

CHAPTER 1

INTRODUCTION

Since the inception of economic planning in India, in the beginning of fifties, banking was assigned a critical role in the process of economic development. In the very first five year plan (1951-55), the role of banking was recognised; "the proper discharge of its functions by the banking system will necessitate its operations more and more in the light of the priorities for development indicated in the plan and less and less in terms of return on capital". It was also envisaged that the banking system will have to be fitted increasingly into the scheme of development visualised for the economy as a whole, for it is only thus that the process of mobilising savings and utilising them to the best advantage becomes socially purposeful.

To enable the banking industry for bringing about a structural and functional transformation, major portion of it was nationalised. In 1955, the largest commercial bank, the Imperial Bank of India, was brought under the major ownership of the Reserve Bank of India. In 1969, fourteen major banks were nationalised and six more banks were nationalised in 1980. Besides this, since 1975, nearly 200 Regional Rural Banks have been set-up under the joint ownership of the Central Government, concerned State Governments and banks in the public sector for specially catering to the needs of the weaker sections of the society.

1.1 Rationale

In the post-nationalisation period, the industry has achieved complete transformation from commercial to social banking and from class to mass banking. The banking industry in India has registered phenomenal growth, perhaps, having few parallels in the world history of banking.

The number of bank offices increased from 8262 in June 1969 to around 57,000 in March 1989. The share of rural branches rose from 22 percent in the same period to 56.55 per cent. The size of population served per bank office improved from 65,000 in 1969 to 12,000 in 1989. The deposits with the commercial banks have increased as a percentage of National Income from 15 per cent in June 1969 to 49 per cent in June 1989. The share of priority sector advances to total credit of public sector banks has risen from 15 per cent in June 1969 to 45 per cent in December 1988.

However, these achievements have cast a dark shadow on the profitability and efficiency of banks, as highlighted by the then RBI Governor R.N. Malhotra (1989). To quote him - "it has brought about noticeable stresses and strains on the effective and efficient working of the system". The annual (compound) growth rate of total operating expenses (20 per cent) was far more than the annual growth rates of total assets (10 percent), total credit (16.9 per cent) and total deposits (17.6 percent), during 1970-86 period. One-fourth of the total number of bank offices were making losses, out of which eighteen per cent were rural bank offices.

What has gone wrong with the Indian Banking Industry ? Is this due to too many controls and regulations on the industry by the banking regulatory authority ? In this context, a brief discussion on the controls and regulations becomes necessary. The arguments in favour of regulation of commercial banking are five-fold. Firstly, the banking industry serves as a channel through which stabilisation policy is transmitted to the economy at large. Regulation promotes stabilisation and assures continued usefulness of the banking system as a tool for implementing the monetary policy. Secondly, the banking industry as an instrument of economic planning for achieving the national objectives of increased production, employment and social justice needs close monitoring by the State and the Central Governments. Thirdly, an unregulated banking industry often leads to unfair competition among banks, which results into excessive speculations, over-banking, and concentration of control over the system in the hands of a few private houses, who use the system for promoting their own interests. Regulation is needed for protecting public interest against these alleged consequences of total freedom. Fourthly, regulations help in preventing bank failures, which have disastrous impact on the economy. Finally, regulation seeks to achieve an optimal ordering of the banking system, that will foster managerial and technological efficiencies and allocative justice. The optimal banking structure is characterised by maximum productive efficiency.

The Indian Banking Industry is a highly regulated industry. The main forms of regulation are : licensing system for opening

branches, administered interest rate structure for deposits and credits, ratios for lending to the priority sectors, rural and backward areas, and preferred classes of the society. Further, large portion of deposits are pre-empted by the state through the cash reserve ratio (CRR) and the statutory liquidity ratio (SLR). What is most important to note here, is that state regulation always increases operating costs for the banking industry. Hence, the controls require to be examined from the angle of cost, both to the state and to the banks. Further, regulation also leads to inefficiencies in the banking industry. The future of banking industry rests on the success we can achieve in the trade-off between promoting the viability and efficiency of banks and their role as catalysts of economic development and social changes.

1.2 Main Theme

The concept of efficiency is a central theme of economic science and economic policy. The theory of economies of scale highlights a major part of this central theme.

The economic theory of firm suggests the relationship between the size of the business and the efficient working of a firm. The theory argues that in the beginning, some factors of production are under-utilised and as the scale of operation increases, their efficient use (productivity) also increases and then a point of their optimum use is reached. Any further expansion beyond this results in an inefficient use of these factors of production. Behind this relationship operates the economic laws of variable

returns (short-run) and returns to scale (long-run). This relationship between the size of the business (or scale of operation) and efficiency is explained by the theory of economies of scale.

However, in view of the mass banking philosophy and social objectives imposed on the commercial banking in India, the econometric models used in developing countries, for examining economies of scale and efficiency in banks, can not be used in the same format.

There are very few studies on economies of scale in Indian banking industry. Rangaragan and Mampilly made the first attempt in 1972. They established relationship between operating expenses (net of interest costs) and total deposits. The other explanatory variables were ratios of composition of deposits (output-mix), number of branches and salary ratio. The quadratic functional form was used to estimate the relationship. The cross-section data of the top 30 banks for the years 1967 and 1968 was provided by the Banking Commission. The deposit size of sample banks varied from Rs. 11 crores to Rs. 830 crores. They first tried to introduce all the bank activities separately but did not get satisfactory results. Hence, total deposits was selected as a proxy for total output. They estimated the least-cost bank to have deposit size of Rs. 300 crores. The limitations of this study were : total deposits was not an appropriate measure of total output and instead of three, two deposit ratios (types of deposits to total deposits) could have been used for taking advantage of the increased degrees of freedom.

In another study of economies of scale in Indian banking, by the Study Group on Banking Costs (1972), a weighted composite index of output and Cobb-Douglas functional form were used. The study concluded that there was indefinite scope for expansion of the output as elasticity coefficients were less than one. Though, the output measure was superior than that of the previous study, it could be used only with accessibility to detailed data at the branch level.

The third study (Banks Since Nationalisation, 1981) was carried out by the Economic Research Division of Birla Institute of Scientific Research, New Delhi. Three different measures of output were taken, viz. total income, total deposits and working funds. It was a cross-section study of three bank groups-14 nationalised banks, 13 selected private sector banks and both groups combined together with the State Bank of India group. The Cobb-Douglas functional form was used. The empirical results suggested that irrespective of the output measure, there were no significant economies or diseconomies of scale for any of the years except for the combined group, where there were significant economies of scale. Thus, it was recommended that there is scope for the smaller banks to grow atleast till they reached the size of the larger banks, without affecting the cost efficiency adversely.

We have not come across any study having a profit function approach for examining the economies of scale in banking industry in India.

1.3 Objectives

This study presents an empirical analysis at both, the system and bank level, to throw light on policy implications for expansion programme in future, in terms of branch network and volume of business, based on cost function and profit function approaches.

The specific objectives of this study are :-

1. To develop cost and profit models for the banking industry, bank groups and banks in India.
2. To empirically examine the economies/diseconomies of scale on the basis of cost and profit models developed.
3. To compare the elasticity results derived from cost function and profit function approaches.
4. To find out the sensitivity of various output (size) variables to cost elasticity results.

1.4 Methodology

The method adopted in this study is of estimating the cost function and profit function from time-series and cross-section data of Indian banks using Ordinary Least Square (OLS) method and other statistical techniques.

1.4.1 Cost Function Approach to the Economies of Scale

The cost function used in the study is :

$$C = f(Q, Q_m, TB, RB)$$

where

C = Cost

Q = Output

Q_m = Output mix ($m=1,2,\dots,n$)

TB = Total number of branches

RB = Ratio of rural branches to total branches

Cost (C)

The cost is defined as total operating expenses net of interest cost. The inclusion of interest costs results in the elimination of much reduced operating cost scale economies.

Two major cost components viz., labour cost and other current expenses (rent, stationary, printing, advertising) have also been estimated separately to investigate the source of economies/diseconomies of scale.

Output (Q)

The definition of output of commercial banks continues to be a controversial subject, in particular, because of its importance in the estimation of economies of scale. No general consensus seems to have arisen on an appropriate definition. This lack of consensus is reflected in the diversity of measures of output employed in the economies of scale literature.

We have identified five different measures of output used in different studies, with a dual objective-to select the best measure on the basis of statistical inferences and to find out the sensitivity of each output measure to the economies of scale.

The five output measures used in the study are :

- 1) Volume of Business [VB]
- 2) Total Assets [TA]
- 3) Earning Assets [EA]
- 4) Total Deposits [TD]
- 5) Total Operating Earnings [TOE]

Output-mix (Qm)

Output-mix relates to the output measure used in the model. Banks with identical output can have different costs, if the output-mix is different. It is essential in cost-output relationship, to be sure, that the output-mix (or composition of output) has remained constant over time and across banks. Hence, the output-mix ratios are used to net out the effects of changes in output-mix on costs.

Output-mix variables are calculated as the percentage (%) share of output components to respective total output.

Total Number of Branches (TB)

This variable is included in the model on the hypothesis that an increase in number of bank branches leads to an increase in costs. More importantly, this variable is used to find out the branch economies.

Ratio of Rural Branches to Total Branches (RB)

In India, in the post-nationalisation period, with rapid branch expansion in hitherto neglected rural areas, with a share of more than 60 % of total branches in these areas, the profitability and cost efficiency has gone down to a great extent. To find out the net impact of this rapid rural branch expansion on operating cost, this variable is included in the model. It is hypothesized here that there is a positive relationship between a change in this variable and corresponding change in the costs.

Functional Form

Economic theory suggests the likely shape of the cost curves. Traditionally, this is supposed to be a total cost curve rising and convex from below (output-axis), and U-shaped average cost and marginal cost curves. However, lately, there is evidence of a linear total cost curve, a horizontal marginal cost curve and L-shaped average cost curve. Hence, there is no conclusive evidence about the nature of the cost-output relationship from past research. In fact, there are four different forms of cost-output relationship : cubic, quadratic, linear and double log (Cobb-Douglas). A cubic functional form gives U-shaped AC and MC curves, a quadratic cost function gives a U-shaped AC and monotonously rising MC curves, a linear form implies a constant MC and an L-shaped AC curves, a double-log functional form results in a constant, falling or rising AC and MC curves with a constant elasticity. All these results depend upon the 'a priori' signs of the coefficients.

Using the time-series and cross-section data both, we estimated all the four forms of various cost functions. Finally, the best-fit equation for each output measure and for each bank has been chosen on the basis of both, economic theory and statistical inference.

Economies of Scale

Economies of Scale (SCE) could be defined in terms of output elasticity of cost ($\epsilon_{l.TC,Q}$).

$$SCE = e1.TC,Q = (\partial TC / \partial Q) \times (Q/C)$$

Where TC is continuous function

if

$e1.TC,Q > 1$; there are diseconomies of scale

$e1.TC,Q < 1$; there are economies of scale

$e1.TC,Q = 1$; neither economies nor diseconomies of scale

Branch Economies (SCB) is the branch elasticity of cost ($e1.TC,TB$) and is calculated as -

$$SCB = e1.TC,TB = (\partial TC / \partial TB) \times (TB/TC)$$

Cubic, quadratic and linear cost functional forms allow these elasticities to vary with the size of the bank.

1.4.2 Profit Function Approach to the Economies of Scale

Donald J. Molineaux (1978) was the first to use profit function for estimating economies of scale in American banking. His study was inspired by the theoretical foundations developed by McFadden (1966) and Lau (1969), who developed the theory of profit function for competitive and non-competitive firms and examined its relationship with the production function. The profit function incorporates both, technical and price efficiencies and we can avoid the difficulties involved with the output definition as usually faced in the cost function approach.

By definition, profit function explains the maximised profit for a firm in competitive situations as a function of prices of output, variable factor inputs and quantities of the fixed factors (capacity variables) of production.

The profit function estimated for both time-series and cross-sectional data is :

$$p = f (P_i, Q_j, Z_k, R_l, S_m)$$

where

p = Current operating revenue less of variable cost
 P_i = Input prices ($i, 1, 2, \dots, n$)
 Q_j = Output prices ($j, 1, 2, \dots, n$)
 Z_k = Fixed factors of production, ($k = 1, 2, \dots, n$)
 R_l = Risk factors ($l=1, 2, \dots, n$)
 S_m = Social banking factors ($m = 1, 2, \dots, n$)

The detailed description of the variables used is given below:

Input Prices (P_i ; $i = 1, 2, 3$)

Inputs are defined in terms of the factors that cause a bank to incur the cost. The input prices are calculated as follows :

Inputs (in Rs.)	Cost of Inputs (in Rs.)	Input Prices (in Rs.)
B1 = Total Dep.-Current	b1 = Int. Paid on B1	$P_1 = b_1/B_1$
B2 = Borrowings	b2 = Int. Paid on B2	$P_2 = b_2/B_2$
B3 = No. of Employees	b3 = Amt. Paid on B3	$P_3 = b_3/B_3$

Output Prices (Q_j ; $j=1, 2, 3$)

Output (in Rs.)	Income from Output (in Rs.)	Output Prices (in Rs.)
A1 = Investment	a1 = Int. Earning From A1	$Q_1 = a_1/A_1$
A2 = Loans/Advances	a2 = Int. Earning From A2	$Q_2 = a_2/A_2$
A3 = Bills Pur./Disc.	a3 = Int. Earning From A3	$Q_3 = a_3/A_3$

Fixed Factors of Production (Z_k ; $k=1, 2, 3$)

Z_1 = Total Number of Branches
 Z_2 = Fixed assets per branch
 Z_3 = Total deposits per branch

Risk Variables ($R_1; 1 = 1,2,3$)

- R1 = Ratio of total credit to total assets
- R2 = Ratio of total borrowed funds to total liabilities
- R3 = Ratio of equity capital to total assets

Social Banking Factors ($S_m; m = 1,2$)

- S1 = Ratio of rural branches to total branches
- S2 = Ratio of priority sector advances to total credit

Functional Form

We have used double-log (Cobb-Douglas) functional form to estimate the economies of scale, which gives constant elasticity for the whole data.

Economies of Scale

The elasticities of profit function with respect to fixed factors of production show the degree of returns to scale.

if

$$\sum_{k=1}^2 E Z_k = 1; \text{ there are neither economies nor diseconomies of scale}$$

$$\sum_{k=1}^2 E Z_k < 1; \text{ there are diseconomies of scale}$$

$$\sum_{k=1}^2 E Z_k > 1; \text{ there are economies of scale}$$

Where, Z_k ($k = 1,2$) are the elasticities of profit function with respect to fixed factors of production.

1.4.3 Sample Design and Data Source

For the time-series analysis, data has been collected for the following groups of banks.

- a. State Bank of India Group
- b. Nationalised Banks
- c. Pvt. Sector Indian Banks
- d. All Commercial Banks

All the data for time-series analysis for both, cost function and profit function, have been collected from the RBI annual publication, "The Statistical Tables Relating to Banks in India".

We collected data for the post-nationalisation period i.e., 1970-86. The latest issue available of Statistical Tables Relating to Banks in India is 1986.

For cross-sectional analysis, data is drawn for 28 public sector banks for three years viz., 1985, 1986, and 1987. For the analysis, the average of these years has been used for both, cost function as well as profit function. The data is collected from Indian Banks Association (IBA) publication, "The Financial Analysis of Banks", Vol.I and II for the relevant years.

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APPENDIX I to VII

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