CHAPTER 6

ECONOMETRIC RESULTS OF COST FUNCTIONS : CROSS-SECTIONAL ANALYSIS

The cross-section data was drawn for 28 public sector banks for three years, viz. 1985, 1986 and 1987. For the analysis, the average of these years was used.

The dependent variable, cost, is defined as total current expenses (TCE) net of interest expenses. Two components of TCE namely, the establishment (labour) expenses and other current (non-labour) expenses have also been used as dependent variables to investigate the sources of economies of scale results.

Six different alternative output measures have been used. These are:

i) Volume of Business (VB)
ii) Total Assets (TA)
iii) Earning Assets (EA)
iv) Total Deposits (TD)
v) Total Operating Earnings (TOE)
vi) Total Number of Branches (TB)

Out of these six output variables, first five are in monetary (Rs.) terms and the last one is in physical (number of branches) term and has been used to find out the branch economies and diseconomies in banking.

Like the time series analysis, we have estimated four forms of the cost functions viz., cubic, quadratic, linear and double-log for each cost variable and for each of six output variables.The

best-fit empirical results (estimated cost equations) selected for all the types of costs and outputs are given in Appendix V, Table No. 1 to 6.

The estimated cost equations are discussed in detail below and then the cost elasticities have been derived at.

6.1 The Analysis of Cost Equations

6.1.1 Dependent Variable : Total Current Expenses (TCE)

1. Out of the total six cost equations selected for six output variables, five equations are cubic, and one equation is quadratic in functional form. The quadratic cost equation is for the TB output variable.

2. $\bar{R}^2$ (0.98) is maximum in the cost equation with TA as output variable.

3. There are only two cost equations which list output-mix variables. These output mix variables are for cost equations with TA and TOE output variables. The output-mix variables with signs of their coefficients are as follows:

Positive	Negative
COMM/TOE	FA/TA
	OA/TA

4. None of the estimated cost equations include TB and RB variables.

6.1.2 Dependent Variable: Establishment Expenses (EC)

1. Out of the total six cost equations, five are cubic and one is quadratic in functional form.

2. The maximum $\bar{R}^2$ (0.996) is found to be in the cost equations with VB and TD as output varibles.

3. The output-mix variables are found to be listed significantly in only three cost equations, viz. cost equations with VB, TOE and TB as output variables with the following signs of their coefficients :

Positive	Negative
BORR./VB	RB/TB
COMM/TOE	SU/TB
	U/TB

4. Except in the case of the cost equation with TA as output variable, all other cost equations have listed TB variable with 'a priori' positive signs of the coefficients. This finding suggests that there are branch diseconomies existing in the case of labour cost in public sector banks.

6.1.3 Dependent Variable : Other Current (Non-labour) Expenses (OC)

1. Except for the cost equation with TB as output variable, which is quadratic in output, all other cost equations are in cubic functional form.

2. The maximum $\bar{R}^2$ (0.992) is for cost equation with VB as output variable.

3. None of the non-labour cost equations list output-mix variables.

4. The ratio of rural branches to total number of branches (RB) has emerged as an important independent variable, listed in five equations. The coefficients of this variable are with negative signs implying thereby that an increase in RB is non-labour cost advantageous.

6.1.4 Conclusions

1) The estimated cost equations with all the cost components and output variables are found to be statistically very significant with high values of R^2 and $\bar{R}^2$.

2) Fifteen out of total eighteen cost equations are cubic in functional form.

3) Total Asset (TA) has turned out to be the best output variable for the Indian Banking Industry.

4) Output-mix variable included in the cost functions are found to be not having significant influence over either of the cost components.

5) In the case of labour cost, total number of branches (TB) is listed in all the cost equations with positive signs of its coefficients, implying thereby that the branch expansion leads to increasing wage bills.

6) Cost equations with non-labour cost as a dependent variable have listed the independent variable, the ratio of rural branches to total branches (RB) with negative sign. This finding indicates the economical use of non-labour cost in the rural branches.

6.2 The Elasticity Results

The output elasticities of different types of costs have been calculated in the way as discussed earlier in the time-series analysis. Further, banks having elasticities below one are enjoying economies of scale, those with above one are suffering from economies of scale and those having around one ($\pm$ 0.5) have reached the optimum size both,in respect of output and branches.

The sample of the cross-section analysis consists of 28' public sector banks and elasticities have been calculated for all the individual sample banks. The elasticities for various types of costs and output have been shown in Appendix VI,Table Numbers 7 to 9.

The results on cost elasticities of various outputs are found to be sensitive to the output measures used in the cross - sectional analysis, unlike time-series analysis. On the basis of elasticity results, five monetary based output variables can be divided into two sets. The first set, consisting of three output variables, namely TA, EA and TOE giving more or less similar elasticities. Another set of output includes VB and TD, having

similar elasticities but different from the former set. The cost elasticity with respect to total number of branches (TB) is totallly different from these two sets of elasticities. In such case, for policy inference, the following two criteria can be used :

1. Selection of the best-fit cost/output equation on the basis of statistical inferences and cost elasticity of that particular output variable. In the cross-sectional analysis, as discussed earlier, total asset (TA) turns out to be best output measure on the basis of statistical inference and the hypothesised theoretical preference.

2. Using the surrogative measure i.e. simple average of the five elassticities.

To make the policy inferences more significant, the values of elasticities from these two criteria have turned out to be very similar. Hence, for policy measures, any of these two elasticities can be used. For this analysis we have chosen the surrogative measure of elasticity for policy inference.

Further, the error term turned out to be rather large for four banks, namely PNB, BARODA, CNTRL, and CANRA, when EA was used as output variable and for four banks, namely INDIN, PNB, CNTRL, and CANRA, when TOE was used as output variable. These banks with larger error terms are termed as out-liers in regression analysis and in order to miligate their consequences on elasticities, the corresponding elasticities have been ignored in the analysis.

The results of surrogative measure of elasticity and cost elasticity of branch have been presented here with the cost component elasticity results for all the twenty eight public sector banks. These elasticity results are presented separately for three bank groups: (A) banks having economies of scale (B) banks having diseconomies of scale and (C) banks operating at the optimum level, in Table No. 1, 2, and 3 respectively. The elasticity results and findings are given below :

6.2.1 Banks Having Economies of Scale

Table No. 1
Elasticity Results of Banks Having Scale Economies

BANKS	Surrogative el. of			Total Branch el. of		
	TCE	EC	OC	TCE	EC	OC
CANRA	0.42	0.59	0.53	0.82	0.96	0.81
PNB	0.44	0.62	0.61	1,24	1.37	1.31
CNTRL	0.45	0.54	0.72	1.32	1.36	1.68
INDIA	0.46	0.64	0.79	0.89	0.96	1.20
SYNDI	0.48	0.57	0.65	0.72	0.87	0.80
BRODA	0.50	0.55	0.67	0.94	1.04	1.15
UCO	0.62	0.57	0.92	1.12	1.22	1.54
UNION	0.69	0.50	0.87	1.16	1.30	1.48
IOB	0.75	0.65	0.89	0.73	0.91	0.83
UNITED	0.87	0.59	1.24	0.86	1.00	1.25
INDIAN	0.92	0.64	0.79	0.91	1.12	1.09

Findings and Policy Implications

1. Eleven out of 28 public sector banks are enjoying economies of scale. All of them belonged to the nationalised bank group.These banks are advised to strive for expansion of the volume of business.

2. Both the cost components of total cost viz., labour and non-labour costs are also showing the economies of scale (except for UNITED) as indicated by the output elasticities of labour and non-labour costs. These elasticities are significantly less than unity.

3. Though, all these eleven nationalised banks are reaping the fruits of conomies of scale, four of them, mentioned below, are suffering from branch diseconomies.

i) PNB
ii) CNTRL
iii) UCO
iv) UNION

The above four banks would be better-off by increasing the turnover of their existing branches. The policy implication is that the average size per branch should be increased. Further, both the cost components of total cost are showing branch diseconomies but, scale economies. Hence, their policies should be tuned for increasing the output and reducing the branch network with the utlimate objective of optimizing the cost allocation.

4. Remaining seven banks, listed below, are enjoying both, scale as well as branch economies, though, very marginal.

i) CANRA
ii) INDIA
iii) SYNDI
iv) BRODA
v) IOB
vi) UNITED
vii) INDIAN

These banks are ideal for launching all out programs for expansion, both in terms of branches and business turnover. Hence, they should be chosen for granting new branch opening licenses by the Reserve Bank of India whereever possible.

6.2.2 Banks Having Diseconomies of Scale

Table No. 2
Elasticity Results of Banks Experiencing Diseconomies of Scale

BANKS	Surrogative el. of			Total Branch el. of		
	TCE	EC	OC	TCE	EC	OC
SBI	4.17	2.03	2.80	1.61	1.47	1.52
PATLA	1.40	0.86	1.36	0.82	1.09	1.07
TRVCR	1.16	0.67	1.16	0.62	1.09	1.67
INDOR	1.13	0.63	1.04	0.62	0.85	0.85
ALLAHA	1.08	0.69	1.33	1.52	1.12	2.13
MAHA	1.09	0.65	1.51	1.11	1.26	1.83
PN&SB	1.09	0.64	1.05	0.77	1.00	1.01
NEWBK	1.12	0.61	1.31	0.75	0.92	1.21
CORPN	1.15	0.70	0.98	0.69	0.97	0.83
ORNTL	1.15	0.74	0.95	0.71	1.02	0.79
ANDRA	1.21	0.77	1.21	1.06	1.35	1.32

Findings and Policy Implications

1. Diseconomies of scale are found in eleven public sector banks, given in Table No. 2. It is recommended that they follow a policy of consolidation of business, emphasising on improved quality of lending, deposit mobilisation etc.

2. The source of diseconomies of scale in all these banks is major cost component, the non-labour cost. The labour

cost is showing economies of scale in all the banks except SBI. This implies that these banks should economise on non-labour expenses in future, where as SBI needs to economise both, on the labour and non-labour components of cost.

3. Seven, out of a total of eleven banks with diseconomies of scale, are enjoying branch economies. These banks are-

i) PATLA
ii) TRVCR
iii) INDOR
iv) PN & SB
v) NEW BK
vi) CORPN
vii) ORNTL

These banks need to contract their total output and expand the number of branches. The branch expansion needs to be planned in a manner so as to transfer business from some of the very big branches to the newly opened branches.

4. Four banks, given below, are suffering from both, the diseconomies of scale and branches:

i) SBI
ii) ALLAHA
iii) MAHA
iv) ANDRA

These banks are too large in terms of both, output and branch network. To economise on costs, they need to embark on a consolidation program. Two or three branches situated in a compact business area scould be merged into one. New business need to be accepted very selectively after overall scrutiny.

6.2.3 Banks Operating at the Optimum

Table No. 3
Elasticity Results of Banks with Output Optimality

BANKS	Surrogative el. of			Total Branch el. of		
	TCE	EC	OC	TCE	EC	OC
BK&JP	0.98	0.56	1.15	0.75	0.92	1.18
HYDER	1.03	0.59	1.09	0.81	1.02	1.17
MYSOR	1.03	0.56	1.07	0.72	0.93	1.08
SRSTR	1.05	0.55	1.27	0.56	0.72	0.97
VIJYA	1.04	0.61	1.05	0.86	1.10	1.17
DENA	1.00	0.58	1.36	0.86	1.07	1.78

Findings and Policy Implications

1. Only six banks, out of 28 public sector banks, are operating at the optimum capacity.

2. These banks (except DENA) are having branch economies. Hence, to gain further on cost efficiency, they should increase their branch network and transfer some business from heavily loaded branches to the newly opened ones. Dena Bank is suffering from very marginal branch diseconomies.

3. These banks with optimum size are found to be enjoying economies of scale in labour cost and diseconomies of scale in non-labour cost. Hence,these banks need to control the inefficient use of non-labour factors for bringing about reduction in non-labour cost.

6.3 Overall Findings

1. Out of the total 28 public sector banks,eleven banks have economies of scale and the same number of banks have diseconomies of scale and the remaining six banks have reached the optimality point.

2. All the public sector banks (except SBI) are enjoying economies of scale in labour cost. But, majority of the banks are suffering from diseconomies of scale in non-labour cost. SBI which is the biggest bank and the oldest one also, has diseconomies of scale in labour cost, non-labour cost as well as in overall cost.

3. As many as nine public sector banks are suffering from branch diseconomies.