CHAPTER - IV.

THE PROBLEM OF EXCESS CAPACITY IN WEST BENGAL

— A STUDY OF PRODUCTION FUNCTION AND

AVERAGE PRODUCTIVITY.

CHAPTER - IV.

THE PROBLEM OF EXCESS CAPACITY IN WEST BENGAL — A STUDY OF PRODUCTION FUNCTION AND AVERAGE PRODUCTIVITY.

4.0: Operating an industrial enterprise on full capacity aspires after theoretical phenomenon and practically what the operation does, is a draw-back from the ideal capacity. So, every industrial enterprise is subject to bear more or less excess capacity apart from actual capacity. In the imperfectly competitive market the practice of a general unit is to use capacity at certain level beyond that there lies an excess capacity. As for an entrepreneur degree of monopoly rises the use of this lying capacity becomes volitional, based on the principle that letting demand condition on market the determination of output and price are relative. Excess capacity works as a barrier to entry in an industry and frustrates the growth of new units in the industry.(1) Pashigian briefly alludes to the possibility that excess capacity may be used by established firms to

forestall entry by threatening to lower price and use such excess capacity to increase output if an entrant should appear.(2)

4.1: Returns to Scale and Productivity as a Measure of Excess Capacity.

In our assignment we are interested to identify the regional variation of excess capacity in the same industry group rather than the estimation of excess capacity in an industry or industrial unit. Here we call excess capacity in terms of 'Poor Performance'. As earlier we had mentioned that operating an industrial enterprise considerably below capacity — one or two shifts when three would be more economic or without great concern for cost control or efficiency or without any concern regarding average productivity of labour — is an evidence of excess capacity. There is a vast difference between this kind of operation and full capacity production at high efficiency. Usually it amounts to the difference between substantial losses and high profits. We deserve that a greater excess capacity in an industry of a region compate to that of another is observed when a higher returns to scale is accompanied with a lower average product.(3) For this we use the production function parameters e.g., returns to scale and technical efficiency to identify the problem of excess capacity of a plant or an industry.

4.2: Studies or Returns to Scale:

In earlier works more often, the Cobb-Douglas production function[4] had become handy for testing the economies of scale. Through this function Dutta[5] (1955) found evidence in favour of constant returns to scale for Indian Manufacturing on the basis of cross section data for 1946-47. Murti and Sastry (1957)[6] estimated Cobb-Douglas production function with cross section data for the industrial sector as a whole, as well as for the same groups of industries for the years 1951 and 1952. Data used was of 320 firms of 28 manufacturing industries. The hypothesis is that the sum of elasticities of output with respect to labour and capital might differ from unity was rejected, indicating constant returns to scale at 0.01 level of significance for each industry group, except for Jute Textiles. Production function estimated for total industry indicated the constant returns to scale as the sum of two elasticities was not statistically different from unity.

Dutta Majumder (1966)[7] arrived at the constant returns to scale of industry, on the basis of a time series study for the period 1951 to 1961. Aggregate study of Dadi and Hashim (1971)[8] also found evidence of constant returns to scale in Indian industries. Narasimham and Fabracy (1974)[9] gave estimates of returns to scale for 28 Indian industries for the period 1946 to 1958 and showed constant returns to scale in all 28 Indian industries individually and together.

Many studies had brought out increasing returns to scale. Yeong Her Yeh (1966)[10] used different specifications of Cobb-Douglas production function and showed that Indian industries to-gether enjoyed large economies of scale. His study covered the period, 1953-58 and inferred increasing returns to scale. Diwan (1967)[11] also producedsupporting evidence of increasing returns to scale for 1953-58. Banerjee (1971)[12] in his study of Indian industries together for the period, 1946-1958 observed the evidence of increasing returns to scale in estimation of Cobb-Douglas production function. The estimation of returns to scale for 28 individual industries by Narasimham and Fabracy (1974) also showed considerable variation between different industries. Subramaniyan (1980)[13] conducted an interstate production. function study for Indian Sugar Industry and found evidence of increasing returns to scale in all India and Tamil Nadu and constant returns to scale in Bihar, Maharastra, Uttar Pradesh & Andhra Pradesh on the basis of estimation of Cobb-Douglas production function for 1953 to 1969. But main defect of Cobb-Douglas estimation is that it assumes elasticity of substitution as unity and perfect competition in input and output market.

The Constant Elasticity of Substitution (C.E.S.) production function brought a new type of estimation for knowing about productive efficiency. Arrow, Chenery, Minhas and Solow show the use of CES in making international comparison.

of productivity efficiency.[14] Several works have been done on estimation of CES for Indian Industries. Diwan and Gujarati (1968),[15] by CES, found the high economies of scale dufing the period 1964-1968. Sankar (1970)[16] also found evidence of economies of scale on estimating the CES for 15 industries together covering the period 1953-1958. Similarly increasing returns to scale was observed by Sakong and Narasimham (1974).

This survey on production function studies of Indian industries is taken up in details because we are interested to provide a specific guideline for our research studies. Since the original form of CES production function carries some defects as to estimate returns to scale and restrictive assumption of perfect competition, we take the superior K'menta approximation of CES production function[17] needfuly in our estimation.

4.3: The M K'menta Approximation:

J. K'menta suggests an approximation to the CES production function in slightly different form as :

$$V = Ae^{u}\left[(1-\delta)K^{-\rho} + \delta L^{-\rho}\right]^{-\frac{R}{\rho}} \quad \ldots\ldots \quad (4.1)$$

Where,

V = Value added,

A = role of technical parameters,

ρ = substitution parameter,

$$\rho \geq -1$$

δ = distribution parameter

$0 \leq \delta \leq 1$.

R = Returns to scale.

L = Labour

K = Capital.

e^u = Stocastic term.

Now,

$$V = \left[L^{-\rho} (1 - \delta) \left(\frac{K}{L}\right)^{-\rho} + \delta \right]^{-\frac{R}{\rho}}$$

$$= A \cdot L^{-\rho \cdot \frac{R}{\rho}} \left[(1 - \delta) \left(\frac{K}{L}\right)^{-\rho} + \delta \right]^{-\frac{R}{\rho}}$$

$$= AL^R \left[\; \right]^{-\frac{R}{\rho}}$$

$$\text{or,} \quad \frac{V}{L} = AL^{R-1} \left[\; \right]^{-\frac{R}{\rho}}$$

and taking logarithims, gives

$$\log \left(\frac{V}{L}\right) = \log A + (R-1) \log L - \frac{R}{\rho} \log \left[(1 - \delta) \left(\frac{K}{L}\right)^{-\rho} + \delta \right]$$

$$\text{or,} \quad \log \left(\frac{V}{L}\right) = \log A + (R-1) \log L - \frac{R}{\rho} \cdot f(\rho)$$

where,

$$f(\rho) = \log \left[(1 - \delta) \left(\frac{K}{L}\right)^{-\rho} + \delta \right]$$

The expression $f(\rho)$ can be approximated by the use of Taylor's expansion,

$$f(\rho) = f(0) + \rho f'(0) + \frac{\rho^2}{2!} f''(0) + \ldots\ldots$$

In the above form

$$f(\rho) = \log \left[(1 - \delta) \left(\frac{K}{L}\right)^{-\rho} + \delta \right]$$

$$f(0) = \log \left[1 - \delta + \delta \right] = \log 1 = 0$$

$$f'(\rho) = \frac{1 \times (1 - \delta) \left(\frac{K}{L}\right)^{-\rho} \cdot \log \left(\frac{K}{L}\right) \times (-1)}{(1 - \delta) \left(\frac{K}{L}\right)^{-\rho} + \delta}$$

$$\text{or, } f'(0) = \frac{-(1 - \delta) \log \left(\frac{K}{L}\right)}{1 - \delta + \delta}$$

$$= -(1 - \delta) \log \left(\frac{K}{L}\right).$$

Now,

$$f'(\rho) = \frac{-(1 - \delta) \left(\frac{K}{L}\right)^{-\rho} \cdot \log \left(\frac{K}{L}\right)}{\delta + (1 - \delta) \left(\frac{K}{L}\right)^{-\rho}}$$

[Since for a^x we have $a^x \log a$]

$$= \frac{\dfrac{-(1-\delta)\log\left(\frac{K}{L}\right)}{\left(\frac{K}{L}\right)^{\rho}}}{\delta + \dfrac{(1-\delta)}{\left(\frac{K}{L}\right)^{\rho}}}$$

$$= \frac{-(1-\delta)\log\left(\frac{K}{L}\right)}{\delta\left(\frac{K}{L}\right)^{\rho} + (1-\delta)}$$

$$= \frac{-(1-\delta)\log\left(\frac{K}{L}\right)}{\delta\left(\frac{K}{L}\right)^{\rho} + (1-\delta)}$$

$$= -(1-\delta)\log\left(\frac{K}{L}\right) \cdot \frac{1}{\delta\left(\frac{K}{L}\right)^{\rho} + (1-\delta)}$$

$$f''(\rho) = -(1-\delta)\log\left(\frac{K}{L}\right) \cdot \frac{\left[\delta\left(\frac{K}{L}\right)^{\rho} + (1-\delta)\right] \times 0 - 1 \cdot \delta\left(\frac{K}{L}\right)^{\rho} \cdot \log\left(\frac{K}{L}\right)}{\left[\delta\left(\frac{K}{L}\right)^{\rho} + (1-\delta)\right]^{2}}$$

$$f''(o) = \frac{\delta(1-\delta)\left[\log\left(\frac{K}{L}\right)\right]^{2}}{\left[\delta + (1-\delta)\right]^{2}}$$

$$= \delta(1-\delta)\left[\log\left(\frac{K}{L}\right)\right]^{2}$$

Since, $\log \left(\frac{V}{L}\right) = \log A + (R - 1) \log L - \frac{R}{\rho} f(\rho)$.

The expression made to

$$\log A + (R - 1)\log L - \frac{R}{\rho}\left[f(0) + \rho f'(0) + \frac{\rho^2}{2!} f''(0)\right]$$

$$= \log A + (R - 1) \log L - \frac{R}{\rho}\left[0 - \rho(1 - \delta) \log \left(K/L\right)\right.$$

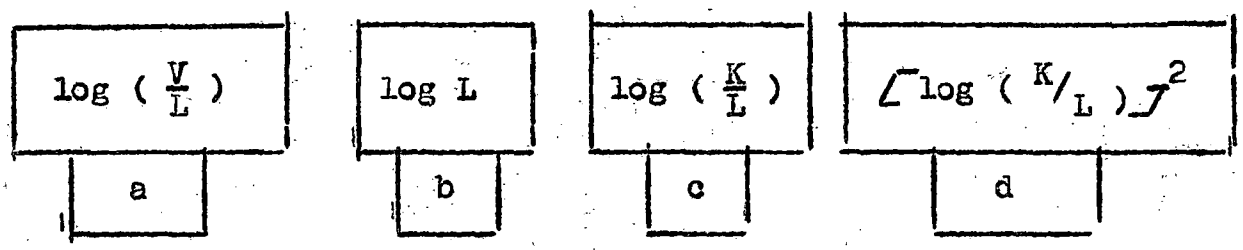
$$\left. + \frac{\rho^2}{2} \cdot \delta (1 - \delta) \{\log \cdot \left(\frac{K}{L}\right)\}^2\right]$$

Hence,

$$\log\left(\frac{V}{L}\right) = \log A + (R-1) \log L + R(1 - \delta) \log\left(\frac{K}{L}\right) - \frac{R \rho \delta (1 - \delta)}{2}$$

$$\left[\log \left(\frac{K}{L}\right)\right]^2 \quad \ldots\ldots \quad 4.2$$

It is linear expression of the production function. Thus, nonlinear production function turns into linear production function. If we have the informations about V, L and K we find the following:



Now, if we regress $\log(\frac{V}{L})$ on log (L), log $(\frac{K}{L})$ and $\left[\log(\frac{K}{L})\right]^2$, we find the equation 4.2 . This procedure will help to find all the parameters of function. The advantage of this estimation is that without the assumption of perfect competition parameters are determined and henceforward the returns to scale. If the function is Cobb-Douglas then the estimated co-efficient of $\left[\log (\frac{K}{L})\right]^2$ should not be significantly different from Zero. If this co-efficient is significantly different from Zero the Cobb-Douglas form is rejected. But since the approximation to the CES required ρ to be close to zero the approximation is valid.

4.4 : The Empirical Evidence of Returns to Scale.

We study this estimation for West Bengal wherein we carry out comparison of excess capacity between North Bengal and South Bengal for the same industry groups. Three groups of industries in Non-census sector have been chosen as sample to catch the whole literature in this respect. We use the data from 1985 - 86 A.S.I. Returns[18] (Non-census) and find the following results:-

(1) K'menta Approximation to the CES for the Industry Group 205 Under North Bengal is,

$$\log\left(\frac{V}{L}\right) = -894.29 + 10.779 \log L + 197.74 \log\left(\frac{K}{L}\right) + 11.100 \left[\log\left(\frac{K}{L}\right)\right]^2$$

S.E (142.51) (2.9817) (33.137) (1.8895)

t (-6.2752) (3.6150) (5.9672) (-5.8744)

$R^2 = 0.9954085$, $F_{3,8} = 72.265$ $d^W = 1.2903$

(Good fitness) (statistically) (A.C. negligible as the data are cross section).

Here log A = - 894.29

Hence A = .1950E-0894

R - 1 = b

R - 1 = 10.779

R = 11.779

Since,

a = -894.29

b = 10.779

c = 197.74

d'= -11.100

Again,

$R(1 - \delta) = c$

or, $11.779 (1 - \delta) = 197.74$

Hence, $\delta = -15.787503$

Since,

$$\frac{R \rho \delta (1 - \delta)}{2} = 11.100 = d'$$

$$\rho = 0.0071112$$

By this the original function is,

$$V = .1950 E - 0894 \left[(1 + 15.787503) K^{-.0071112} - 15.787503 L^{-.0071112} \right]^{-\frac{11.779}{.0071112}}$$

(2) K'menta approximation to the C.E.S. for industry Group 205 under South Bengal is.

$$\log\left(\frac{V}{L}\right) = -1.8253 + 0.5805 \log L + 1.8445 \log \left(K/L\right) + 0.055429 \left[\log \left(K/L\right)\right]^2$$

S.E. (1.4478) (0.3472) (0.5196) (0.035568)

t_{20} (1.2607) (1.6719) (3.5479) (-1.5584)

$R^2 =$ 0.9419189, $F_{3,20} = 108$, $D^W = 1.7387$

By the above procedure the original function is:

$$V = .06688 \left[(1 + 0.1670357)K^{-0.3598152} - 0.1670357\ L^{-0.3598152} \right]^{-\frac{1.5805}{0.3598}}$$

(3) K'menta approximation to the CES for the industry group 353.4 under North Bengal is:

$$\log(V/L) = 5.8713 + 3.1768 \log L - 1.7182 \log(K/L) - 0.038473 \left[\log(K/L)\right]^2$$

S.E (0.9773) (0.9822) (0.5469) (0.054678)

t* (6.0078) (3.2343) (-3.1419) (0.7036)

$R^2 = 0.9630874$, $F_{3,1} = 8.6970$ $d^W = 1.4157$

Here the Original function is:

$$V = 743500 \left[(1 - 1.4113675)K^{-0.031701} + 1.4113675\ L^{-0.03170301} \right]^{-\frac{4.1768}{0.031701}}$$

(4) K'menta approximation to the CES for Industry Group 353.4 under South Bengal is:

$$\log(V/L) = 5.9229 + 0.2367 \log L - 0.7398 \log(K/L) - 0.064307 \left[\log(K/L)\right]^2$$

S.E (1.6524) (0.5785) (0.5033) (0.058486)

t^y (3.5843) (0.4092) (-1.4699) (1.0995)

$R^2 = 0.6054916$ $F_{3,2} = 1.0232$ $D^W = 1.0316$

From the above form the original function is:

$$V = 837300 \left[(1 - 1.5982049)K^{0.1087781} + 1.5982049\, L^{0.1087781} \right]^{\frac{1.2367}{0.10877}}$$

(5) K'menta approximation to the CES for the industry groop 204.1 under North Bengal is:

$$\log(V/L) = 0.3419 - .9926 \log L + 1.3470 \log(K/L) + 0.034313 \left[\log (K/L)\right]^2$$

S.E (9.3449) (0.1180) (3.9835) (0.4261)

t (0.036585) (-8.4153) (0.3382) (-0.080523)

$R^2 = 0.9962918$ $F^*_{3,1} = 89.558$ $d^W = 1.2410$

The original function is :

$$V = 2.198 \left[(1 + 0.8202702) K^{-0.0621103} + 0.8202702 L^{-0.0621103} \right]^{-\frac{0.74}{0.0621103}}$$

(6) K'menta approximation to the CES for the industry group 204.1 under South Bengal is :

$$\log(V/L) = 1.9433 + 0.8578 \log L + 0.2898 \log (K/L) - 0.0016239 \left[\log(K/L) \right]^2$$

S.E. (4.7283) (0.2761) (2.1686) (0.2490)

t^* (0.4110) (3.0844) (0.1337) (0.0065213)

$R^2 = 0.8513485$ $F^*_{3,2} = 3.8181$ $d^W = 1.27$

The original function is:

$$V = 87.76 \left[(1 - 0.8440091) K^{-0.0132783} + 0.8440091 L^{-0.0132783} \right]^{-\frac{1.8578}{0.0132}}$$

From the above analysis a table can be formed by returns to scale with corresponding average productivity of labour in each industry group for both regions. The table shows that more excess capacity is existing in the industries of North Bengal. However, there would have been better results if Cochrane-Orcutt method would be followed for the data. The industry group 204.1 suffers from decreasing returns to scale which stands as barrier to new entrants. By role of technical parameters the Southern industries are more efficient than those of Northern and it proves a regional intra-industry disparity in terms of excess capacity.

Table : 4.1.

Excess Capacity in Different Industry Groups in North Bengal and South Bengal.

Industry Group	Returns to scale		* Average product of labour in (Rs)		Technical Efficiency	
	North Bengal	South Bengal	North Bengal	South Bengal	North Bengal	South Bengal
1	2	3	4	5	6	7
205	11.779	1.5805	103438.67	161663.35	.1950E-0894	.06688
353.4	4.1768	1.2367	4565.7933	78562.301	743500	837300
204.1	0.74	1.8578	22053.805	27103.517	2.198	87.76

* Average product calculated from the A.S.I. Returns (Non-census) for 1985-86.

4.5: The General View:

In North Bengal for industry group 205 under Non-census sector few units are producing some common types of yeast bread as wheat bread, rye bread and biscuits. The products have limited local demand for which the units use their capacity as accordingly. A few units like Glenary at Darjeeling, Ferazzines Bakery at Siliguri and JECIJ & Co. at Jalpaiguri produce variety of products which have good local market span. As the preference pattern of general consumers is to select a good quality of items, the local products are inferrior to those of outside. In the town areas of North a large percent of people is quality conscious about the bakery products and they do not use the local products, instead of these they use the quality from outside. By this local units loose some portion of their market and hence a stikyness of demand for their product is observed. For the industry the units in the South produce not only quality but also variety of bakery products of which biscuits are getting large market at outside the region. In Calcutta area East India Bakery, Santosh Biscuits, Farinni Continental Bakers, Prince Bakery, New Baby Biscuits Co. Standard Biscuits and Solar Bakery and Confectionery are maintaining the variety of products. The quality products are maintaining by Senco's Bakery at Hooghly and Paramount Traders at Durgapur. Here many big units in census sector produce various dietary breads and quick breads which get a good market share outside the state. The capacity utilization of these units are linked with large market span.

For the industry group 204.1 the flour mills in the northern region are running with hardship as the big market portion for their products is at outside where supply comes mostly from other than the northern region. A good quality of input for output is not abailable in the area where factories are dependent on the imported wheat. Shortage of working capital, a common problem of the units, takes them to senile decay of activity although the units are not so old. We see same type of problem in the units like National Flour Mill on Burdwan Road, Siliguri. Flour Mill and Northern Flour Mill on Sevoke Road. The losses in other units bring them to statemate. But under South mainly in Calcutta area many units are running on normal condition. These are Mahabir Flour Mill, New India Flour Mill, Biswanath Swadeshi Mill etc. The mills of Ghusuri area at Howrah as Food Products Corporation, Bangabashi Roller Flour Mill and Mahakali Flour Mill are running with poor capacity but regularly. The units of other districts as Madanmohan Roller Flour Mill of Serasol, Ananda Flour Mill in Bankura are running with good installed capacity. However, the Murshidabad Roller and Flour Mill at Bengatia, Cossimbazar, Srima Roller Flour Mill on Bankura Road in Purulia have closed down as the working capital had been eaten by the service burden of loans from bank and private sources.

Between regions, we are also interested to compare manufacturing of agricultural machinery, equipments and parts

in Non-census sector. For this we choose industry sub-group 353.4 wherein units are producing tea machineries. Now, tea processing needs modern machineries to confirm perfection of varities for black and green tea -- as dust, blended, unblended, leaf grade, waste and instant tea powder. For better quality better machineries are demanding for withering, rolling, fermenting and firing steps. In North Bengal the units for producing tea machinaries are mainly Economic Engineering Works, Associated Engineering Co. at Siliguri and Northern Engineering Works at Gairkata, Jalpaiguri. For them the volume of output in each unit is sufficiently low as compare to the volume of output produced in each unit situated in Calcutta-Howrah belt where units are producing a better quality. It is true that the units like James Warren Hide, Samual Osporn Ltd. Calco Engineering Works, Nippa Manufacturing Co.(P) Ltd., The General Industries Co. and Sigma Engineering Co. are in right place for producing machinaries which need many inputs from other industrial units. Through this priviledge they produce more and significantly share the market in the tea belt of Northern region.

Having a greater priviledge to minimize the cost of production by better sophisticated technology, the outer competitive units push their products through supply agents in the markets of the backward areas where local units find themselves in narrow pace. The fear of competition then limits the activity of running units and the growth of new units of the area. This is the fact by which the existing

units in North operate on greater excess capacity than those of South.

The same sort of result seems right for our purpose if we study the variation of excess capacity for same industry group among different districts of West Bengal where backward districts bear the greater excess capacity for operating units. As in registered manufacturing sector of backward districts we observe combination of higher capita-output ratio with lower value added labour ratio compare to those of Calcutta-Howrah -Hughlee industrial belt.(19) However, keeping in view the overall picture of productivity in registered manufacturing sector of different industrial states in India, we clear up a perception of higher excess capacity in all industries of West Bengal. Here generation of excess capacity is observed if any one pay attention to the table (4.2):

Table : 4.2.

The Productivity in Registered Manufacturing Sector of West Bengal.

Year	Intensity of capital	Productivity of labour	Productivity of capital	Input output ratio
1977-78	0.528	0.761	1.426	0.72
1980-81	0.568	0.791	1.390	0.74
1981-82	0.663	0.9240	1.386	0.76
1982-83	0.668	0.936	1.401	0.75
1984-85	0.884	1.248	1.412	0.77
1985-86	1.110	1.504	1.355	0.77

* Value Rs. in lakhs.

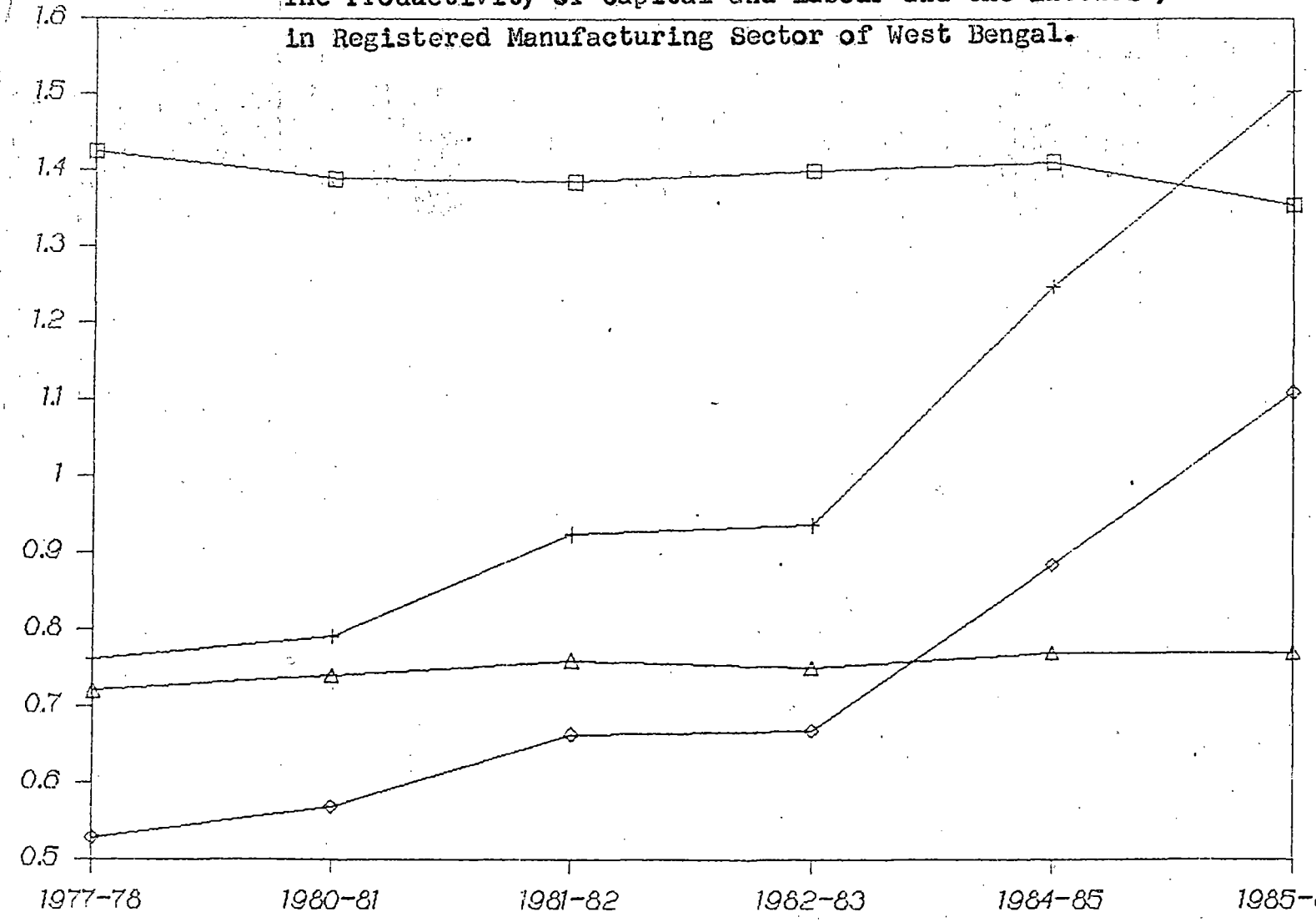
Sources: 1) Data calculated from ASI Frames 1977-78 for the year 1977-78.

2) From 1980-81 to 1985-86 data calculated from Statistical Abstract, West Bengal (1978-1989), Table 17.5, Bureau of Applied Economics and statistics. P. 481.

From the year 1977-78 to 1985-86 the labour productivity had increased because capital intensity (capital labour ratio) attended upon labour productivity. For the period productivity of capital and input output ratio had fallen through because of falling growth rate of output and rising inputs in the sector. Itshows under utilization of capital and hence a rising degree of excess capacity in Registered Manufacturing Sector of West Bengal. In addition to this, here in backward areas most of the units are following greater excess capacity within few days of their birth i.e. a generating crisis process of industrialisation programme. Following this crisis process we go through the function of public and private sector manufacturing units in the state.

FIG. No. 4.1.

The Productivity of Capital and Labour and the Intensity in Registered Manufacturing Sector of West Bengal.



REFERENCES.

1. Wenders, T. John. : Excess Capacity As a Barrier to Entry; Journal of Industrial Economy, Nov., 1971, Vol XX No. 1.

2. Pashigian, B.P. : Limit Price and the Market Share of the Leading Firm; Journal of Industrial Economy, July, 1968.

3. Pal, Asit Kumar. : The Inter-Industry Disparity between North Bengal and South Bengal in Registered Manufacturing Sector; M.Phill. Dissertution 1991, P. 98

4. Douglas, P.H. : Are there Laws of Production; American Economic Review, Vol. 38, 1948. P. 1 - 14.

5. Dutta M.M. : The Production Function for Indian Manufacturing; Sankhya, 1955, 15.

6. Murti, V.N. and Sastry K.V: Production Function for Indian Industry, Econometrica, 25.1957.

7. Dutta Majumdar, D.: Productivity of Labour and Capital in Indian Manufacturing during 1951-1961.
   Arthaniti, 1966.

8. Dadi, M.M. and Hashim, S.R. : An Adjusted Capital Series for Indian Manufacturing 1946 -64 Anvesak, Dec.1971.

9. Narasimham, G.V.L. and Fabrycy. M.Z. : Relative Efficiencies of Organised Industries in India, 1949-1958; The Journal of Development studies, 1974.

10. Yeong Her Yeh.: Economies of Scale for Indian Manufacturing Industries. The Econometric Annual of the Indian Economic Journal Vol.XIV.1966.

11. Diwan, R.K. : Returns to Scale in Indian Industry; The Indian Economic Journal Vol.15; 1967.

12. Banerjee, A. : Productivity Growth and Factor Substitution in Indian Manufacturing; Indian Economic Review, 1971.

13. Subramaniyan, G : An Inter State Production Study for Indian Industry: An Econometric Approach. Indian Journal of Economics Vol. 61. 1980.

14. Arrow K.J. Chenery, H.B. Minhas, B.S. and Solow, R.M. : Capital-Labour Substitution and Economic Efficiency Review of Economics and Statistics, Vol. 43, 1961. P. 225 - 50.

15. Diwan R. and Gujarati D: Employment and Productivity in Indian Industries. Artha Vijnana, Vol. 10. 1968.

16. Sankar, U : Elasticities of Substitution and Returns to Scale in Indian Manufacturing Industries. International Economic Review, Oct. 1970.

17. K'menta J : On Estimation of the C.E.S. Production Function. International Economic Review, Vol. 8. 1967. P 180-9.

18. Bureau of Applied Economics and Statistics, Govt. of West Bengal :- A.S.I. Returns (Non-census) 1985-86, Kiron Sankar Roy Road, Calcutta.

19. Bureau of Applied Economics and Statistics, Govt. of West Bengal: Statistical Abstract, 1978-87. Table. 17.5, P. 476. 481.