reported in **Table 3-2**. Mean elasticity of total cost with respect to output for the SBI and its associates group was found close to 1 for all the selected years, except in the financial year 2003-04, having an '**e**' value of greater than 1, i.e. (**e** = 1.07). As against this, the mean elasticity of total cost was close to 1 of the 19 PSBs group in all the selected years. [**Table 3-2**]

It is relevant to note the extent of economies/diseconomies of scale by their sources for each group of banks. For the selected years, the sources of economies and

eir magnitudes vary among the groups of banks. In case lects the minimum point of AC curve for the SBI group in all years of the study except in the financial year 2003-04, with diseconomies of scale (**e** = 1.07). For the cost item salaries and wages to workers, SBI group operated at the economies of scale (**e** = 0.94) in the year 1991-92 and at minimum point of AC curve in the financial years 1994-95 (**e** = 1.02) and also in the financial year 1999-00 (**e** = 0.99) and further to diseconomies of scale in other two study periods. Depreciation item shows to operate in economies of scale (**e** = 0.94) during the period 1991-92 and 2006-07 (**e** = 0.91) for the bank group. But in other study periods, depreciation cost item were operated at minimum efficient scale in 1995-96 (**e** = 0.98) and even turned out to diseconomies of scale in the financial years 1999-00 and 2003-04 with elasticities (**e** = 1.09) and (**e** = 1.08) respectively. General expenses for the SBI group operated at the minimum point of AC curve and hence all the values of '**e**' were closed to 1 in all years of study.

The nature of scale operation in case of other 19 PSBs is different from that of the SBI group. Unlike the SBI group, this bank group operated at the minimum point of AC curve for the total cost in all the study periods. The elasticities of total cost with respect to total output are (**e** = 0.88), (**e** = 0.83), (**e** = 0.84), (**e** = 0.80) and (**e** = 0.94) in the financial years 1991-92, 1995-96, 1999-00, 2003-04 and 2006-07 respectively. For the cost items interest cost and the general expenses too, the other 19 PSBs group were operated in economies of scale, all the '**e**' values less than 1. In case of the cost item wages and salaries to employees, this bank group operated in economies of scale in all the selected period except in the financial year 2006-07, which have an '**e**' value of 1.00, i.e. at the minimum point of AC curve. Regarding the depreciation cost item, there were economies of scale in the financial year 1991-92 (e = 0.79) and in the financial year 1995-96 (e = 0.90). But in the other study periods, the values of '**e**' were close to 1. But, unlike the SBI group, this bank group does not have diseconomies of scale in any of the specified cost items for any specified study period.

A comparison of the nature of scale operation of both the bank groups is meaningful. From the total cost point of view, the SBI group operated at the minimum point of AC, i.e. the values of '**e**' are closed to 1 and for the other PSBs group, operated under the economies of scale in each selected study period. From the

tems, except payments and provisions to employees and t too for specific years, other cost items do operated at either at the minimum point of AC curve or turned diseconomies of scale. But, in case of the other PSBs group none of the specified cost items did not turn out to be diseconomies of scale in each specified time period. All the specified cost items operated in economies of scale except for cost items like provisions and payments to employees and depreciation and that too operated at the minimum point of AC curve and for specific periods. Briefly, the other 19 public sector bank groups are slightly more efficient than the SBI group.

For the overall 27 banks, there were economies of scale in terms of total cost in the period 1991-92 (**e** = 0.93) and 1995-96 (**e** = 0.94) but operated at the minimum point of AC curve in the financial year 1999-00 (**e** = 0.98), turned to diseconomies of scale during the period 2003-04 (**e** = 1.12) and further at the minimum point of AC in 2006-07 (**e** = 1.02). For all specified cost items, either operated at economies of scale or at minimum point of AC curve in the study periods 1991-92 and 1995-96 and some of the cost items turned to diseconomies of scale from the financial year 1999-00 to 2006-07. These cost items that turned to diseconomies of scale were depreciation (**e** = 1.28) and general expenses (**e** = 1.01) during 1999-00, interest cost (**e** =1.13), wages and salaries (**e** = 1.11), and again depreciation (**e** =1.39) during 2003-04, and only wages and salaries (**e** = 1.17) in the period 2006-07.

Table 3-2

Regression results of specified cost items on total advances, mean elasticity and scale position for the selected years fr 1991-92 to 2006-07.

Panel 3-2 A: State Bank of India and its Associated Banks group

1991-92

Cost Items	Marginal Cost (MC)	Mean Average Cost (AC′)	Mean elasticity of Cost w.r.t. Output	R-Square	Scale Posi
(1)	(2)	(3)	(4)	(5)	(6)
Interest Cost	13.73* (242.10)	13.71	1.00	1.00	Cost efficient Scale
Wages & Salaries	3.52* (142.25)	3.73	0.94	1.00	Economies of Scale
Depreciation on Bank's property	0.117* (67.03)	0.124	0.94	.999	Economies of Scale
General Expenses	1.40* (233.22)	1.46	0.96	1.00	Cost efficient Scale
Total Costs	18.77* (251.48)	19.02	0.99	1.00	Cost efficient Scale

Note: t-values in the parentheses, * significant at the 1 per cent level.
The value (s) of marginal cost is the estimated regression coefficient and the value of mean average cost is worked out by using the formula mentioned in section 3.2.

Panel 3-2 B: State Bank of India and its Associated Banks group

1995-96

Cost Items	Marginal Cost	Mean Average Cost	Mean elasticity of Cost w.r.t. Output	R-Square	Scale Positio
(1)	(2)	(3)	(4)	(5)	(6)
Interest Cost	13.72* (195.24)	13.92	0.99	1.00	Cost efficient Scale
Wages & Salaries	5.62* (88.11)	5.51	1.02	.999	Cost efficient Scale
Depreciation on Bank's property	0.145* (130.13)	0.149	0.98	1.00	Cost efficient Scale
General Expenses	1.70* (305.64)	1.73	0.99	1.00	Cost efficient Scale
Total Costs	21.18* (240.41)	21.30	0.99	1.00	Cost efficient Scale

Note: t-values in the parentheses, * significant at the 1 per cent level.

Panel 3-2 C: State Bank of India and its Associated Bank group

		1999-00			
Cost Items	**Marginal Cost**	**Mean Average Cost**	**Mean elasticity of Cost w.r.t. Output**	**R-Square**	**Scale Position**
(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
Interest Cost	15.59* (144.92)	15.42	1.01	1.00	Cost Efficient Scale
Wages & Salaries	4.56* (90.62)	4.59	0.99	.999	Cost Efficient Scale
Depreciation on Bank's property	0.378* (72.93)	0.347	1.09	.999	Diseconomies of Scale
General Expenses	1.480* (104.26)	1.476	1.00	.999	Cost Efficient Scale
Total Costs	22.01* (147.48)	21.84	1.01	1.00	Cost Efficient Scale

Note: t-values in the parentheses, * significant at the 1 per cent level.

Panel 3-2 D: State Bank of India & its Associated Bank group

	2003-04				
Cost Items	**Marginal Cost**	**Mean Average Cost**	**Mean elasticity of Cost w.r.t. Output**	**R-Square**	**Scale Positio**
(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
Interest Cost	12.34* (105.60)	11.52	1.07	.999	Diseconomies of Scale
Wages & Salaries	4.14* (60.86)	3.79	1.09	.998	Diseconomies of Scale
Depreciation on Bank's property	0.447* (76.86)	0.415	1.08	.999	Diseconomies of Scale
General Expenses	1.33* (72.18)	1.30	1.03	.999	Cost efficient Scale
Total Costs	18.26* (95.00)	17.02	1.07	.999	Diseconomies of Scale

Note: t-values in the parentheses, * significant at the 1 per cent level.

Panel 3-2 E: State Bank of India & its Associated Bank group

	2006-07				
Cost Items	**Marginal Cost**	**Mean Average Cost**	**Mean elasticity of Cost w.r.t. Output**	**R-Square**	**Scale Positi**
(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
Interest Cost	6.93* (262.59)	7.02	0.99	1.00	Cost efficient Scale
Wages & Salaries	2.39* (75.33)	2.17	1.10	.999	Diseconomies of Scale
Depreciation on Bank's property	0.175* (41.70)	0.193	0.91	.997	Economies of Scale
General Expenses	0.98* (84.10)	0.95	1.03	.999	Cost Efficient Scale
Total Costs	10.48* (233.75)	10.33	1.01	1.00	Cost Efficient Scale

Note: t-values in the parentheses, * significant at the 1 per cent level

Panel 3-2 F: Other Public Sector Banks group

		1991-92			
Cost Items	**Marginal Cost**	**Mean Average Cost**	**Mean elasticity of Cost w.r.t. Output**	**R-Square**	**Scale Positi**
(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
Interest Cost	14.22* (42.03)	15.09	0.94	.990	Economies of Scale
Wages & Salaries	2.69* (9.66)	3.81	0.71	.846	Economies of Scale
Depreciation on Bank's property	0.12* (6.08)	0.15	0.79	.685	Economies of Scale
General Expenses	1.20* (10.05)	1.57	0.77	.856	Economies of Scale
Total Costs	18.23* (34.68)	20.61	0.88	.986	Economies of Scale

Note: t-values in the parentheses, * significant at the 1 per cent level

Panel 3-2 G: Other Public Sector Banks group

	1995-96				
Cost Items	**Marginal Cost**	**Mean Average Cost**	**Mean elasticity of Cost w.r.t. Output**	**R-Square**	**Scale Positi**
(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
Interest Cost	13.24* (20.79)	15.52	0.85	.962	Economies of Scale
Wages & Salaries	3.79* (7.47)	5.28	0.72	.767	Economies of Scale
Depreciation on Bank's property	0.18* (9.16)	0.20	0.90	.832	Economies of Scale
General Expenses	1.60* (17.94)	1.76	0.91	.950	Economies of Scale
Total Costs	18.82* (18.24)	22.76	0.83	.951	Economies of Scale

Note: t-values in the parentheses, * significant at the 1 per cent level

Panel 3-2 H: Other Public Sector Banks group

			1999-00		
Cost Items	**Marginal Cost**	**Mean Average Cost**	**Mean elasticity of Cost w.r.t. Output**	**R-Square**	**Scale Positio**
(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
Interest Cost	13.14* (23.17)	15.90	0.83	.969	Economies of Scale
Wages & Salaries	3.95* (8.91)	4.68	0.84	.824	Economies of Scale
Depreciation on Bank's property	0.26* (8.40)	0.25	1.01	.806	Cost efficient Scale
General Expenses	1.28* (29.57)	1.43	0.90	.981	Economies of Scale
Total Costs	18.63* (22.60)	22.26	0.84	.968	Economies of Scale

Note: t-values in the parentheses, * significant at the 1 per cent level

Panel 3-2 I: Other Public Sector Banks group

		2003-04			
Cost Items	**Marginal Cost**	**Mean Average Cost**	**Mean elasticity of Cost w.r.t. Output**	**R-Square**	**Scale Positio**
(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
Interest Cost	7.99* (16.49)	9.79	0.82	.941	Economies of Scale
Wages & Salaries	2.58* (6.95)	3.41	0.75	.740	Economies of Scale
Depreciation on Bank's property	0.253* (6.33)	0.247	1.03	.702	Cost Efficient Scale
General Expenses	0.99* (10.89)	1.25	0.79	.875	Economies of Scale
Total Costs	11.80* (15.05)	14.70	0.80	.930	Economies of Scale

Note: t-values in the parentheses, * significant at the 1 per cent level

Panel 3-2 J: Other Public Sector Banks group

		2006-07			
Cost Items	**Marginal Cost**	**Mean Average Cost**	**Mean elasticity of Cost w.r.t. Output**	**R-Square**	**Scale Positio**
(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
Interest Cost	6.62* (26.75)	7.14	0.93	.977	Economies of Scale
Wages & Salaries	1.897* (9.93)	1.904	1.00	.853	Cost efficient Scale
Depreciation on Bank's property	0.16* (7.91)	0.17	0.99	.786	Cost Efficient Scale
General Expenses	0.81* (15.08)	0.89	0.91	.930	Economies of Scale
Total Costs	9.49* (50.34)	10.10	0.94	.993	Economies of Scale

Note: t-values in the parentheses, * significant at the 1 per cent level

Panel 3-2 K: All 27 Public Sector Banks

1991-92

Cost Items	Marginal Cost	Mean Average Cost	Mean elasticity of Cost w.r.t. Output	R-Square	Scale Positi
(1)	(2)	(3)	(4)	(5)	(6)
Interest Cost	13.75* (110.27)	14.57	0.94	.998	Economies of Scale
Wages & Salaries	3.43* (36.71)	3.78	0.91	.982	Economies of Scale
Depreciation on Bank's property	0.12* (21.44)	0.14	0.84	.948	Economies of Scale
General Expenses	1.38* (38.78)	1.53	0.90	.984	Economies of Scale
Total Costs	18.67* (110.07)	20.01	0.93	.998	Economies of Scale

Note: t-values in the parentheses, * significant at the 1 per cent level

Panel 3-2 L: All 27 Public Sector Banks

1995-96

Cost Items	Marginal Cost	Mean Average Cost	Mean elasticity of Cost w.r.t. Output	R-Square	Scale Positio
(1)	(2)	(3)	(4)	(5)	(6)
Interest Cost	13.61* (67.70)	14.92	0.91	.995	Economies of Scale
Wages & Salaries	5.41* (29.16)	5.37	1.01	.971	Cost efficient Scale
Depreciation on Bank's property	0.15* (23.06)	0.14	0.82	.955	Economies of Scale
General Expenses	1.69* (65.43)	1.75	0.97	.994	Cost efficient Scale
Total Costs	20.86* (62.40)	22.21	0.94	.994	Economies of Scale

Note: t-values in the parentheses, * significant at the 1 per cent level

Panel 3-2 M: All 27 Public Sector Banks

		1999-00			
Cost Items	**Marginal Cost**	**Mean Average Cost**	**Mean elasticity of Cost w.r.t. Output**	**R-Square**	**Scale Positi**
(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
Interest Cost	15.31* (68.69)	15.73	0.97	.995	Cost efficient Scale
Wages & Salaries	4.49* (35.15)	4.65	0.97	.980	Cost efficient Scale
Depreciation on Bank's property	0.37* (29.30)	0.29	1.28	.972	Diseconomies of Scale
General Expenses	1.46* (78.94)	1.45	1.01	.996	Diseconomies of Scale
Total Costs	21.63* (68.87)	22.11	0.98	.995	Cost efficient Scale

Note: t-values in the parentheses, * significant at the 1 per cent level

Panel 3-2 N: All 27 Public Sector Banks

		2003-04			
Cost Items	**Marginal Cost**	**Mean Average Cost**	**Mean elasticity of Cost w.r.t. Output**	**R-Square**	**Scale Positio**
(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
Interest Cost	11.77* (32.77)	10.39	1.13	.977	Diseconomies of Scale
Wages & Salaries	3.93* (24.22)	3.54	1.11	.959	Diseconomies of Scale
Depreciation on Bank's property	0.43* (19.61)	0.31	1.39	.972	Diseconomies of Scale
General Expenses	1.29* (33.88)	1.23	1.02	.979	Cost efficient Scale
Total Costs	17.42* (32.37)	15.51	1.12	.977	Diseconomies of Scale

Note: t-values in the parentheses, * significant at the 1 per cent level

Panel 3-2 O: All 27 Public Sector Banks

			2006-07		
Cost Items	**Marginal Cost**	**Mean Average Cost**	**Mean elasticity of Cost w.r.t. Output**	**R-Square**	**Scale Positio**
(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
Interest Cost	6.89* (89.58)	7.10	0.97	.997	Cost efficient Scale
Wages & Salaries	2.33* (34.09)	2.00	1.17	.979	Diseconomies of Scale
Depreciation on Bank's property	0.175* (25.65)	0.175	1.00	.963	Cost efficient Scale
General Expenses	0.96* (46.75)	0.91	1.05	.989	Cost efficient Scale
Total Costs	10.36* (115.34)	10.18	1.02	.998	Cost efficient Scale

Note: t-values in the parentheses, * significant at the 1 per cent level

(MES):

ize (MES) of total output, i.e. total advances is defined as the level of output at which fall in average total cost (**AC′**) over a given interval of output was found for the first time to be less than one per cent. The minimum efficient size/output works out to be at the output level of Rs. 4500 crore in 1991-92. For the financial year 1995-96, the minimum efficient output level is obtained at Rs. 5000 crore and declined to Rs. 4000 crore in the financial year 1999-00. In case of the financial years 2003-04 and 2006-07, the average total cost was found to be increasing over successive intervals of output, no attempt was made to make calculations of MES as it has little value to the study. It appears from **Table 3-1** that MES was attained in all 27 public sector banks in each of the three particular years which found MES. [**Table 3-3**]

3.4 Main Points:

Regression is fitted for total cost and for each specified cost items on the total output based on the linear cost function as given in the previous section for selected years 1991-92, 1995-96, 1999-00, 2003-04 and 2006-07. Economies of scale for all the 27 public sector banks are worked out for each year. The average size of each bank group tends to increase over the study period. In the financial year 2003-04, the average size of the SBI group which was Rs. 27564 crore increased to Rs. 60284 crore in the financial year 2006-07. And for the other 19 public sector bank group, the average size which was Rs. 21696 crore in the financial year 2003-04 jumped to Rs. 47216 crore in 2006-07, almost doubled. The MC and the mean average cost of both the bank groups were more or less the same in all the particular study periods. Decline in the MC and mean average cost for both the bank group was visible from the financial year 2003-04.

Regression results show that from the overall 27 banks point of view, total cost operated at the economies of scale in the financial years 1991-92 and 1995-96 with **e** values were 0.93 and 0.94 respectively. But in the rest of three years, the values of **e** were found closed to 1 in two study periods and diseconomies of scale in the financial year 2003-04 (**e** = 1.12). The SBI group operated at the minimum point of AC curve in terms of the total cost, but in specific cost items, this bank group operated at economies of scale and also at diseconomies of scale. The diseconomies of scale of this bank group were in

(**e** = 1.07), in case of wages and salaries to employees in depreciation in 1999-00, 2003-04 and 2006-07. No cases for diseconomies of scale were found in case of general expenses for this SBI group. On the contrary, the other 19 PSBs did not operate in diseconomies of scale in aggregate cost as well as specified cost items in any of the study period. The total cost for this bank group was found to operate in economies of scale in each of the analysis period (**e** = 0.88, **e** = 0.83, **e** = 0.84, **e** = 80 and **e** = 94 in 1991-92, 1995-96, 1999-00, 2003-04 and 2006-07 respectively). And regarding cost items, operated at the economies of scale and turned to the scale at the minimum point of AC curve but not diseconomies of scale in operation.

To sum up, in terms of efficiency between the two bank groups, the 19 PSBs were found to be more efficient than the SBI group in the study period. For the 19 public sector groups as analyzed detailed in the above paragraph that all the firms operated at the economies of scale for each specified time period. On the contrary, the SBI group operated at the cost efficient scale in all the study periods except in the financial year 2003-04, where this bank group operated at the diseconomies of scale. The existence of scale operation at the minimum point of AC curve for the SBI group in relation to the other 19 PSBs indicated that this bank group fully exploited the internal economies available with the increase in size. And that is why scale turned to diseconomies of scale in the financial year 2003-04 for this bank group and finally avoided the diseconomies of scale in the financial year 2006-07, as given by the elasticity value (**e** = 1.01).

The minimum efficient size/output of the banks is found at the output level of Rs. 4500 crore in the financial year 1991-92, Rs. 5000 crore in the financial year 1995-96 and declined to Rs. 4000 crore in the financial year 1999-00. However, in the financial years 2003-04 and 2006-07, average total cost was found increasing trend over successive intervals of output, so the MES of these periods were not computed. These MES is attained by all the 27 banks in each of the three periods which analyzed the MES of the firms.

From the perspective of all the twenty-seven banks, the banks operated at the economies of scale in the financial year 1991-92 and 1995-96. However, in the financial year 1999-00, all the public sector banks operated at the minimum point of AC curve. It

exploited the internal economies of scale during a gap of f cost efficient scale in 1999-00 to diseconomies of scale in 2003-04 indicated that with size, firms find it difficult to co-ordinate with the additional staff members, communicate their directors to the right process in a timely way and also monitor personal effectively. These are the possible factors that can turn the firms from the minimum point scale to the diseconomies of scale. This is evident from the operation of diseconomies of scale in terms of wages and salaries, depreciation, interest cost and even total cost in the financial year 2003-04. However, firms try to avoid the diseconomies by reorganizing, dividing operations, hiring new managers, and so on. This is visible in the financial year 2006-07, where all the banks operated at the minimum point of AC curve with an elasticity value of (**e** = 0.998).

From this analysis it is concluded that economies of scale existed for the Indian banks during the period 1991-92 to 2006-07. But, size is not a factor for determining profitability of the banks. It is because, the SBI group is still earning net profit (Rs. 5619 crore) with a growth rate of 24.54 per cent in the financial year 2003-04, where total cost and most of the cost items operated at diseconomies of scale of this bank group in the period. On the other hand, the 19 public sector bank group although experiences economies of scale in all the periods but in real terms made net losses of Rs.(-1165 crore) in 1995-96 where all the cost items and total cost of this bank group were operating at economies of scale.

Table 3-3

Levels of Total Output (Total Advances) and Minimum Efficient Size/Output (MES) during 1991-92 to 2006-07

Total Output (*Rs. in crores*)	Average Total Cost	Fall in AC (*Per cent*)	Total Output (*Rs. in crores*)	Average Total Cost	Fall in AC (*Per cent*)
(1)	**(2)**	**(3)**	**(1)**	**(2)**	**(3)**
	1991-92			***2003-04***	
500	33.004	---	5000	8.475	
1000	25.837	21.72	5500	9.288	
1500	23.447	9.25	6000	9.965	
2000	22.253	5.09	6500	10.538	
2500	21.536	3.22	7000	11.029	
3000	21.058	2.23	7500	11.455	
3500	20.717	1.62	8000	11.828	
4000	20.461	1.24	8500	12.156	
4500	**20.262**	**0.97**	9000	12.449	
5000	20.103	0.79	10000	12.945	
5500	19.972	0.65	15000	14.436	**Increasing AC**
MES	**4500**				
	1995-96			***2006-07***	
1000	31.220	---	10000	9.456	
1500	27.768	11.06	15000	9.756	
2000	26.042	6.22	20000	9.906	
2500	25.006	3.98	25000	9.996	
3000	24.316	2.76	30000	10.056	
3500	23.823	2.03	35000	10.099	
4000	23.453	1.55	40000	10.131	
4500	23.165	1.23	45000	10.156	
5000	**22.935**	**0.99**	50000	10.176	
5500	22.747	0.82	55000	10.192	
6000	22.590	0.69	60000	10.206	**Increasing AC**
MES	**5000**				
	1999-00				
2500	24.105	---			
3000	23.693	1.71			
3500	23.398	1.24			
4000	**23.177**	**0.94**			
4500	23.005	0.74			
5000	22.868	0.60			
5500	22.755	0.49			
MES	**4000**				

Source: Based on Table 3-2 & Own Calculation.

Note: The values of AC in column (2) is worked out by using the formula: **AC= a/Q + b,** with the values of **a** and **b** as given in TABLE 3-2 in Section 3.3 and the value of total output is given above in column (1) year wise.