CHAPTER-VII :

DETERMINANTS OF PROFITABILITY :

REGRESSION ANALYSIS

I. PURPOSE :

The main purpose of undertaking this chapter is to provide explanation of the profitability in Indian Manufacturing Industries with the help of regression analysis. We therefore intend to probe into an inquiry of the factors responsible for variations in profit rates of each industry over 25 years of period, and factors responsible for inter-industry variations in profit rates in each of the 25 years. In short, we wish to explore the determinants of profitability.

If we formulate certain relationship between each of these variables and profitability, we can provide some guidelines for the policy framework to the industries as well as the government.

II. EXPLANATORY VARIABLES AND HYPOTHESES :

(A) Turnover Assets Ratio (x_1) :

Turnover Assets ratio which is conventionally termed as Capital Turnover Ratio[1] or Assets Turnover Ratio[2]

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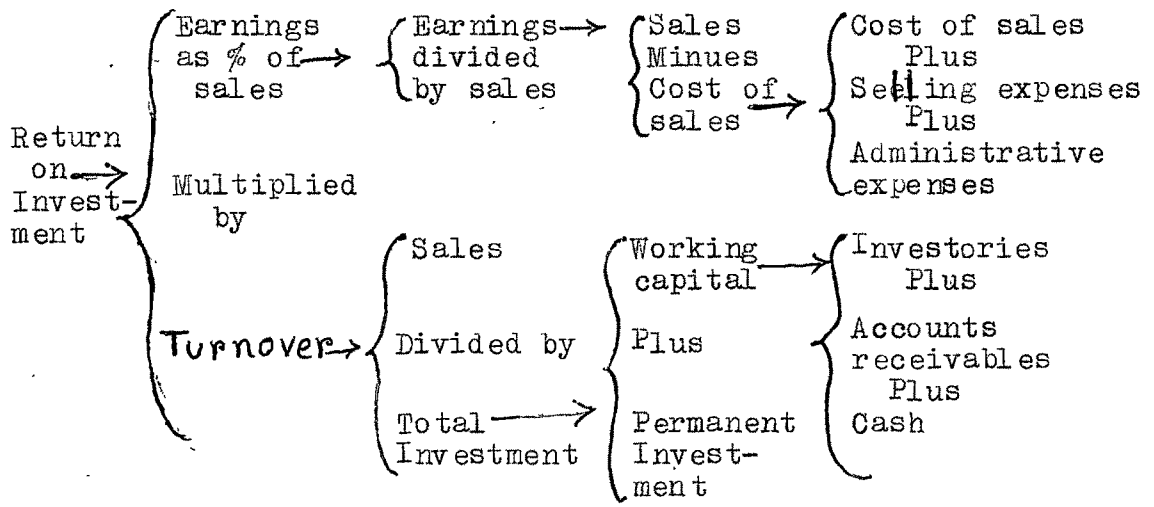
1 See Kuchhal, S.C. : Corporate Finance, Principles and Problems Chaitanya Publishing House, 1973, pp.47-58.

2 Chowdhry, S.B.: Management Accountancy, Kalyani Publishers, Delhi, 1974, p.303.

is designed to measure the effectiveness of the use of assets by seeing how active they are in producing gross income. In short, Turnover Assets Ratio, indicates the ~~proportion of~~ Sales per unit of Total Assets.

A popularly known "Du Pont Chart System" of control[3] designed for management control, indicates how the final figure of (gross profit rate) Return on Investment is derived by the product of two different ratios, viz., Investment Turnover Ratio and Profit Margin. The following chart explains this.

Du Pont Control Chart : Relation of Factors Affecting Return on Investment



The above mentioned chart denotes that Return on Investment is derived by the product of Earnings as proportion of sales i.e. Profit Margin ($\frac{\text{Profits}}{\text{sales}}$) and Turnover

3 See Kuchhal, S.C.: op.cit. pp.47-48.

i.e. $\left(\frac{\text{Sales}}{\text{Total capital employed}}\right)$. This can be expressed as follows :

(ROI) = Return on Investment = Profit Margin x Turnover

$\therefore$ ROI = $\left(\frac{\text{Profits}}{\text{Sales}}\right) X \left(\frac{\text{Sales}}{\text{Total capital employed}}\right)$

This implies that both these ratios affect the profitability.[4] It is assumed that given the profit margin a rise in Turnover Assets ratio will lead to a rise in profitability and vice-versa. (Assets comprise of Net Fixed Assets and Current Assets).

(B.) Net Fixed Assets as Proportion of Total Net Assets (x_2):

This variable indicates the capital intensity in any industry. It is generally assumed that higher the proportion of net fixed assets in the total net assets of a firm, the more difficult task it is for the firm to adapt to changing technology. Prof. Marshall, A. emphasizes certain barriers to the immediate adaptation of a firm to new conditions. He terms these barriers under the headings of technological and contractual limitations. The technological barriers arise due to the durability of the certain types of capital assets which cause delays in withdrawal of specialized resources and delays in construction of new ones, thereby delaying the expansion of productive capacity. The contractual barriers are of short-term nature as they fix prices or rates of purchase or sale. In short, both, the

4 Hart, P.E. : Studies in Profit, Business Saving and Investment in the U.K. 1920-1962 (Vol.III), George Allen & Unwin Ltd., London, 1968, pp.228-240.

technological i.e. use of specialized durable assets, and, contractual barriers govern the speed of adaptation to new conditions. Hence, Stigler argues "Consider, then, specialized and durable resources. Obviously, if resources are not specialized, they can be shifted among industries, and usually on a large scale within a year or two. If they are not durable, an industry can contract its productive capacity rapidly by failing to replace worn-out assets if demand falls. If resources are quickly producible the industry can expand its capacity rapidly when demand rises or costs fall. We cannot identify specialized resources in our industries, but we can measure the variations among industries in the use of fixed (durable) capital. We would expect rates of return in relatively unprofitable industries to rise (toward the general level) more rapidly, the less the share of fixed assets in total capital."[5]

Following this line of argument, we assume that, the higher the proportion of fixed assets in total assets of the industry, more difficult would it be for the industry to adapt to changing conditions and adversely would the profitability of the industry be affected. In other words, we assume negative association between this variable and profitability of the industry.

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5 Stigler, G.J.: Capital and Rates of Return in Manufacturing Industries : A Study by National Bureau of Economic Research, Princeton University Press, New York, 1963, pp.64-65.

The fixed capital comprises of net fixed assets i.e. the value of Land, Buildings, Plant & Machinery and Other Fixed Assets while total net assets comprise of Net Fixed Assets and Current Assets. The Ratio taken here is a financial one.

(C) Capital-Output Ratio (x_3) :

The capital-output ratio at disaggregative level i.e. industry-wise or commodity-wise, occupies a central place while choosing the techniques or allocating the investment in industries. Relative capital intensity of an industry is reflected in its Capital-Output ratio. In a labour abundant and capital scarce country like India, low capital intensive technology for industries is preferred to the high-capital intensive one. This is so, because, wherever the choice exists, the former enables to increase the rate of flow of output per unit of capital available to the maximum possible extent.

In short, the capital-output ratio, being indicative of capital requirement per unit of output, is one of the determinant factors of investment decisions and choice of techniques used. The private industries being mainly profit motivated, would consider this factor to be of great importance, because its trend over time would indicate whether it is profitable to undertake more investment or not. The

inverse of capital-output ratio, i.e. output-capital ratio reveals the productivity of capital. It indicates, how much output-does one unit of capital produce. The higher the productivity of capital the higher would be the profitability of that industry and vice-versa. In short, from amongst a large number of industries, an investor would be interested in selecting that industry for which the productivity of capital is relatively high, thereby leading to reap high profits also. Hence, it is necessary to examine the capital-putput ratio i.e. inverse of capital-productivity, for different industries.

Similarly, an industry with a high capital-output ratio in the initial period may improve its capital productivity over time. Such an industry would be capable of increasing its profitability over time through improving the productivity of capital. Hence, it is necessary to observe, whether, the variations in profitability of the industry over time are the effectof the variations in capital productivity. A fall in capital-output ratio,for a particular industry over time would be indicative of an increasing capital productivity and hence we assume that profitability of such industry (with declining capital-output ratio) would rise over time. In other words we assume that the declining capital-output ratio will be associated with rising profitability over time for a particular industry and vice-versa.

Having formulated the hypothesis, we come to the measurement of the capital-output ratio. This being the ratio between capital stock and output produced by it, its meaning and significance depends on the nature of its numerator and denominator. Hence Domar argues, "In defining capital and output I would place the emphasis on the expression 'produced by it', in the sense that the stock of capital should include all capital needed to produce a given output, while the latter should contain all output produced by a given stock of capital."[6] This implies that the concept of capital-output ratio refers to that capital which is productive. In other words it refers to that concept of capital which is produced means of production and is appropriate to the value concept of physical assets. However, when we come to valuation of physical assets, we are faced with a number of problems which are discussed in details in Chapter IV on "Estimates of Capital". We have formulated capital stock series (for physical assets) for each industry at consistent values over the whole period, thereby giving the adjusted gross capital stock for each industry over 25 years' period.

The second problem that arises is of measuring the output produced by the capital in each industry over the

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6 Domar, E.D.: "The Capital-Output Ratio in the United States: Its Variation and Stability" In the "Theory of Capital"(Ed. Lutz, F.A. and Hague, D.C., Macmillan & Co.Ltd.,1961), p.96.

said period. The putput of the industry can be defined in terms of value added by the industry. The problem faced here is, should we take net value added or gross value added as representative of output of the industry?" Since our capital stock for each industry is gross of depreciation, there is logical compulsion that we should take value added too, gross of depreciation, i.e. gross value added. Hence, we define gross value added as a summation of wages and salaries, rent, profits, interest charges, and depreciation. (Value added is defined as output minus input also).

Briefly, we define our capital-output ratio as an average concept and measure it by dividing the gross stock of capital (physical assets valued at current prices) by the gross value added (at current prices).

Finally, a word of caution is required. Normally the accounting practice considers the assets existing on the last day of accounting year to be the capital stock of the firm, whereas the reported output is the sum of output flowing over the whole period. Many new additions made to the assets during the year, are not put to productive use for the complete period, to which the output relates. Hence, there is some over-estimation of capital-output ratio. However, this over-estimation will be less if there are some assets which have been discarded, and therefore are excluded

from the list of stock of capital even if they have been put to productive use for some part of the year. Hence, the overestimation of this ratio would be larger for the industry taken as a whole because this discrepancy which is true of each firm would get aggregated for the industry or the whole sector.

In addition to this, there are two other problems involved in calculation of this ratio : (1) Discrepency between purchaser's and producer's prices (2) bringing capital at current prices.

It is necessary to take care of the price - concept while measuring the capital-output ratio. Generally, the capital-output ratios are derived from the data given by the firms or the companies. The RBI data used for this study is based on company-wise reporting which gives additions to stock of capital at purchasers' prices i.e. prices evaluated at final stage and hence include excise and sales taxes, inward transportation charges, traders' margins, etc., while the outputs are in producers' prices, i.e. prices at ex-factory value excluding excise and sales taxes, transport charges or trade margin etc. It is logical therefore to argue that since the stock of capital is valued at purchasers' prices, the output that it produces should also be

valued at purchasers' prices while estimating the capital-output ratio. In short, discripency between these two should be eliminated. Further it is observed by Hashim & Dadi, "The difference between the two prices will vary from commodity to commodity, but sometimes it may be quite large as much as to make purchasers' prices four times the producers' prices ..... Hence it isonly logical that Capital and output both be reckoned in the prices which include the same components."[7]

However, due to non-availability of purchasers' producers' price ratios for each industry over the whole study period, we have not been able to bring about this refinement into our capital output ratio. We have stuck to the conventional average (gross) capital output ratio for these reasons.

Though Hashim and Dadi[8] have worked out purchasers' producers' ratios for two digit A.S.I. (Annual Survey of Industries) industries, they have done it for one year only i.e. 1963. We postulate that a negative association exists between profitability and capital-output ratio of the industry. Hence, lower the capital-output ratio, higher would be profit rate of the industry and vice-versa.

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7 Hashim, S.R. and Dadi, M.M. : Capital Output Relations in Indian Manufacturing, 1946-1964.The M.S.University Series No.2, Baroda, p.59.

8 Hashim, S.R. and Dadi, M.M. op.cit., pp.61-62.

(D) Index of Production (x_4)

The firms working under private sector are interested in earning maximum possible profits. Profits, however are the difference between the firms sales revenue and the total costs incurred on the production of the commodity. The sales revenue is realised when the output is sold in the market. In short, given the price of the product, the larger the output, the larger would be the sales revenue from that product. The firm, intending at maximising the profits would do it by raising its sales revenue, reducing its costs or by doing both the things. In short, the larger the production of the commodity, the larger would be the realized sales revenue and more would be the profits and vice-versa. Hence, it is assumed that the profitability of the firm would be positively related with the Index of Production of the firm. Since, the industry consists of a number of firms and since above relation would be true for each firm, we assume that the larger the index of production of an industry (growth of output), the more profitable would that industry be and vice-versa.

The RBI data gives information on the value of production at current prices (for each industry separately, over the study period). If we adjust for the price variations

in value of production at current prices, it would work as a proxy for physical output. In other words, if we express the value of production at constant prices, we eliminate the price changes over the period and hence indicate the trends in the physical output of the industry.

Since we are examining 21 Indian Manufacturing Industries, and since we are interested in time series as well as cross-section analysis, we need to express the value of production of each industry separately, at constant prices over the whole period. This implies that we require different price indices (See Appendix : VII.II) for the output of different industries over the whole period, i.e. 1950-51 to 1974-75. This task involved a number of problems which are discussed in Appendix VII.I, Methodological Notes on Commodity Price Deflators at the end of this chapter. We postulate that positive relation exists between the profitability of the industry and the growth of physical output (expressed as Index of Production).

(E) Rate of Inflation (x_5) :

India is a fast developing country. A growth oriented economy carries along it certain imbalances which are expressed in different ways. Inflation is one of the outcomes of growing economy. India is facing this problem

The National Income is expressed both at current and constant prices in both the series with these two different base years. When the national income at current prices is expressed at constant prices, it involves a use of price diffator.[10] In short, these two series provide us an implicit national income deflator which can be found out by dividing the national income at current prices by the national income at constant prices.

Since the implicit national income of deflator series has 1948-49 and 1960-61 as two different base years, and since 1960-61 was a common year for both the series, we have converted the national income deflator at 1950-51 base so as to indicate rate of inflation.

(F) Rate of Growth of Capital (x_6):

Our intention in treating the growth of an industry (in terms of value of Fixed Assets and Inventories valued at constant prices) as an explanatory variable in multivariate model (for explaining variations in profitability) is to test the following hypothesis forwarded by Marris[11] and Penrose[12] (each separately). They have called

19. The national income at constant prices is calculated by considering the prices of commodities in different sectors.

11. Marris, R.L. : Economic Theory of Managerial Capitalism, Chapter II, Macmillan & Co. Ltd., London, 1964.

12. Penrose, E.T.: The Theory of the Growth of the Firms, Basil Blackwell, Oxford, 1959.

the attention of research workers on the non-conventional aspect of the relationship between profitability and growth. They suggest that profitability itself is a function of growth of capital and that this converse functional relationship between growth and profitability is a negative one. Beyond a certain growth rate the higher the growth, the lower the level of profitability of the firm. However, in the initial stages of expansion when the pick level of growth of industry is not reached, there is a possibility for the above relationship to be positive, i.e. both growth of industry and rate of profit moving in the same direction. So far as Indian Industries are concerned, we presume that there is still scope for expansion and hence expect a positive association between growth and profitability.

Rate of Growth is defined as the rate of growth of assets (Fixed Assets and Inventories) valued at constant prices. In short, the yearly rates of growth as defined in Chapter on Growth : Profitability Relationship, have been used in explaining Time Series as well as Cross-Section analysis.

(G) Debt-Equity Ratio (x_7)

The debt-equity ratio measures the relative importance of borrowed funds of long term nature in relation to the

owned funds. The ratio gives an indication of safety of stakes taken by the creditors for long term loans. Many companies resort to a larger debt-equity ratio because of the ultimate low cost of financing capital. The interest charges on borrowed money is set off from the profits assessed for income tax whereas if a company had equity capital, the dividends paid on the equity shares are not adjustable against taxable income. Hence, Ramachandran observes, "Therefore, borrowed money is always cheaper than equity capital. Further more, a company having a larger borrowing, will accrue a net surplus to be distributed among a smaller number of equity shareholders, resulting in larger earnings per share."[13]

Further, India has been facing a problem of financing the industries due to the shyness of capital. The Government of India, considering this, initiated a number of financial institutions after Independence. Hence, Prof. Mehta asserts, "Facts suggest that over the last two decades or so the corporate financial structure has become increasingly borrowing oriented. Attempts have been made to explain this trend in terms of shortage of equity and/or lower retention."[14] Hence,

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13 Ramachandran, H. : Financial Planning and Control, S. Chand & Co. Pvt. Ltd., 1972, p.106.

14 Prof. Mehta, B.V. :"Industrial Finance in India: A Trend Report" taken from A Survey of Research in Economics, Vol.5, 1975, pp.113-146.

Prof. Mehta suggests to investigate the effect of reduction in the real cost of borrowing (as interest changes are allowed to deduct from taxable income) and its impact on debt-equity financing. This implies that debt financing is a cheaper source of finance compared to equity capital and should therefore be able to affect the net profitability. Following this line of arguments we postule that the higher the debt-equity ratio, the higher would be the level of net profitability.

The debt equity ratio is estimated by taking long term loans as percentage of equity capital. The long term loan is defined as all borrowings other than those from commercial banks and 'others'. Since this ratio is published in RBI data on company finances, we have relied upon the same and taken the ratio directly from the published volumes. Hence, we have notmade any adjustment in estimating this ratio. The published ratio excludes all the borrowings from commercial banks and 'others' till 1964-65 from the definition of debt, while they include loans against mortgages from these sources in the debt from 1965-66 onwards and this leads to under-estimation of debt-equity ratio till 1964-65. Since, we have taken the ratio straight away from the RBI published data, this ratio faces this limitation.

In short, we have attempted to explain variations in profitability (Industry-wise over time and inter-industry for a given year), both gross and net separately, through variations in above mentioned explanatory variables. It is assumed that Turnover Assets Ratio (x_1), Index of Production (x_4), Rate of Inflation (x_5), Rate of Growth of Capital (x_6) and Debt Equity Ratio (x_7) are positively related with profitability while Net Fixed Assets as Proportion of Total Net Asset (x_2), and Capital-Output Ratio (x_3), are negatively related with profitability of an industry.

In addition to the industry-wise and inter-industry analysis, we have attempted to examine the sectoral variations in gross and net profit rates separately with the help of the variables mentioned above. While calculating these variables for different sectors, we have used the same method as we have used for estimating the gross and net profit rates i.e. weighted averages for the sectors (including absolute figures for respective industries in each sector). An example is shown below :

Tunover Assets Ratio for the Consumers' Goods Sector is estimated as

$$\frac{\sum_{i=1}^{10} \text{Sales}}{\sum_{i=1}^{10} \text{Total Net Assets}}$$

where i=1 ... 10 i.e. the 10 industries of which this sector comprises.Following this method all other ratios are worked out for each sector (except rate of inflation as it is common for industries as well as the sectors.) Assuming the above mentioned relationships to exist between profitability and variables for each sector also, we have tried to explain sector-wise variations in gross and net profit rates, each separately. The estimated ratios of these explanatory variables are presented in Tables of Appendix VVI-III at the end of this chapter.

Thus, this chapter intends to explain the industry-wise and sector-wise variations in profit rates (gross and net each separately), over-time and inter-industry variations in given years with the help of above mentioned variables which are expressed in percentage terms.

We are, however, aware of the fact that due to lack of availability of data (either for all the industries in given year or for each industry over the whole period of 25 years), we have not been able to incorporate some other very useful and important variables in our analysis. Some of such variables are availability of raw materials, Government policy, concentration ratio, wage rates, location coefficient etc. The non-availability of data prevented as from including these variables in our explanatory variables. However, we have

attempted to study some of these in chapter VI on Determinants of Profitability: General Factors - before we attempt to explain the structure of profit rates in 21 Indian Manufacturing Industries under study with the help of multivariate regression analysis.

III. METHODOLOGY :

As has been observed above, we aim to explore the factors which determine the earning capacity of the industry with the help of statistical tool of multiple regression analysis for both the time series and cross-section data. Hence, linear multivariate model is fitted with respect to (gross and net profit rates separately as dependent variables being explained by a number of other independent variables) each industry over 25 years period as well as for different industries (Cross section of industries) during each of the years from 1951-52 through 1974-75. The following model is fitted to both the Time Series and Cross-Section data :

$$P = \alpha_0 + \alpha_1 x_1 + \alpha_2 x_2 + \alpha_3 x_3 + \alpha_4 x_4 + \alpha_5 x_5 + \alpha_6 x_6 + \alpha_7 x_7 + e.$$

where P = Gross or net Profit Rate

x_1 = Turnover Assets Ratio

x_2 = Net Fixed Assets as a proportion of Total Net Assets.

x_3 = Capital-Output Ratio

x_4 = Index of Production

x_5 = Rate of Inflation

x_6 = Rate of Growths of Capital (Fixed Assets and Inventories) Valued at Constant Prices)

x_7 = Debt Equity Ratio

α_0 & α_1 to α_7 are parameters to be estimated

e = Error term.

This model is fitted toboth gross and net profit rate each as dependent variable and variables x_1 to x_7 as independent variables. However, variable x_7, i.e. Debt-Equity Ratio, is used for explaining variations in net profit rate only for both the Time Series and Cross-Section analysis.

We have used Debt-Equity Ratio (x_7), for explanation of variations in net profit rate only and not for gross profit rate because gross profit rate is a return on total capital employed. It is gross of interest charges and taxes. Total Capital Employed Comprises of both equity and borrowed (i.e. long term loans) capital. In other words gross profits is income earned on both equity and borrowed capital. Hence, which of these two has larger proportion matters least when one refers to gross profit rate. However, in case of net profit rate, the relative share of borrowing has considerable influence on net profits. This is obvious from the fact that

net profit rate is derived after deduction of interest charges on borrowed capital and taxes. The companies are allowed to set off the amount of interest charges on borrowed capital from profits assessed for income tax, while dividends on equity capital are not adjustable against taxable income. This makes borrowing as cheaper source of finance. Hence, larger the proportion of borrowed capital, in total, the greater would be the net profit rate and vice-versa.

Similar type of linear multivariate model is fitted to explain inter-industry variations in gross and net profit rates (each separately) for each of the years from 1951-52 through 1974-75. However, the number of explanatory variables is reduced here, as x_5, the Rate of Inflation, is dropped out for cross-section analysis.

We intend to explain the industry-wise, sector-wise (Time series) and inter-industry (Cross-section) variations in gross and net profit rates, (each separately), with the help of the seven explanatory variables mentioned above in the model. We have postulated relationship between profitability and each of these variables according to the hypotheses discussed above.

It should be noted that in order to overcome the problem of multicollinearity, we have dropped those explanatory

variables which are found to be highly correlated with each other. This has been done through examining each of the correlation matrices before fitting each of the relations. Hence, those variables which are found to be having statistically significant correlation coefficient (at 5% level) are dropped out and others are retained.

IV. MAIN FINDINGS :

(A) Time Series Analysis :

(i) Gross Profit Rate : Table 7.1 summarises the results of fitting the Linear Multivariate Regression Model to each of the Indian Manufacturing Industries and Sectors (over time) and reveals the "determinants of gross profit rate." The last column of Table 7.1 indicates d-statistic for each fitted relation. Following conclusion are drawn from Table 7.1.

1. The linear multivariate model has proved to be a 'good fit' for each of the fitted relations, except for Jute Textiles Industry. That is obvious from the fact that $\bar{R}^2$, the coefficient of determination (adjusted for degrees of freedom) is statistically significant at 1% level[15] for

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15 Revealed through the 'F'-Ratio in bracket below the value of $\bar{R}^2$. See Table 7.1.

Table 7.1 : Multiple Regression Results for "Determinants of Gross Profit Rate"
(Time Series Analysis : 1951-52 to 1974-75)

Ind. Sl. No.	Industry	α_0	Turnover Assets Ratio x_1	Net Fixed Assets as Proportion of Total Net Assets x_2	Capital Output Ratio x_3	Index of Production x_4	Rate of Inflation x_5	Rate of Growth of Capital x_6	$\bar{R}^2$	Durbin-Watson d Statistic
		(α_0)	(α_1)	(α_2)	(α_3)	(α_4)	(α_5)	(α_6)	($\bar{R}^2$)	'd'
1	2	3	4	5	6	7	8	9	10	11
1.	Grains & pulses	31.900	-.0094 (-1.7909)	+.0064 (.0860)	-.0261** (-10.3727)		-	-.0660 (-1.269)	.8536** (34.514)	1.582@@
2.	Edible Vegetable & Hydrogenated Oils	12.360	-	-	-.0140** (-6.4710)	-	0.0373** (4.2545)	.0139 (.2150)	.7855** (29.078)	1.292
3.	Sugar	12.214	.0519** (3.4200)	.04425 (.6413)	-.0139** (-4.0204)	-	-	-	.5425** (10.090)	1.300
4.	Tobacco	21.183	-	-.6365** (-3.4358)	-	-	.0106 (1.3031)	-.0104 (-.8909)	.3498** (5.125)	1.806@@
5.	Cotton Textiles	5.053	.1853** (5.8957)	-	-.0384** (-7.1907)	-	-	-.0011 (-.0176)	.8051** (32.661)	1.275
6.	Silk-Rayon & Woollen Textiles	28.724	-	-	-.0290** (-10.5546)			-.0238 (-.5042)	.8292 (56.831)	1.287
7.	Medicines & Pharmaceutical Preparations	57.408	.0015 (.0566)	-.4781* (-2.3534)	-.0925** (-10.5100)	-	-	-.0159 (-.8378)	.8413 (31.483)	2.021@@
8.	Matches	5.290	-	.1021 (1.0312)	-	.0577* (2.9357)	-	-.0716 (-.4217)	.4531** (5.971)	1.278

...cont.

Table 7.1 (contd.)

1	2	3	4	5	6	7	8	9	10	11
9.	Pottery, China Earthern Ware & Structural Clay Products	12.295	.1451** (3.7923)	-.0226 (-.5024)	-.0247** (-5.2942)	-	-	-.0152 (-.6186)	.7643** (19.643)	1.778@@
10.	Paper & Paper Products	-15.473	.3748** (10.6051)	-	-	-	-	.0247 (.4581)	.8348** (59.116)	1.434@@
CONSUMERS GOODS SECTOR		20.664	-	-	-.0312** (-8.9386)	-	.0318** (12.3288)	.0684 (1.879)	.9271** (98.524)	1.225
11.	Iron & Steel	27.562	-	-.1616** (-3.9710)	-.0125** (-6.6745)	-	-	-.066 (-.8725)	.7739** (27.247)	1.427@@
12.	Aluminium	6.295	-	.2256** (4.5370)	-.0146** (-8.2362)			-.0445* (-2.1240)	.8118** (34.070)	1.151
13.	Basic Industrial Chemicals	19.762	-	-	-.0177** (-14.7541)	.0002** (9.0244)	-	-	.9536** (237.214)	1.970@@
14.	Cement	29.687	-	-.1930** (-3.4255)	-.0138** (-9.4876)	-	-	-.0477 (-.8196)	.8142** (34.601)	1.142
BASIC GOODS SECTOR		8.678	.1342 (6.9530)	-	-.0104** (-5.5609)	-	-	-	.8001** (47.096)	1.097
15.	Transport Equipment	15.166	-	.0779 (1.7075)	-.0213** (-10.0584)	.0002** (4.4743)	-	.0003 (.03804)	.8768** (41.919)	1.654@@
16.	Electrical Machinery, Apparatus & Appliances	26.059	-	-.2472** (-2.6700)	-.0238** (7.8641)	-	.0035 (.7403)	.0120 (.9344)	.7604** (19.250)	1.227
17.	Machinery (Other than Transport, etc.)	19.558	-	.0345 (1.9341)	-.0311** (-16.4700)	.0004** (5.6441)	-	-.0177 (-1.8470)	.9283** (75.469)	1.079

...cont..

Table 7.1 (contd.)

1	2	3	4	5	6	7	8	9	10	11
18.	Ferrous/Non-Ferrous Metal Products	11.114	.0123 (.2936)	-	-.0106** (-5.5768)	-	.0191 (1.5410)	.0012 (.1026)	.6825** (13.360)	1.348
CAPITAL GOODS SECTOR		17.752	-	.0926 (1.7454)	-.0301** (-13.1999)	.0002** (6.4812)	-	.0189 (1.1984)	.9221** (69.080)	1.062
19.	Jute Textiles	22.780	-.0229 (-.5321)	-	-.0199** (-2.7130)	-	-	.0264 (.6212)	.1758 (2.636)	0.980+
20.	Other Chemical Products	10.976	--	-	-.0165** (-11.3656)	-	.0417** (6.1184)	.0013 (.1618)	.9072** (75.905)	1.92@@
21.	Rubber & Rubber Products	15.261	.0702** (5.0960)	-	-.0380** (-5.8752)	.0005** (3.1867)	-	.0033 (.1332)	.6914** (13.880)	1.737@@
INTERMEDIARY GOODS SECTOR		20.299	-.0006 (-.0185)	-	-.0206** (-1.8191)	-	-	.0199 (.6560)	.5014** (8.709)	1.399
WHOLE MANUFACTURING SECTOR		19.478	.0191** (2.9508)	-	-.0255** (-8.1962)	.0013** (10.3082)		.0469 (1.2676)	.9022** (54.014)	1.166

Source : Table 3.1 and 3.2, and Appendix Tables VII.I to VII.III. VII

Notes :

1. Regression Equation $P = \alpha_0 + \alpha_1 x_1 + \alpha_2 x_2 + \alpha_3 x_3 + \alpha_4 x_4 + \alpha_5 x_5 + \alpha_6 x_6 + \alpha_7 x_7 + e$

   where x_1 = Turnover Assets Ratio (%)
   x_2 = Net Fixed Assets as Proportion of Total Net Assets (%)
   x_3 = Capital-output Ratio (%)
   x_4 = Index of Production (Index Numbers)
   x_5 = Rate of Inflation (Index Number)
   x_6 = Rate of Growth of Capital (at Constant 1950-51 prices)(Per cent per annum).
   α_0 to α_7 are parameters and e is the error term.

2. Figures in brackets below the coefficients α_1 to α_6 denote T (computer programme used does not give T for α_0, the intercept).

cont...

Notes to Table 7.1 (contd.)

3. Figures in bracket below $\bar{R}^2$ denote F-Ratio.

4. *, ** denote 5% and 1% level of significance respectively.

5. @, @@ denote no autocorrelation at 5% and 1% level of significance respectively.

6. 'd' Statistic without any signs, denotes that test is inconclusive for positive autocorrelation.

7. +, ++ denotes positive autocorrelation at 5% and 1% level of significance respectively.

all these fitted relations (Except Jute Textiles). However, Table 7.1 indicates that the degree of explanation of variations in gross profit rate provided through these explanatory variables, differs widely for different industries, $\bar{R}^2$ ranging in value from .3498 (for Tobacco) to .9536 (for Basic Industrial Chemicals) for the fitted relations with significant results.

Out of the total 'good fits', majority (i.e. 15 fitted relations) provide explanation of variation in gross profit rate around 75% or more.

If we examine the performance of each of the explanatory variables, we observe from Table 7.1 that Capita-Output Ratio (x_3) plays most effective role in determination of gross profit rate in all the industries, i.e. 18 Indian Manufacturing Industries (except Tobacco, Matches & Paper & Paper Products Industries for which it is dropped out). The coefficient of Capital-output Ratio carries postulated negative sign in all the fitted relations (i.e. 18) and ranges in value from -.0106 (for Ferrous/Non-Ferrous Metal Products) to -.0925 (for Medicines & Pharmaceutical Preparations). Except in case of Jute Textiles (significant at 5%) This variable is found to be having coefficient which is statistically significant at 1% level. The above mentioned values

indicate that when capitaloutput ratio rises by one percentage point, the gross profit rate of Ferrous/Non-Ferrous industry falls by .0106 per centage point and that of Medicines and Pharmaceutical Preparations Industry, ~~rises by~~ falls by .0925 percentage point and Vice-Versa. In other words, the negative association between Capital-Output Ratio and Gross Profit rate implies that industries which raise the productivity of capital also raise the profitability over time and vice-versa.

3. As far as variable x_1 i.e. Turnover Assets Ratio is concerned, it is found to be having positive sign in Seven out of Nine fitted relations in which it is retained and negative signs in remaining two fitted relations. However, its coefficient, α_1, is statistically found to be significant in Five fitted relations only for which it carries positive sign and thus confirms to our postulated hypothesis. The industries in which it is found to be statistically significant are Sugar, Cotton Textiles, Pottery-China-Earthernware and Structural Clay Products, Paper & Paper Products and Rubber & Rubber Products with coefficient around .0519, .0185, .1451, .3748 and .0702 respectively. The value of coefficient α_1 indicates that when Turnover Assets Ratio rises by one percentage point, the gross profit rate rises

by .0519, .0185, .1451, .3748, .0702 percentage point for Sugar, Cotton Textiles, Pottery etc., Paper & Paper Products and Rubber & Rubber Products industries respectively. An interesting point to be observed here is that x_1 is dominant in case of industries belonging to Consumers Goods Sector (i.e. all the four except Rubber & Rubber Products). In short, rising sales per unit of amount invested leads to rising gross profit rate of these industries and vice-versa.

4. Index of Production, i.e. x_4, is observed to be having coefficient statistically significant (at 1% level) in all the Five fitted relations with the postulated positive sign. The industries for which it is retained and has positive significant coefficient are Matches (α_4=.05775), Basic Industrial Chemicals (α_4=.00021), Transport Equipment (α_4= .00029), Machinery (other than Transport etc.) (α_4= .00042) and Rubber & Rubber Products (α_4=.00050). The values of α_4 indicate that when the Index of Production (x_4) rises by one point, the gross profit rate of Matches, Basic Industrial Chemicals, Transport Equipment, Machinery (other than Transport) and Rubber & Rubber Products Industries, rises by .05775, .00021, .00029, .00042 and .00050, percentage point over time and vice-versa.

An important point to be noticed here is that three

out of the five above mentioned industries (i.e. Basic Industrial Chemicals, Transport Equipment and Machinery (other than Transport etc.) belong to Basic and Capital Goods Sector. In other words, growing output in these industries (all the five) has been associated with rising profitability over time and vice-versa.

5. As far as Proportion of Net Fixed Assets in Total Assets, x_2, is concerned, it is observed that its coefficient assumes negative sign as per our expectation in Six out of Twelve fitted relations to different industries, while for the other six relations it assumes positive sign. However, the industries for which x_2 has been statistically found to be significant with negative coefficient as per our assumption are five in number, having coefficient around -.6365, -.4781, -.1616,-.1930 and -.2472 for the five industries : Tobacco, Medicines & Pharmaceutical Prpparations, Iron & Steel, Cement and Electrical Machinery, Apparatus and Appliances respectively. This implies that higher proportion of net fixed assets in total results in decline in gross profit rate due to difficulty involved in immediate, adaptation of these industries to changing conditions. This confirms to the arguments forwarded by Prof. Marshall and Stigler G.J. with respect to technological barriers faced by the industries, mainly with respect to proportion of fixed assets in total.

The above mentioned values of coefficient of x_2 indicate that when proportion of fixed assets in total rises by one percentage point profitability (gross) in Tobacco, Medicines & Pharmaceutical Preparations, Iron & Steel, Cement and Electrical Machinery, Apparatus and Appliances industries falls by .6365, .4781, .1616, .1930, .2472 percentage points respectively over time and vice-versa.

However, Table 7.1 further reveals that the coefficient of x_2 assumes positive sign with significant value (1%) for only one Industry, viz., Aluminium, and, carries value around .2256. This is contrary to our hypothesis and requires further investigation.

6. Table 7.1 further reveals that α_5, the coefficient of Rate of Inflation, has positive sign as per our assumption in case of all the five industries for which it is retained. However, Edible Vegetable and Hydrogenated Oils and Other Chemical Products are the two industries in case of which coefficient of x_5 is statistically found to be significant (with positive sign). This implies that gross profit rate of these industries is positively correlated with Rate of Inflation, and, the latter contributes to the rising trend in gross profit rate of these two industry over time.

The coefficient of Rate of Inflation assumes value around .0373 and .0417 for Edible Vegetables and Hydrogenated Oils and Other Chemical Products Industry respectively, which indicates that when there is rise in Index of Price (National Income Deflator) by one point the gross profit rate of these two industries rises by .0373 and .0417 percentage point respectively and vice-versa.

7. Variable x_6, i.e. Rate of Growth of Capital, shows the weakest performance. The coefficient of x_6 carries positive sign as per our expectations in Eight out of Nineteen fitted relations, while in Eleven relations it carries negative sign. However, we observe from Table 7.1 that x_6 is found to be statistically significant in case of one fitted relation only for which it carries negative sign, the industry being Aluminium Industry. The coefficient of x_6 for Aluminium Industry carries value around -.0445 and indicates that when Rate of Growth of Capital rises by one percentage point, the net profit rate of Aluminium Industry falls by .0445 percentage point and vice-versa. This is however contrary to our expectations and confirms to the arguments forwarded by Marris, R. and Penrose, E.T. about converse functional relationship between profitability and Rate of Growth of Capital. This implies that Aluminium Industry in India has reached the

saturation point of expansion, and hence, any further expansion would lead to fall in its profitability.

The following Table indicates the number of industries (Sector-wise) where the different explanatory variables are significant in explaining gross profit rate, significance level being 5% or 1%.

Explanatory Variables	No.of Industries in Different Sectors				
	Consumers Goods Sector	Basic Goods Sector	Capital Goods Sector	Intermediary Goods Sector	Whole Manufacturing Sector
Turnover Assets Ratio (x_1)	4 (6)	-	- (1)	1 (2)	5 (9)
Net Fixed Assets as proportion of Total Net Assets (x_2)	2 (6)	3 (3)	1 (3)	-	6 (12)
Capital-Output Ratio (x_3)	7 (7)	4 (4)	4 (4)	3 (3)	18 (18)
Index of Production (x_4)	1 (1)	1 (1)	2 (2)	1 (1)	5 (5)
Rate of Inflation (x_5)	1 (2)	- (2)	-	1 (1)	2 (5)
Rate of Growth of Capital (x_6)	- (9)	1 (3)	- (4)	- (3)	1 (19)

Note :Figures in brackets indicate the total number of industries for which the variables were retained.

The above mentioned table clearly reveals that Capital-

-output Ratio has been most effective factor affecting gross profit rate in majority of Consumers Goods Industries and each of the industries of the Basic, Capital and Intermediary Goods sector. Turnover Assets Ratio is more effective in case of Consumers Goods Industries while Fixed Assets - Total Assets (net) ratio influences Basic Goods Industries most. Index of Production is observed to be asserting more influence on Capital Goods Industries. Rate of Inflation and Rate of Growth of Capital are found to be having very less influence on gross profit rate of different industries.

The similar exercise was carried for different sector-wise determinants of gross profit rate also. Capital-Output Ratio (x_3), was observed to be most effective determinant in all the fitted relations. The results are briefed in Table 7.2.

(A) Time Series Analysis :

(ii) Net Profit Rate : The similar analysis is undertaken with respect to net profit rate and results are presented in Table 7.2.The last column of the Table reveals d-statistic for each fitted relation.The Table highlights the following points.

1. Linear Multiple Regression Model has proved to be a "good fit" in case of all the fitted relations except two viz.,

Table 7.2 : Multiple Regression Results for "Determinants of Net Profit Rate"
(Time Series Analysis : 1951-52 to 1974-75)

Ind. Sl. No.	Industry	α_o	Turnover Assets Ratio x_1	Net Fixed Assets as proportion of Total Net Assets x_2	Capital Output Ratio x_3	Index of Production x_4	Rate of Inflation x_5	Rate of Growth of Capital x_6	Debt-Equity Ratio x_7	$\bar{R}^2$	Durbin-Watson 'd' Statistic
		(α_o)	(α_1)	(α_2)	(α_3)	(α_4)	(α_5)	(α_6)	(α_7)	$\bar{R}^2$	d
1	2	3	4	5	6	7	8	9	10	11	12
1.	Grains & Pulses	40.041	-.0266** (-3.1014)	-.1777 (-1.4725)	-.0243** (-5.9066)	-	-	-.0762 (-.8971)	-	.7116** (15.189)	1.165
2.	Edible Vegetable & Hydrogenated Oils	19.870	-	-	-.0262** (-6.2694)	-	.0360* (2.1313)	.0592 (0.14764)	-	.7142** (20.162)	1.480@@
3.	Sugar	34.905	.0144 (.6435)	.1751 (-1.7227)	-.0333** (-6.5557)	--	--	--	-	.6384** (14.537)	1.048
4.	Tobacco	1.550	.0459* (2.4123)	.0384 (.1929)	-	-.00007 (-.2474)	-	1.2539 (.9725)	-	.0974 (1.620)	1.781@@
5.	Cotton Textiles	4.154	.2895** (4.5951)	-	-.0659** (-6.6499)	--	-	.0735 (.6477)	.0307 (1.0967)	.7858** (22.088)	1.884@@
6.	Silk-Rayon & Woollen Textiles	18.252	-	-	-.0215** (-6.7202)	-	-	-0.0488 (-.935)	.1991** (2.8337)	.7667** (26.197)	2.543@@
7.	Medicine & Pharmaceutical Preparations	28.526	-.0013 (-.1155)	.0834 (.9523)	-.0660** (-17.363)	-	-	.0179* (2.184)	-	.9446** (98.953)	2.213@@
8.	Matches	29.1351	-	-	-.0787** (-5.1625)	.0418** (3.5069)	-	-.1068 (-1.1202)	-	.5899** (9.630)	1.377

cont...

Table 7.2 (contd.)

1	2	3	4	5	6	7	8	9	10	11	12
9.	Pottery, China Earthenware & Structural Clay Products	32.093	-	-.1522 (-1.5255)	-.0380** (-3.7711)	.00045 (.6756)	-	-.0126 (-.2198)	-	.4172** (5.116)	1.003
10.	Paper & Paper Products	21.092	.4519** (9.0772)	-	-	-	-	-.0042 (-.0526)	.0249 (.9592)	.7949** (30.716)	1.678@@
CONSUMERS GOODS SECTOR		27.382	-	-	-.0425** (-4.6079)	.0033** (5.6641)	-	.1388 (1.4689)	-	.7427** (23.134)	1.104
11.	Iron & Steel	28.244	-	-.0441 (-.8060)	-.0208** (-8.2686)	-	-	.0769 (1.0698)	-	.7854** (29.060)	1.193
12.	Aluminium	18.776	-	-	-.0203** (-7.5464)	-	-	.0079 (.2577)	.1531** (5.1533)	.7922** (30.229)	1.450@@
13.	Basic Industrial Chemicals	21.668	-	-	-.0208** (8.5253)	.0003** (6.8844)	-	-	-	.8936** (97.626)	1.985@@
14.	Cement	25.077	-	-.0497 (-.5883)	-.0186** (-8.6134)	-	-	-.0280 (-.3212)	-	.7809** (28.318)	0.691++
BASIC GOODS SECTOR		16.093	.0551 (1.5638)	-	-.0125** (-3.6532)	-	-	-	-	.4115** (9.042)	1.415@@
15.	Transport Equipment	19.641	-	.0962 (1.1525)	-.0301** (-7.6057)	-	-	.0186 (1.5979)	-	.7626** (25.626)	1.762@@
16.	Electrical Machinery, Apparatas & Appliances	25.045	-	-.1323 (-.8363)	-.0287** (-5.5347)	-	-.0076 (-.9384)	.0378 (1.7306)	-	.6257** (10.613)	1.935@@
17.	Machinery (Other than Transport)	24.989	-	.0470 (.8963)	-.0455** (-8.2016)	.00044 (2.0075)	-	-.0398 (-1.4144)	-	.7536** (18.586)	1.540@@
18.	Ferrous/Non-Ferrous Metal Products	41.758	-.0276 (-.3836)	-.7269* (-2.4405)	-	-	.0096 (.5027)	.0016 (.0817)	-.2347** (-4.1626)	.6228** (8.596)	1.549

cont...

Table 7.2 (contd.)

1 2	3	4	5	6	7	8	9	10	11	12
CAPITAL GOODS SECTOR	24.559	-	-.0037 (-.0457)	-.0397** (-11.5496)	.00015** (2.848)	-	.0514* (2.1691)	-	.8917** (48.329)	1.834@@
19. Jute Textiles	7.346	.0118 (.1338)	-	-	-	-	.0436 (.4790)	-.3769 (-1.9168)	.0397 (1.317)	1.850@@
20. Other Chemical Products	14.833	-	-	.0263** (18.529)	-	.0222** (3.5363)	.0068 (.8942)	-	.9491** (144.090)	1.634@@
21. Rubber & Rubber Products	6.868	.1044** (3.3516)	-	-.0457** (-3.0345)	-	-	.0481 (.9243)	.1530 (1.8566)	.5118** (7.028)	1.943@@
INTERMEDIARY GOODS SECTOR	22.058	-.0126 (-.2803)	-	-.0228** (-3.5843)	-	-	.0333 (.7356)	-	.3309* (4.791)	1.537@@
WHOLE MANUFACTURING SECTOR	22.740	.0286* (2.2592)	-	-.0349** (-5.7355)	.00121** (4.9590)	-	.1047 (1.4465)	-	.7575** (18.960)	1.294

Source: Table 3.2 and Appendix Tables : VII.I, VII.VII.

Notes: 1. Regression Equation = $P=\alpha_0+\alpha_1x_1+\alpha_2x_2+\alpha_3x_3+\alpha_4x_4+\alpha_5x_5+\alpha_6x_6+\alpha_7x_7+e$,

where P denotes Gross or Net Profit Rate
x_1 = Turnover Assets Ratio (%); x_2 Net Fixed Assets as proportion of total Net Assets
x_3 = Capital-Output Ratio (%); x_4 = Index of Production (Index Numbers);
x_5 = Rate of Inflation (Index Numbers) x_6 = Rate of Growth of Capital (Percent per annum; ~~x_6 = Rate of Growth of Capital (Per cent per annum)~~); x_7 = Debt-Equity Ratio (%); α_0 to α_7 are parameters and e is the error term.

2. Figures in brackets below the coefficients α_1 to α_7 denote T. (Computer programme does not give T for α_0, the intercept.
3. Figures in bracket below $\bar{R}^2$ denote F-Ratio.
4. *, ** denote 5% and 1% level of significance respectively.
5. @, @@ denote no autocorrelation at 5% and 1% level of signifiance respectively.
6. 'd' statistic without sign denotes inconclusive test.
7. +, ++ denote positive autocorrelation at 5% and 1% level of significance respectively.

Tobacco and Jute Textiles Industries. The Table 7.2 reveals that out of nineteen good fits, eleven relations provide more than 75% of explanation of variations in net profit rate.

2. As far as performance of each of the explanatory variables is concerned, the Table indicates that Capital-Output Ratio i.e. x_3 (as in the case of Gross Profit Rate) is found to be the best explanatory variable. This is obvious from the fact that the coefficient of x_3 is statistically found to be significant (at 1% level) in all the Seventeen fitted relation to different industries for which this variable is retained.

However, this variable, x_3, is observed to be highly correlated with other variables in case of industries like Tobacco, Paper & Paper Products, Ferrous/Non-Ferrous Metal Products and Jute Textiles, Hence, it is dropped out. It is further observed from Table 7.2 that the value of coefficient of Capital-Output Ratio, x_3, differs widely for different industries and ranges between -.0186 (cement) to -.0787 (Matches). An important point to be noticed here is that the coefficient of x_3 assumes negative sign in all the fitted relations in which it is retained. This confirms well with our hypothesis of negative association between net profit rate and Capital-Output Ratio, x_3. In other words, industries

having more and more capital intensive techniques (rising x_3) are expected to experience decline in net profit rate earned over time and vice-versa.

3. Turnover Assets Ratio (x_1) (Popularly known as Capital-Turnover Ratio or Assets Turnover Ratio) is observed tobe the Second best explanatory variable. It is found to be significant in five fitted relations out of nine for which it is retained. However, the coefficient of x_1 assumes positive sign in case of six fitted relations and negative in case of 3 relations. However in four fitted relations it carries positive sign and is significant too. Confirming to our hypothesis between x_1 and profit rate (net) in case of industries like Tobacco, Cotton Textiles, Paper & Paper Products and Rubber & Rubber Products Industry (with coefficients around .0459, .2895, .4519 and .1044 respectively).

However, it is observed that the coefficient of x_1 assumes negative sign (it is significant at 1% level) in case of Grains & Pulses industry. This is contrary to our postulated positive association between profitability and x_1. This may probably be due to the fact that profit margin ($\frac{\text{Profits}}{\text{Sales}}$) for this industry might have fallen more sharply than the rise in Turnover Assets Ratio.

4. As far as the performance of variable x_4 (Index of Production) is concerned, it is observed to be having positive coefficient as per our hypothesis in four fitted relations out of five fitted relations for which it is retained. However in case of only two industries viz., Matches and Basic Industrial Chemicals, this coefficient is significant and has positive sign with value around .0418 and .0003 respectively. This implies that net profit rate of these two industries experienced rise due to growing volume of output produced by them and vice-versa.

5. Rate of Inflation, x_5, is found to be affecting the net profit rate of only two industries, (out of four) viz., Edible Vegetable and Hydrogenated Oils ($_5$=.0360) and Other Chemical Industry ($_5$=.0222). The coefficient of x_5 assume positive values for three fitted relations out of 4 and is found to be statistically significant for above mentioned two industries. This confirms to our postulated hypothesis of positive association between net profit rate and inflationary trend in the economy. This implies that the rising prices in the country benefitted the producers of these two industries most.

6. As far as Debt-Equity Ratio, x_7, is concerned, it is observed to be significantly influencing the net profit rate of three industries only. The Table reveals that the coefficient of x_7 is significant in case of Silk-Rayon and Woollen Textiles ($_7$=.1991) Aluminium ($_7$=.1531) and Ferrous/Non-Ferrous Metal Products ($_7$=-.2347) Industries. It is further observed from the Table that the coefficient of x_7 is having positive values for first two industries as per our assumption while it assumes negative value for Ferrous/Non-Ferrous Metal Product Industry; which is contrary to our assumption. Table 7.2 further reveals that the coefficient of x_7 assumes positive sign in Five fitted relations and

negative in two out of total seven relations in which it is retained. However, the coefficient is significant in above mentioned industries only. This implies that debt financing is a cheaper source of finance for Silk-Rayon and Woollen Textiles and Aluminium Industry. However, in case of Ferrous/Non-Ferrous Metal Products it has not been so which is contrary to our hypothesis of positive association between net profit rate and x_7. Hence this requires further investigation.

7. As far as variable x_2 is concerned, (ie. Net Fixed Assets as Proportion of Total Net Assets), it is statistically observed to be significant in one fitted relation only (for Ferrous/Non-Ferrous Metal Products) out of eleven fitted relations for which it is retain. The coefficient of x_2 assumes negative sign in seven out of eleven fitted relations and positive in four relations. However only in case of above mentioned industry its coefficient is negative and statistically significant at 5% level. This implies that rising proportion of net fixed assets in total for this industry has contributed to falling trend in net profit rate of this industry and vice-versa & confirms to our hypothesis that the rising proportion of fixed assets in total barrier causes a technological barrier to the industry hence adaptation to changing

conditions becomes difficult resulting thereby in falling profitability of the industry overtime.

8. In case of variable x_6 i.e. Rate of Growth of Capital, it is observed that the variable is significant in one fitted relation only (out of nineteen) and has a positive coefficient for Medicines and Pharmaceutical Preparation Industry for which it is significant. This indicates that there is still scope for the expansion of this industry as both the net profit rate and rate of growth of capital are positively correlated for this industry. However the coefficient of x_6 carries positive sign for 13 out of 19 relations and negative for 3 though positive sign is significant for above given one industry only.

While summing up therefore we can say that the linear multivariate model has proved to be a 'good fit' for majority ~~of~~ the fitted relations and provides for majority of explanation of variations in net profit rate of different industries overtime.

Moreover, the derived estimates are also efficient in majority of the fitted relations. In order to see the influence of the explanatory variables on net profit rate of different industries, we give below a Table summarising the number of industries in each sector where the different explanatory

variables are significant in explaining net profit rate. Significance level considered is 5% or 1%.

Explanatory Variables	No.of Industries in Different Sectors				
	Consumers Goods Sector	Basic Goods Sector	Capital Goods Sector	Interme-diaty Goods Sector	Whole Manufac-turing Sector
Turnover Assets Ratio (x_1)	4 (6)	-	- (1)	1 (2)	5 (9)
Net fixed Assets as proportion of Total Net Assets (x_2)	- (5)	- (2)	1 (4)	-	1 (11)
Capita-Output Ratio (x_3)	8 (8)	4 (4)	3 (3)	2 (2)	17 (17)
Index of Production(x_4)	1 (3)	1 (1)	- (1)	-	2 (5)
Rate of Inflation(x_5)	1 (1)	-	- (2)	1 (1)	2 (4)
Rate of Growth of Capital(x_6)	1 (9)	- (3)	- (4)	- (3)	1 (19)
Debt-Equity Ratio (x_7)	1 (3)	1 (1)	1 (1)	- (2)	3 (7)

Note : Figures in brackets indicate the total number of relation for which the respective variables are retained.

It is obvious from Table given above, that Capital-Output Ratio is most effective factor, in case of net profit rate also. The Turnover Assets Ratio is found to be

influencing Consumers Goods Industries, more. However, Net Fixed Assets as Proportion of Total Net Assets (x_2), and, Debt-Equity Ratio are effective in case of Capital Goods industries, while Index of Production and Debt Equity Ratio have more influence upon Basic Goods Industries than Consumers Goods Industries. Rate of Growth of Capital is found to be having very meagre influence on industry-wise variations in net profit rate. The results of this Table are found to be more or less similar to those summarised for gross profit rate.

We have attempted to examine the sector-wise determinants of net profit rate also by applying the similar exercise to the sectoral data. The results are presented in Table 7.2. We observe from the Table that Linear, Multivariate Model has proved to be a'good fit' to all the five fitted relations to the sectors. Capital Output Ratio (x_3), is observed to be asserting high influence on sectoral variations in net profit rate overtime. (Please see Table 7.2 for other results)

(B) Cross-Section Analysis :

Having examined the determinants of industry-wise and sector-wise (Time Series Analysis) gross and net profit rates (each separately), we proceeed to study the factors influencing the inter-industry variations in these.

It has already been observed earlier that our universe of industries comprises of twenty-one manufacturing industries. These industries differ widely in their age structure. Moreover, some of these industries are agro-based (e.g. Grains & Pulses, Edible Vegegable & Hydroganated Oils, Sugar, Tobacco, Cotton-Textiles, Jute Textiles, etc.), some are mineral based (e.g. Iron & Steel, Aluminium, Transport Equipment, Electrical Machinery, Apparatus & Appliances, Machinery (Other than Transport etc.) and Ferrous/Non-Ferrous Metal Products), some are chemical based (e.g. Medicines & Pharmaceutical Preparations, Basic Industrial Chemicals, Other Chemical Products) while remaining are mixture of these (e.g. Silk-Rayon & Woollen Textiles, Rubber & Rubber Products etc.). This implies that the different industries would be affected in different degrees by a given event. We have attempted here to explore some important factors influencing the profitability of these industries at a given point of time, considering inter-industry variations in profit rates (both gross and net).

The Linear Multiple Regression Model, as discussed earlier in Section III, Methodology of this Chapter, has been fitted to the data for different industries for each of the years from 1951-52 through 1974-75. The exercise is

carried for both the concepts of profit rate, viz., gross and net profit rates.

In order to avoid the problem of multi-collinearity, we have dropped those variables which are highly correlated with others, having correlation coefficient significant at 5% level.

However, as far as variable x_5, i.e. Rate of Inflation is concerned, we have altogether dropped it for cross-section analysis as mentioned earlier.

We summarize below the findings of cross-section study on "determinants of profitability".

(B) Cross-Section Analysis :

(i) Gross Profit Rate : Table 7.3 presents the results of Cross-Section analysis of determinants of gross profit rate. Following conclusions are derived from it.

The linear multivariate model has proved to be a'good fit' (revealed from the fact that $\bar{R}^2$ is statistically significant at either 5% or 1% level), in twenty three out of twenty-four fitted relations, (except for the year 1963-64). This is obvious from the values of $\bar{R}^2$, the coefficient of determination. It is observed that $\bar{R}^2$ varies widely in value from .2493 (for 1961-62) to .6563 (for 1952-53). In short,

Table 7.3 : Multiple Regression Results for "Determinants of Gross Profit Rate"
(Cross-Section Analysis for Different Years)

Year		Turnover Assets Ratio	Net Fixed Assets as proportion of Total Net Assets	Capital Output Ratio	Index of Production	Rate of Growth of Capital	$\bar{R}^2$
	(α_0)	x_1	x_2	x_3	x_4	x_6	
		(α_1)	(α_2)	(α_3)	(α_4)	(α_5)	$\bar{R}^2$
1	2	3	4	5	6	7	8
1951-52	16.274	.0165 (1.6363)	-	-.0153** (-4.1425)	-	-.1115 (-1.2543)	.5222** (8.287)
1952-53	17.205	.0056 (.6041)	-	-.0117** (-6.3340)	-.0219 (-.8624)	-	.6563 (13.730)
1953-54	14.985	1.6209 (1.7312)	-	-.0116** (-3.9435)	-.0199 (-.9678)	.0243 (.2370)	.5124** (6.254)
1954-55	15.985	.0098 (.9071)	-	-.0144** (-4.9874)	-	-.1378 (-.9417)	.5542** (9.286)
1955-56	15.163	.0154 (1.2622)	-	-.0143* (-2.8768)	-	-.0138 (-1.0315)	.2855* (3.664)
1956-57	15.812	.0166 (1.5946)	-	-.0179** (-4.7266)	-.0081 (-1.9497)	.2558* (2.2097)	.5251** (6.529)
1957-58	13.647	.0173 (1.5080)	-	-.0137** (-3.8266)	-.0018 (-.7682)	.0695 (1.3286)	.4717* (5.464)
1958-59	14.053	.0165 (1.7422)	-	-.0107** (-3.0939)	-.0023 (-1.1512)	-	.4172* (5.073)
1959-60	14.484	.0197* (2.1428)	-	-.0114* (-2.5236)	-.0006 (-.2917)	.0623 (.3740)	.3761* (4.014)
1960-61	17.093	.0135 (2.0926)	-	-.0147** (-3.9298)	-.0008 (-1.0885)	-	.4917** (4.450)

cont...

Table 7.3 (contd.)

1	2	3	4	5	6	7	8
1961-62	15.695	-	-	-.0120** (-2.9418)	-.0005 (-.5766)	.0362 (.4763)	.2493* (3.214)
1962-63	19.691	-.0043 (-.5487)	-	-.0147** (-3.4501)	-.0007 (-1.1869)	-.0233 (-.2239)	.3098* (3.244)
1963-64	117.318	-.0036 (-.4494)	-	-.0108* (-2.8385)	-.00004 (-.0878)	-.0161 (-.1816)	.2250 (2.452)
1964-65	15.386	.0179 (1.8358)	-	-.0126* (-2.5317)	.00017 (.3476)	-	.3692* (4.902)
1965-66	18.690	.0108 (1.0379)	-	-.0178** (-3.5603)	-	.0064 (.4842)	.4522** (6.503)
1966-67	18.008	.0136 (1.2419)	-	-.0158** (-3.7246)	-	.0194 (.1457)	.4189** (5.805)
1967-68	18.702	.0013 (.1384)	-	-.0162** (-4.7541)	-	-	.5075** (11.307)
1968-69	19.232	-.0016 (-.2109)	-	-.0184** (-4.5992)	-.00033 (-.1655)	.4890* (2.5578)	.5791** (7.881)
1969-70	24.063	.0029 (.3239)	-	-.0252** (-5.0112)	-.00027 (1.2839)	.2434 (1.1098)	.5213** (6.446)
1970-71	19.922	-.0021 (.3113)	-	-.0154** (-3.9151)	-	-.0357 (-.7875)	.3948* (5.132)
1971-72	19.837	-.0016 (-.3175)	-	-.0155** (-5.2202)	-	-	.5790** (14.063)
1972-73	19.471	-.0090 (-1.3837)	-	-.0136** (-4.0505)	-	-.0046 (-.0268)	.4906** (7.100)
1973-74	18.301	-.0012 (-.1070)	-	-.0132** (-3.7377)	.00030 (0.3118)	.1831 (.7594)	.4481* (4.857)
1974-75	19.375	-.0040 (-.5111)	-	-.0110** (-3.6570)	.00004 (.7305)	-	.4614** (6.426)

Notes to Table 7.3

Source: Table 3.1 and Appendix Tables VII.I to VII.VI.

Notes : 1. Regression Equation = $P = \alpha_0 + \alpha_1 x_1 + \alpha_2 x_2 + \alpha_3 x_3 + \alpha_4 x_4 + \alpha_5 x_5 + \alpha_6 x_6 + e$

where P denotes Gross or Net Profit Rate.

x_1 = Investment Turnover Ratio (%)
x_2 = Net Fixed Assets as proportion of Total Net Assets(%)
x_3 = Capital-output Ratio(%)
x_4 = Index of Production
x_5 = Rate of Inflation (Index Numbers) which is dropped out for Cross-Section Analysis.
x_6 = Rate of Growth of Capital (Per cent per annum)
x_7 = Debt-Equity Ratio (Per cent)

α_0 to α_6 are parameters and e is the error term.

2. Figures in brackets below the coefficients α_1 to α_6 denote T.(computer programme does not give T for α_0, the intercept.

3. Figures in bracket beloe $\bar{R}$ denote F-Ratio.

4. *, ** denote 5% and 1% level of significance respectively.

different explanatory variables (except x_2 i.e. Net Fixed Assets as Proportion of Total Net Assets, which is dropped for all the fitted relations on account of multi-collinearity) provide explanation of variations in gross profit rate among different industries in the range of 25% to 66%.

Table 7.3 reveals that Capital-Output Ratio, x_3, is the most important factor in determination of inter-industry gross profit rate. This is true for all the years from 1951-52 through 1974-75. This is obvious from the fact that coefficient of Capital-Output Ratio is statistically significant in all the twenty-four fitted relations. Moreover, this coefficient, α_3, assumes negative sign which confirms to our postulated negative relationship between profitability and Capital Output Ratio. However, the coefficient is observed to be varying widely in value from -.0107 (for 1958-59) to -.0252 (for 1969-70). This implies that if Capital-Output Ratio rises by one percentage point than gross profit rate of industries falls by .0107 and .0252 percentage point for the year 1958-59 and 1969-70 respectively.

Rate of Growth of Capital, x_6, is found to be the second factor responsible for inter-industry variations in gross profit rate. Table 7.3 reveals that x_6 had been significant in Two (out of Seventeen) fitted relations only viz.,

for the years 1956-57 and 1968-69. The coefficient of x_6 is observed to be having positive value[16] for the above mentioned two relations which confirms to our expectations. It implies that, Indian Manufacturing Industries had not reached the saturation point of expansion during these two years at least. In short, it does not confirm to the converse functional relationship between growth and profitability as suggested by Marris, R. and Penrose, E.T. However, this variable has been significant in two out of seventeen fitted relations for which it is retained. Hence, overall performance of x_6 can be said to be very weak.

Tunover Assets Ratio, x_1 is found to be the another variable which amounted for inter-industry variations in gross profit rate for the fitted relation for one year only (out of 23) i.e. 1959-60. The Coefficient of x_1, for the fitted relation of 1959-60 assumes postulated positive sign[17] (statistically significant). $_1$, the coefficient of x_1 assumes value around .0197 (significant at 5% level) which indicates that when Turnover Assets Ratio is raised by one percentage point, gross profit rate of industries, is raised

16 The coefficient α_6 of this variable assumes positive sign in Eight out of remaining Fifteen Relations while it has negative sign for the remaining sign relations. However, these coefficients are statistically non-significant.

17 The coefficient of x_1 assumes positive sign in Fourteen out of remaining Twenty-Two relations while in Eight relations it assumes negative sign. These Coefficients however are statistically observed to be non-significant.

by .0197 percentage point in 1959-60. This implies that during 1959-60, industries having larger sales per unit of amount invested, also experienced higher profits and vice-versa.

As far as variable x_4, i.e. Index of Production, is concerned, The Table indicates that it has no significant influence on gross profit rate of different industries. This is obvious from the fact that x_4 has not turned out to be statistically significant in any of the fitted[18] relations (i.e. 15 relation) in which it is retained. This implies that whether the output of an industry is relatively larger or smaller matters least when one considers the inter-industry variations in gross profit rate.

While summing-up therefore, we can conclude that Capital-Output Ratio has been observed to be the most effective factor in inter-industry variations in gross profit rate.

(B) Gross-Section Analysis :

(ii) Net Profit Rate : Table 7.4 highlights the results of inter-industry analysis with respect to net profit rate following conclusions are derived from the table 7.4.

The Linear Multivariate Model has proved to be a 'good fit' for majority of the fitted relations, i.e. Fourteenout of

18 The coefficient of x_4 assumes positive signs for two fitted relations and negative for remaining 12 ones. However, the coefficients are statistically non-significant.

Table 7.4 : Multiple Regression Results for "Determinants of Net Profits Rate"
(Cross-Section Analysis for Different years)

Year	(α_0)	Turnover Assets Ratio x_1 (α_1)	Net Fixed Assets as proportion of Total Net Assets x_2 (α_2)	Capital-Output Ratio x_3 (α_3)	Index of Production x_4 (α_4)	Rate of Growthof Capital x_6 (α_6)	Debt-Equity Ratio x_7 (α_7)	$\bar{R}^2$
1	2	3	4	5	6	7	8	9
1951-52	17.674	.0157 (1.0362)	-	-.0178** (-3.6327)	-	-.1054 (-.7816)	-.0310 (-.4327)	.3666* (3.894)
1952-53	17.678	.0117 (.8811)	-	-.0195** (-7.2759)	-.00069 (-.0188)	-	-	.7306** (19.082)
1953-54	16.506	.0164 (1.4441)	-	-.0164** (-4.5894)	-.01752 (-.7028)	.0124 (.0996)	-	.5639** (7.644)
1954-55	19.715	.0037 (.2265)	-	-.0227** (-4.9585)	-	-.0718 (-.2878)	.0454 (.5177)	.5248** (6.522)
1955-56	13.497	.0173 (.9822)	-	-.0110 (-1.4352)	-	-.0159 (-.8273)	.0089 (.0849)	-.0137 (.933)
1956-57	13.224	.0134 (.9453)	-	-.0158** (-3.0671)	-.01054 (-.1.8689)	.4514* (2.8736)	- -	.3658* (3.884)
1957-58	10.135	.0071 (.3575)	-	-.0097 (-1.5876)	.00005 (.0137)	.1106 (1.2799)	-	.0638 (1.341)
1958-59	10.808	.0104 (.7038)		-.0049 (-.9041)	-.00135 (-.4365)	-	-	-.0582 (.633)
1959-60	8.205	.0196 (1.5786)	- -	-	.00125 (.5135)	.1905 (.8171)	.0643 (1.0921)	.0172 (1.087)
1960-61	13.832	.0107 (1.4281)	-	-.0082 (-1.9590)	-	.0024 (.2541)	-	.1678 (2.344)
1961-62	15.703	-	-	-.0168** (-4.5577)	-.00056 (-.8294)	.1079 (1.7280)	.1154* (2.2810)	.5634** (7.452)

Table 7.4 : (contd.)

1	2	3	4	5	6	7	8	9
1962-63	13.261	-.0134 (-1.1476)	-	-.0050 (-.7748)	-.00030 (-.3247)	.0651 (.4167)	-	-.0569 (.731)
1963-64	9.340	-.0118 (-1.2348)	-	-	.00030 (.5755)	.1136 (1.0816)	.0316 (.5331)	.1554 (1.920)
1964-65	11.420	.0071 (.6849)	-	-.0074 (-1.4040)	.00062 (1.1932)	-	-	.1535 (2.209)
1965-66	13.334	-.0024 (-.1945)	-	-.0086 (-1.4735)	-	.0317 (1.5606)	-	.2118 (2.7915)
1966-67	12.352	.0091 (.7466)	-	-.0120* (-2.5639)	-	.3897* (2.6548)	-	.3736* (4.976)
1967-68	2.957	-.0074 (-.5204)	-	-	.00032 (1.0150)	.5514* (2.6210)	-	.3047* (3.922)
1968-69	11.656	-.0057 (-.5145)	-	-.0113 (-1.9754)	-.00011 (-.5409)	.7534* (2.7477)	-	.3186* (3.338)
1969-70	17.706	-.0051 (-.4257)	-	-.0184* (-.2.7517)	-.000002 (-.00849)	.5556 (1.8985)	-	.2531* (2.694)
1970-71	2.359	-.0060 (-.6704)	.1672* (2.1701)	-	.00039* (2.3443)	.0129 (+.2117)	-	.3064* (3.099)
1971-72	19.282	-.0147 (-1.5827)	-	-.0158** (-3.0490)	-	-	.0274 (.4131)	.3754* (4.806)
1972-73	14.145	-.0167 (-1.8341)	-	-.0125* (2.7084)	-	-.0881 (-.3855)	.1120 (1.5261)	.3859* (3.984)
1973-74	8.655	.0149 (.5859)	-	-.0186* (-2.3429)	.0000003 (.001677)	.2673 (.5212)	.2530 (1.3836)	.0906 (1.378)
1974-75	19.370	-.0083 (-.8050)	-	-.0125** (-3.1939)	-.000006 (-.0858)	-	-	.3281* (4.093)

Notes to Table 7.4

Source: Table 3.2 and Appendix Table VII.I to VII.VII.

Notes : 1. Regression Equation = $P = \alpha_0 + \alpha_1 x_1 + \alpha_2 x_2 + \alpha_3 x_3 + \alpha x_4 + \alpha_5 x_5 + \alpha_6 x_6 + \alpha_7 x_7 + e$

Where P denotes Gross or Net Profit Rate

x_1 = Turnover Assets Ratio (Per cent)

x_2 = Net Fixed Assets as Proportion of Total Net Assets (Per cent)

x_3 = Capital Output Ratio (Per cent)

x_4 = Index of Production (Index Numbers)

x_5 = Rate of Inflation (Index, Numbers) whichis dropped out for cross-section analysis

x_6 = Rate of Growth of Capital (Per cent Per Annum)

x_7 = Debt-Equity Ratio (Per cent)

α_0 to α_7 are parameters and e is the error term.

2. Figures in brackets below the coefficients α_1 to α_7 denote T. (Computer programme does not give T for α_0, the intercept).

3. Figures in bracket below $\bar{R}^2$ denote F-Ratio.

4. *, ** denote 5% and 1% level of significance respectively.

twenty four fitted relations. This is obvious from the fact that $\bar{R}^2$, the coefficient of determination is statistically significant at 5% (in Ten fitted Relations) and 1% (in Four fitted relations) level of significance. However, the degree of explanation of inter-industry variations in net profit rate provided by different explanatory variables differs widely. This is revealed from the value of $\bar{R}^2$ which ranges from .2531 (1969-70) to .7306 (1952-53).

Amongst the different explanatory variables, Capital-Output Ratio, i.e. x_3, is observed to be most effective determinant of inter-industry net profit rate (same is observed for gross profit rate also). This is obvious from the results of Table 7.4 which denotes that x_3 is statistically significant (with negative sign) in Twelve out of Twenty fitted relations. Moreover, its coefficient assumes negative sign for all the fitted relations (i.e. Twenty) which confirms to our assumption of negative associationbetween x_3 and net profit rate. This implies that industries capable of improving the productivity of capital can raise their net profit rate and vice-versa. In other words, industries having less capital intensive technology (lower Capital-Output Ratio) would reap higher profit rate while those having more capital intensive techniques would suffer from lower profit rate (net) in a given year.

Table 7.4 further reveals that the coefficient of x_3 varied widely in value from -.0120 (1966-67) to -.0227 (1954-55).

Rate of Growth of Capital, x_6, is found to be another explanatory variable influencing inter-industry net profit rate. This variable is observed to be statistically significant in Four out of Nineteen fitted relations for which it is retained. It is found to be having positive coefficient (significant at 5% level) for all these four fitted relations[19] for the years 1956-57, 1966-67, 1967-68 and 1968-69, ~~[illegible]~~ α_6 being .4511, .3897, .5514, .7534 respectively. This indicates that there is a positive association between net profit rate and growth of industries.

This implies that in Indian there is still scope for expansion of Indian Manufacturing Industries. This is observed to be true in late seventees and confirms to our expectation. However, it does not support the converse functional relationship between profitability and growth as suggested by Marris R. and Penrose, E.T.

As far as variable x_2 i.e. Net Fixed Assets as Proportion of Total Net Assets, is concerned, it is retained for

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19 The coefficients of x_6 for Eleven out of remaining Fifteen relations assumes positive sign while for four relations it takes negative sign. These coefficients are however statistically nonsignificant.

one fitted relation only i.e. for 1970-71 and its coefficient is observed to be positive (α_2=.1672) and is statistically significant too. (In all other fitted relations this variable is dropped out on account of multi-collinearity.) This implies that positive association existed between x_2 and net profit rate of different industries for the year 1970-71, which is contrary to our assumption of negative association between the two. Hence this requires further investigation.

As far as Debt-Equity Ratio, x_7 is considered, it is also statistically found to be significant in one i.e. 1961-62, out of Nine fitted relations for which it is retained. Its Coefficient assumes positive sign[20] (which is significant at 5% level) as per our assumption. α_7, the coefficient of Debt--Equity Ratio assumes value around .1154 for this fitted relation which indicates that when Debt-Equity ratio is raised by one percentage point, the net profit rate is raised by .1154 percentage point and vice-versa. This implies that debt-financing proved as a cheaper source of finance, which resulted in raising the net profit rate of different industries during 1961-62.

The Index of Production , i.e. x_4 is also observed to be affecting inter-industry net profit rate in one (for 1970-71) out of Sixteen fitted relations.[21] The coefficient of x_4 is found to be having positive sign as per our hypothesis and

20 The coefficient of x_7 assumes positive sign in case of Seven out of remaining Eight fitted relations, while it assumes negative sign for one relation. These coefficients however are statistically non-significant.

21 The coefficient of x_4 assumes positive sign for six and negative for nine fitted relations out of remaining 15. However these coefficients are statistically non significant.

indicates that there existed positive association between net profit rate and growth of output of different industries during 1970-71.

Turnover Assets Ratio, x_1 has been observed to be exerting no influence on net profit rate as it is statistically non-significant in all the fitted relations (23 in total) for which it is retained (However it carries positive sign for thirteen fitted relations and negative for Ten ones, though the results are statistically non-significant). More or less similar type of tendency is observed for gross profit rate.

In short, Capital-Output Ratio, x_3, has been the most influential factor in inter- industry variations of net profit rate.

V. CONCLUSIONS

(A) Time Series Analysis :

(1) The linear multivariate model has proved to be a 'good fit' in majority of the fitted relations. This is true for both the concepts of profitability.

(2) Capital Output Ratio, x_3, has been found to be the most effective determinant of profitability (both). It is

observed to be negatively associated with profitability as per our hypothesis. This implies that industries which raised the productivity of capital over time (i.e. lowered the Capital-Output Ratio) could raise their profitability too and vice-versa.

(3) Index of Production, i.e. growth of output of the industry is found to be second best explanatory factor in determination of profitability of an industry. It is positively associated with profitability and confirms to our hypothesis. Hence, larger the output, more is the sales revenue realized and higher is the profitability achieved by the industry. This variable has been observed to be more effective with respect to gross profit rate than net profit rate.

(4) Turnover Assets Ratio, x_1, is 3rd best determinant of profitability. It is positively associated with profitability in majority of the cases and hence confirms to our postulated hypothesis.

(5) x_2, i.e. Net Fixed Assets as Proportion of Total Net Assets is observed to be exerting more influence on gross profit rate than on net profit rate. Except in case of Aluminium Industry, this variable is found to be negatively associated with profit rate and confirms to our hypothesis.

This implies that increasing proportion of fixed assets in total assets results in a technological barrier and therefore affects the profitability of the industry adversely and vice-versa. This confirms well to the arguments forwarded by Prof. Marshall. (Please refer to Section II(ii) of this chapter for details).

(6) Inflationery Trend in the economy has been observed to be advantageous in case of two industries only, viz., Edible Vegetable and Hydroganated Oils and Other Chemical Products. This is proved from the fact that x_5, i.e. Rate of Inflation is observed to be significant for these two industries only and has positive coefficient which confirms to our hypothesis.

(7) Rate of Growth of Capital, x_6, is observed tobe asserting no influence on gross profit rate while it is found to be significantly affecting the net profit rate of Medicines and Pharmaceutical Preparations Industry Positively. This implies that there exists some scope for the expansion of this industry.

(8) Debt-Equity Ratio, x_7, is observed to be positively associated with net profit rate of two industries, viz., Silk-Rayon and Woollen Textiles and Aluminium Industry. This implies that debt financing has been a cheap source of

finance which resulted in the raising of the net profit rate of these two industries. However, in case of Ferrous-Non-ferrous Metal Products Industry, x_7 is found to be negatively related which is contrary to our hypothesis and requires further investigation.

(8) In case of sector-wise analysis it is observed that Capital-Output Ratio, x_3, asserts top-most influence, followed by Turnover Assets Ratio (x_1) (More effective for gross profit rate), and Index of Production (more effective in case of net profit rate). As far as Rate of Inflation (x_5), is concerned it asserts influence on gross profit rate of consumers Goods Sectors only while Rate of Growth of Capital (x_6) is found to be more effective in case of net profit rate of Capital Goods Sector only.The Coefficients of x_5 and x_6 arenhaving positive signs as per our hypothesis.

(B) Cross-Section Analysis :

(1) The linear multivariate model has proved to be a 'good fit' in majority of the fitted relations. This is obvious from the value of $\bar{R}^2$ which is statistically significant at 5% or 1% level. This is true for both the concepts of profitability.

(2) Capital-Output Ratio, having negative coefficient is found to be exerting highest influence on inter-industry

rate of profit. It implies that industries with lower capital Output Ratio experienced higher profits and vice-versa.

(3) Rate of Growth of Capital, x_6, is found to be affecting the net profit rate more than gross profit rate. The coefficient of this variable, i.e. α_6, assumes positive sign indicating positive association between profitability and growth. This indicates that as far as Indian Manufacturing Industries are concerned, the saturation point of expansion has not yet been reached and there is still scope for expansion of these industries.

(4) Turnover Assets Ratio, x_1, is observed to be influencing gross profit rate only while x_2, x_4 and x_7 are effective in case of net profit rate only. However, the influence of these variables can be said to be very weak because they are found to be significant (having postulated signs for their coefficients) in one fitted relations each.

(5) Due to differences in the natures of different industries, their age structure, differences in their basis etc. we find that the regression analysis provides relatively less explanation in inter-industry variations in profitability, while in case of time series Analysis, the regression analysis has been more effective.