CHAPTER - IV
PRICE - COST MARGIN FOR THE INDIAN NON-ELECTRICAL AND ELECTRICAL MACHINERY INDUSTRIES DURING 1973-74 TO 1988-89 : AN ANALYSIS OF TRENDS AND DETERMINANTS
## Chapter - IV

**Price - Cost Margin for the Indian Non-Electrical and Electrical Machinery Industries During 1973-74 To 1988-89: An Analysis of Trends and Determinants**

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4.1. INTRODUCTION

A change in the structural composition of firms in an industry reveals the extent of diversification characterising the given line of manufacturing activity in a national economy. Consequent to industrial diversification, the manufacturing industrial activity in market assumes dynamic properties. This dynamism over time, alters the prospects of the industries in securing both short-term and long-term profitability. Economic analysis tends to capture these dynamic nature of profitability by conceptualising price-cost margin. This concept is different from the traditionally familiar accounting concepts of profitability. Selecting appropriate principle for pricing the commodities and services, also influence the level of profitability. The subject has a long history of emphasising the principle of marginal-cost pricing as the most appropriate basis.

Price-cost margin measures the surplus of income or profit generated in an enterprise over the aggregate cost incurred in producing a given volume of output. Price-cost margin is an important economic indicator of this surplus income. It has theoretical as well as empirical relevance in economics. Profitability, defined in an accounting terminology is fairly a simple phenomenon widely being used in assessing the operational efficiency of firms. Often we find inter-industry and inter-firm differences in profitability. There are several factors to which such variations in profitability are linked. The factors often used to explain profitability include, the absolute size of firms, the extent of market concentration, product diversification etc.
Other factors which are also considered include the market environment and the Research and Development expenditure, the policies relating to advertisement, marketing strategies and the principle used in pricing the products. Apart from such internal factors, external factors such as government policies with reference to taxes, incentive systems etc., also influence the profitability of the firms.

Price-cost margin, defines the profitability in a different way. This is a short term view of profitability based on current sales and current cost figures. The average price-cost margin is defined as the ratio of above variables. Price-cost margin thus measures the extent of revenue surplus i.e., price over the average cost of producing a given volume of output. The return on capital on the other hand, measures the surplus of operating expenses viewed from the base of operating investments i.e. capital employed. Typically the latter shows the marginal efficiency of capital employed in industrial enterprises or the long term profitability.

In the present research, an attempt is made to study the price-cost margin for the three digit industry categories and examine the behavioural pattern during the reference period and the factors determining it in the Indian Non-Electrical(35) and Electrical Machinery(36) manufacturing industries.

4.2. FACTORS AFFECTING PRICE-COST MARGIN

In the following section we discuss the factors influencing the price-cost margin in a dynamic industrial market environment.

4.2.1. CAPITAL-OUTPUT RATIO

The capital-output ratio is an important economic variable that directly exerts its influence on the price-cost margin of the firms. Other things being equal, it is predicted that a higher level of price-cost margin will be theoretically consistent with
a low capital-output ratio. In other words higher the productive efficiency of capital employed in the value adding process of a firm, higher will be the volume of price-cost margin.

4.2.2. SELLER CONCENTRATION

Various theoretical models on oligopoly market structure provide convincing proofs that the presence of seller concentration will enable the dominant firms to charge prices well above the long-run average costs. Thus, theoretically price-cost margin of the firms are positively influenced by the extent of seller concentration that characterises an oligopoly market.

4.2.3. BARRIERS TO ENTRY

The conditions of entry faced by the firms into an industry also plays a vital role in determining the behaviour of prices in a market. The presence of collusion among firms in an oligopoly causes entry barriers for the new firms. Consequently such entry barriers lead to a situation in which the existing firms in the industry will continue to enjoy high price-cost margin. The conventional price theory alternatively argues that when entry barriers does not exist, the price of the product in the market cannot in the long-run, exceed the average cost of production. Hence, the presence of barriers to entry provides the basic condition for the price of the products to exceed the average cost of production. Empirical evidences in this regard also suggest that seller concentration and the entry conditions for the new firms in the industry be concurrently taken into account in order to explain the size of price-cost margin and its variations across the industries. Bain[1] observed that the economies of scale, product differentiation, patent rights etc. to be important elements that will cause barriers for the entry of firms in to an industry. He observed that industries in which a high degree of concentration of firms exist tend to enjoy higher return vis-à-vis firms that operate in a competitive industrial system.
4.2.4. GROWTH OF DEMAND

Differing market demand conditions for the various industrial output has a positive influence on the price-cost margin of the participating firms. This is due to two reasons. First, firms in industries facing rapid growth in demand, operate relatively at a low level of competitive pressures than in industries where growth of market demand is less. In the case of oligopolistic industries where fixed costs are relatively high, slow growth rate or decline in demand may cause the collusive oligopoly to break, leading the firms to operate under joint-profit maximisation pricing behaviour. This in turn will reduce price-cost margin secured by the firms.

4.3. THEORETICAL FRAME WORK

The theory of price determination takes into account the market structure, in explaining variations in the pricing behaviour across the industries. Whether prices tend to be affected by short-run demand and supply conditions or whether prices change only occasionally in response to changes in 'full costs' are generally traced to the extent to which markets are competitive or oligopolistic[2]

The best and most up-to-date test of the role of concentration has been studied by Eckstein and Wyss[3]. They have estimated price equations for 16 two and three digit manufacturing sector industries using quarterly data. Price differences across the industries was traced by using industry concentration levels. Demand and cost variables, in their study provided a good fit in the more competitive sectors, whereas in the more concentrated industries, the variable viz. the full cost pricing provided statistically a superior fit. Capacity utilisation, which Eckstein and Wyss have used as a proxy for the short-run market disequilibrium arising due to pricing inflexibility. It has proved to be significant only in oligopolistic industries with medium concentration levels.
Eckstein and Fromm's[4] classic study on industry pricing, outlines two predominant models of industry pricing:

- a competitive model in which prices respond to changes in short-run demand and marginal cost functions, and
- an oligopolistic full cost pricing model in which prices do not respond to short-run changes in the market conditions, but adapt slowly to changes in the long-run level of unit costs.

The latter is defined to be that level of costs associated with some standard or projected rate of output and hence may presumably average out any short-run random fluctuations in demand.

The principal issues in specifying equations to test these alternative formulations involve how short-run versus long-run factors are to be represented. To test the applicability of the competitive market model, changes in demand and short-run marginal cost must be included in the price equation. Unit labour and material costs are the most important elements in the short-run marginal costs. Variations in capacity utilisation can also be used as a useful proxy variable for short-run changes in cost. Because, many inputs are fixed in the short-run, changes in utilisation rates will be directly related to short-run marginal costs. However, periods in which utilisation rates rise to very high levels may be ones in which short-run marginal costs are rising as capacity is strained. Sharply rising utilisation rates may also be a useful proxy variable for assessing demand conditions, or lengthening delivery schedules and order backlogs.

There are no observable measures of ex-ante shifts in the short-run demand curve. However, orders, output and utilisation rates all may be useful in describing demand shifts. Changes in these variables reflect both ex-ante demand shifts and
price behaviour in the market. Variation in unfulfilled orders, excess inventory stocks or lower utilisation rates were labeled by Eckstein and Fromm [5] as the ‘dis-equilibrium phenomenon’. No change in price might imply no large scale dislocations required to maintain stable inventories, backlogs in unfulfilled orders, or the utilisation rates. All other things being equal, larger swings in these variables will be observed in industries with less flexible prices. Even in competitive industries with quite flexible prices, utilisation rates, deliveries and order backlogs are not constant at every point in time. Both changes in order backlogs or delivery rates and price changes are part of the short-run market clearing process. At the level of aggregation typically used in 'industry' studies, these variables are, therefore useful proxies for analysing shifts in ex-ante demand.

Eckstein and Wyss [6] suggest these variables to be useful in explaining prices also in less competitive sectors where prices are less flexible. Donald and Mahlon [6] postulate the reverse as a proxy for short-run market conditions, these ‘dis-equilibrium factors’ may prove insignificant in industries with a long-run full cost approach to pricing but should be significant in competitive industries as a measures of short-run changes in market conditions.

The customary formulation of the full cost pricing model assumes that most firms establish prices based on some concept of unit costs at a 'standard' level of output, but neglect short-run variations in demand or productivity. An implicit consensus on ‘full costs’ is that it can substantially reduce uncertainty in oligopoly markets. Generally, the literature has focused on the distinction between the long and the short-run as the key characteristic used by an industry in defining standard costs. One way of representing long-run influences in price equations is to select cost measures which are invariant to cyclical variation in output. Alternatively, cost measures with cyclical variations may be smoothed. A moving average eliminates short-run variations and hence is a useful description of ‘long-run’ cost influences.
Donald and Mahlon[7] in their study have observed that there may be circumstances in which current-period measures of market conditions may be a useful predictor of pricing decisions. In some instances a large increase in demand or cost in the current quarter indicates a change which will not be reversed. A change in negotiated wage rates or a price change of key material inputs are obvious examples on the cost side. Just what type of demand change can be constructed as signaling a 'permanent' shift is less obvious. In a period of large increase in demand or costs, which would allow the industry to raise its price without substantially affecting output, all firms may tacitly agree that a formula based on a weighted average of past period prices or costs to be no larger relevant. During such periods, short-run market conditions as reflected in current quarter data on order backlogs, utilization rates, or input prices are highly visible to all and may prove relatively easy to use as a basis for tacit agreement on prices. The inclusion of such variables in current quarter may prove to be significant for the oligopolistic and competitive industries alike.

4.4 COST IMPORTANCE AND PRICE-COST MARGIN

Profit maximisation and the theory of derived demand provide the theoretical basis for studying the relation between price-cost margin and the importance of cost. First order condition for the short-run profit maximisation of a firm (or joint profit maximising cartel) require that the equilibrium price-cost margin i.e. price minus marginal cost, divided by price to be the inverse of the elasticity of demand, or, in the case of producer goods, the inverse of the elasticity of derived demand. Only the relation between the importance of cost and derived demand elasticity is needed to complete the chain[8].
This relation seems to have been discussed first by Marshall[9]. Hicks[10] and Allen[11] extended and formalised Marshall's results. Hicks formula for the elasticity of derived market demand is

\[
\lambda = \frac{\sigma (\eta + e) + ke (\eta - \sigma)}{\eta + e - k(\eta - \sigma)} ... ... ... ... ... \quad [1]
\]

Where,

- \(\lambda\)-the elasticity of derived demand,
- \(\sigma\)-elasticity of substitution between the relevant input and 'all other inputs taken together',
- \(\eta\)-the absolute value of the elasticity of demand for the output of the purchaser of the input,
- \(e\)-the elasticity of supply of 'other inputs', and
- \(k\)-the proportion of the costs of the input-purchasing product accounted for by the relevant input'[12].

As 'e', the elasticity of supply of all other inputs, approaches infinity, equation [1] reduces to

\[
\lambda = k\eta + (1+k)\sigma ... ... ... ... ... \quad [2]
\]

the formula developed by Allen in modeling the individual demand for an input by a single competitive firm assumes a constant returns to scale production function. The Allen formula applies as well to the case of a competitive industry buying an input, provided that other inputs are not specialised to that industry[13].

If, we think in terms of an industry selling a good, \(X\), which some \(Y\) industry uses as an input, then we can interpret equation(2) to mean that \(\lambda\), the elasticity of
derived demand for X, will increase with k, the share of X in the total production costs of Y, if η, the demand elasticity for Y, is greater than the elasticity of substitution between X and all non-X inputs in the production of Y. For the X-industry, it will be important to be unimportant' - in the Marshallian sense of increasing the freedom to raise price by lowering derived demand elasticity - only if (η-σ) is positive.

Of course, industries do not sell products unless they are monopolies or joint profit maximising cartels. If we are to understand the relation between cost-importance and price-cost margins measured at the industry level, we must begin by analysing how cost-importance interacts with other variables in determining the elasticity of derived demand for the individual firms within an industry.

We can apply the equation (2) to the derived demand elasticity for the output of either a firm or an industry, provided that σ is appropriately defined. In the context of an industry selling X, the appropriate σ in the equation (2) is the elasticity of substitution between X and all other (non X) inputs taken together, what we might call the 'industry specific' elasticity of substitution. If, instead, we consider a representative firm within the X industry selling its output, the all other inputs taken together will include the output of other firms within the X-industry. As a result, the firm specific level of σ will be a function both of the industry specific σ (which sets the lower bounds) and the ability of X-buyers to switch from one X-supplier to another.

The elasticity of substitution between X and all other (non X) inputs is likely to be quite low in the short-run. Thus, for the representative X-industry firm, the sign of (η-σ) and consequently the relation between cost importance and derived demand elasticity is likely to depend largely upon the extent to which the firm-specific σ is
evaluated by the ability of X buyers to profitably switch from one X supplier to another in response to price differences. This in turn seems to depend upon two factors viz., the transaction costs involved in changing X-suppliers, and the degree of pricing coordination among X-industry firms.

4.5. DETERMINANTS OF PRICE-COST MARGIN AND THE TOOLS OF ANALYSIS

Many factors influence the price-cost margin. Among them the most significant are the relative share of the market by the individual industrial units (at three digit) in the aggregate market of the industry and the capital-labour ratio. In order to trace the effects of these two factors on price cost margin, a model has been formulated having the neo-classical theory of market structures as the basis.

The neo-classical theory of competitive market structure discusses at length how the extent of diversification influences the profitability of the industries. In other words, the degree of competition influences the profit earning capacity. The industrial growth in a dynamic economic system helps the very size of the markets to expand. The increase in the relative market share of the industrial units in the aggregate over a period could be considered as an indicator to know whether or not a particular industry is growing in a relative context at a faster rate than other industry categories. The degree of competition that prevails in an industry could be measured by the market share that it accounts for in the aggregate. Highly competitive industrial structure would lead to a depression in the profit earning capacity.

Capital-intensity is typically measured in empirical studies as the ratio of capital invested per unit of labour. The magnitude of capital intensity can have a positive influence on the price-cost margin provided that the capital capacity is utilised fully. In other words, the capital must be fully productive to contribute towards realising more output. Capacity utilisation, thus, becomes a matter of great
concern in manufacturing industry because any under-utilisation of capacity would result in higher overhead charges per unit of production which naturally would result in escalating the unit cost of production, i.e., a low price-cost margin. Thus, the profitability as measured by the price-cost margin tends to decrease. The under utilisation of capacity in the industries due to shortage of raw materials, inadequate power, shortage of working capital, labour unrest, machine breakdowns, lack of demand etc., could also contribute to a negative relationship between the price-cost margin and capital-labour ratio. There is a need to carefully relate the capital-labour ratio with the profitability of industries.

The size distribution of the firms in industries, economies of scale, barriers to entry, product diversifications, patent rights, licensing, advertisement, etc., together make market structure of the industry imperfect. As a result of which some firms having greater share in the industry will be able to control prices and marked supply in such a way that they get maximum surplus. Absolute monopoly is the extreme case of monopoly power where maximum profits are associated with. The concentrated markets having either 'homogeneous' or 'differentiated' oligopolistic structures would come in the next order as far as monopoly power is concerned and so would be having considerable impact on the occurrence of profits. The perfect competition would be the extreme polar case of absolute monopoly. In such a situation there will be no scope for super normal profits. However, economists perceive such super normal profits to occur only in the short-run.

Whatever be the conditions in which profits occur to firms i.e. due to the implicit earnings of the entrepreneurship and or reward for risks, uncertainties, and innovations, or a return due to monopoly power, it is an essential reward for the firms to continue operating in an industry/market. In fact, as Joel[14] remarked, 'a business firm is an organisation designed to make profit, and profit is the primary measure of its success'. A business firm needs profit for survival, satisfaction, stability
and growth even when it tries to achieve a goal other than the profit maximisation. However, ambiguity in defining profit, in an universal sense has been pointed out by economists. Their definition does not exactly fit with the one employed by the accountants. Besides this lack of universal definition, there are other controversies in defining profit. These relate to whether profit should be gross or net of interest and taxes, or whether it should refer to the short-term profit or the long-term one. For a small firm managed by a proprietor himself the implicit costs will be parts of his profit but large corporations where there is complete separation between ownership and management, there will not be any implicit costs and therefore the concept of profit resembles with the one given by the economists.

The treatment of interest on loan capital in profit accounting is not unambiguous. If actual interest payments, have been deducted before the calculation of profit, then comparison of profit between firms will be affected by their debt-equity ratio or the gearing ratio. On the other hand, if interest is not deducted, than the comparison of profit will be affected by the inter-firm differences in capital intensity. Similarly, provision of depreciation and taxes create serious conceptual and measurement problems in profit analysis as they are likely to vary from firm to firm depending on the method of estimation and the specific taxation laws in practice. Firms may follow different methods for arriving at depreciation provisions.

Let us go back to the profit accounting identity and summarise some of the problems in conceptualisation and measurement of profit in precise terms. Given,

\[ \pi = R - C \]  \[1\]

where

\[ \pi = \text{Total profit} \]
\[ R = \text{Total revenue} \]
\[ C = \text{Total costs of production}. \]

\( \pi \) is gross or net depends on what is included in 'c', we may express
\[ C = g.k + D \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad [2] \]

where,

- \( k \) = capital stock in value
- \( g \) = the return covering depreciation, interest and risk premium appropriate to the industry.
- \( D \) = direct cost such as labour cost, material cost, fuel and power, selling costs, managerial remuneration.

Total revenue \((R)\) is the income that accrues to the firm by sale of commodities/output in the market at the prevailing price. By and large, there will not be any ambiguity in the measurement of ‘\( R \)’ except some difficulty in the valuation of inventories and a conceptual problem related to whether equipment sold should be treated as income or recovery of capital invested. The later interpretation makes sense so it should normally be excluded from computation of profit.

The cost side of the profit equation \((1)\) also has serious conceptual issues to be reckoned with. Let us examine the elements of direct cost first. It includes all items of costs, implicit or explicit except depreciation and imputed interest which are accounted by ‘\( gk \)’. For large firms where there is complete divorce between management and ownership, there will be no implicit costs of entrepreneurship but in small units, entrepreneurs do perform management functions and employ their self-owned resources in business for which they get payment in implicit form. What should be the criteria for such payments is not well defined in literature. So, if such payments are included in the direct costs \((D)\), they are likely to cause a bias, as entrepreneurs may have fixed high costs for their services. To avoid such bias probably accountants are right in excluding them from ‘\( D \)’ but in economics it makes no sense to exclude them.
Direct costs includes selling and advertisement expenditure also. There is however some doubt about their inclusion as costs. Through such costs particularly by advertisement expenditure, a stock of 'goodwill' is created in the market for the products of the firm. 'Goodwill' is an intangible asset and any expenditure on it should therefore be interpreted as capital expenditure. On this account it is argued that advertisement and selling expenses should not be included in direct cost. Only the depreciation expenditure on capital should be included in the direct cost. However, in practice advertisement and selling expenses are treated as annual cost items and therefore, they are included in the cost while profits are estimated. The other element of cost, i.e. 'gk' which is defined as capital cost, showing annual depreciation, imputed interest and risk premium, is very much difficult to be measured precisely. There are difficulties in measuring the stock of capital 'k' and the rate 'g'. There is no satisfactory measure for 'k'. It may be expressed at historical cost as accountants generally do, but economists argue that replacement costs are again difficult to be assessed precisely. What will be the current costs of assets in use is difficult to find as there will not be second hand markets in which their opportunity costs may be evaluated. Again, whether gross value of 'k' is to be taken into account or the net value, is also an area of dispute. Net value makes sense from accounting sense but it is common practice to use gross value of 'k'. The rate of depreciation which is a major component of 'g' has no unique value, it depends on the method of depression accounting chosen by the firm such as straight line depreciation method, declining balance method, etc.

Similarly, the amount of imputed interest is difficult to be assessed precisely because multiple rates should be chosen to compute the opportunity cost of capital. But, it is not easy to decide. The coverage of risk margin is also difficult to find as there are no set methods for this. Subjective judgment plays dominant role in assessing the risk involved in a business. On the whole, the estimation of capital cost component of total cost is difficult and sometimes quite arbitrary, which will affect
the profit calculation very much. The total amount of profit, whatever be its definition and the measuring procedures adopted it has little consequence unless it can be meaningfully related with the business operations. For this reason, the profitability of a business is generally defined in terms of a profit rate which expresses total profit as a percentage of either total assets or sales or any other conceptually strong denominator. Total assets ('k' as denoted above) can be expressed in gross or net terms, either at historical or replacement costs. One may use total value of fixed assets instead of total assets to compute the profit rate. Similarly, one may take total sales in gross terms or net of particular input costs such as selling expenses. What should be used in the denominator while computing profit rate depends upon the objective or the specific stand point from which it is being measured. A shareholder will be interested in the relationship between net profit and nominal value of share capital, a salaried manager may be concerned with effective utilisation of all resources, he may therefore prefer to compute profit rates using sales or total cost as denominator. Both sales and total cost of production are annual flows. The profit rates obtained by using them as denominator will therefore give us a short-term perspective of profitability. Price cost margin is the indicator of this short term perspective of profitability and the return on total assets on the other hand will give us a long term perspective of profitability.

Hence, Price-cost margin assumes importance in economic analysis. It has theoretical as well as empirical relevance. Price-cost margin shows the extent of surplus or profit generated over its average cost. It is thus an indicator of profitability.

By keeping the above discussed points, a model has been formulated to estimate empirically the price-cost margin and examine its determinants in the Indian Non-Electrical Machinery(35) and the Electrical Machinery(36) manufacturing industries at three digit level desegregation. To define profitability (short-terms) we can use Price-cost margin as an indicator. It is based on current year data on sales and
cost of production. It is used to refer to the gross return on sales measured in percentage. The gross-return on sales, thus equals to the value of output minus direct variable costs of production including the overhead costs viz., materials and fuel purchases, salaries and wages and related expenses and outlays for purchased services like repairs and maintenance, advertising etc. except interest and depreciation.

There are many possible ways to measure price-cost margin and return on capital in terms of certain ratios depending on the choice of the variable. It depends on the purpose of the study and convenience by which it can be used on the available set of informations. We may express the measures of price-cost margin and return on capital based on the Annual Survey of Industries (ASI) data in our analysis here. The typical measures of price-cost margin are expressed as:

1. Gross price-cost margin = \( \frac{R - D}{R} \)
2. Net price-cost margin = \( \frac{R - C}{R} \)

Where,

- \( R \) = Total Value of products (Total Value of Output)
- \( D \) = Total Direct Cost (Total value of inputs + Labour Cost (i.e. Total Emoluments))
- \( C \) = Total Cost of Production (Total direct cost + Depreciation)

The return on investment or long term profit, as it is commonly refereed to, is the residue of earnings which remains after meeting all costs including depreciation. This residue as a percentage of the total amount of capital invested in an enterprise is termed as the 'Return on Investment'. It is otherwise known as 'Return on Capital'. This profitability measure is expressed as:
3. Gross return on capital = \( \frac{R-D}{K} \)

2. Net return on capital = \( \frac{R-C}{K} \)

Where,

- \( R \) = Total Value of products (Total Value of Output)
- \( D \) = Total Direct Cost (Total value of inputs + Labour Cost (i.e. Total Emoluments))
- \( C \) = Total Cost of Production (Total direct cost + Depreciation)
- \( K \) = Total Assets (Net fixed assets)

In general, higher the value of the profitability indices, greater is the earning capacity of the firm or industry.

4.6. DETERMINANTS OF PRICE-COST MARGIN

By keeping the above discussed points, a model has been formulated to estimate empirically the factors influencing/determining price-cost margin of the Non-Electrical Machinery(35) and the Electrical Machinery(36) industries at three digit level disegregation for the time series data from 1973-74 to 1988-89. The model is linear in nature and takes the following form:

\[
\text{GPCM} = \alpha + \beta_1(K/Q) + \beta_2(Q/L) + \beta_3(K/L) + \beta_4(wr) + \beta_5(P_{t-1}) + \beta_6CU + \mu
\]

For the purpose of estimation, we have used this linear regression model based on the OLS principle. The parameter of the variable capital-output ratio \( K/Q \) viz., \( \beta_1 \) in the model measures the impact of capital productivity on the price-cost margin. The \( K/Q \) ratio indicates the extent of capital required to generate an unit of output. In a competitive system, growth of productive efficiency of capital is indicated by a fall in the value of the \( K/Q \) ratio. Hence, growth in absolute values of \( K/Q \) would
have an inverse relationship with the Price-Cost Margin. However, in its magnitude it has to be quite low. Despite an increase in $K/Q$ magnitudes, $\beta_1$ could assume a positive sign and signify an expanding scale of operation to be true in some industries. Thus, the sign property of $\beta_1$ would prove to be quite useful to know the nature of growth of price-cost margin during the reference period.

The parameter $\beta_2$ associated with variable $Q/L$ viz., labour productivity explains the nature and the extent of its relationship with the price-cost margin as prevalent during 1973-74 to 1988-89. Since, price-cost margin measures the surplus of the revenue over the cost of manufacture in which labour cost is also included, there should be an apparent relationship between price-cost margin and $Q/L$. However, since price-cost margin is a differential surplus there is possibility that despite increase in $Q/L$, the price-cost margin could register a decline over the years implying a situation where the productive contributions by labour do not result in improving price-cost margin. Such a situation would underlie the market environment in which the industry is facing constraints to pass on the benefits of productivity growth to the owners of the capital. In contrast, it is also possible that in a rapidly developing cost effective industrial system, productive contributions of labour can help the industry to increase its capability towards earning surplus of revenue over cost i.e., price-cost margin. Thus, labour productivity depending upon the nature and characteristics in which a particular industry is operating, the parameter $\beta_2$ can assume either a positive or negative magnitude.

The parameter $\beta_3$, in respect of the variable viz., the technology factor as measured by $K/L$, may reasonably be specified to assume a positive sign to imply that the technology modernisation have to make positive impact on price-cost margin. The underlying theoretical assumption is that technical change is a means to improve the rate of return in any competitive industrial system. It also has roots with modernisation as a means of promoting the earnings in manufacturing industrial
organisation. However, if for reasons beyond short-term corrections, additional capital per unit of labour might cause price-cost margin to decelerate and might indicate inefficient technology causing price-cost margin to retrogress. However, one has to remember the specifications of the model is with reference to only time series estimates as in our case. Thus, $\beta_3$ is expected to assume greater than zero but less than one magnitude.

The parameter $\beta_4$ measures, the relationship between wage rate and the price-cost margin. We have considered the wage rate as an important variable that should have an important bearing on the short-run profitability namely the price-cost margin. Traditionally, other things being equal if wage rate increases its effect is expected to decrease the rate of growth in price-cost margin. Such an argument rests with the celebrated conflict between surplus of revenue over cost and the extent of hike in wage bill consequent upon increases wage rate. Thus, $\beta_4$ when assumes a minus property would underline the rate of deceleration in price-cost margin on account of increases in the wage rate. But if there exists scope in the market environment for both price-cost margin and the hike in wage rates to simultaneously increase, then $\beta_4$ can assume a positive magnitude.

The parameter $\beta_5$, is related with the previous year price-cost margin in our model. In a growing industrial economy like in India, if other things remain the same, past magnitude of price-cost margin should exert a positive impact on the current year price-cost margin. This is to imply that over the years there would be a progressive rate of growth in price-cost margin. However, in an industrial system, where there are government policies which intervene and regulate the working of market mechanism as in India, mostly with a view to direct industrial growth from developing tendencies of market concentration fostered by long-run revenue surplus over cost, there are possibilities that $\beta_5$ can tend to assume a minus sign implying short-run declarations. It is to be pointed out the results do not refer to absolute
surplus over cost, but the rate of growth in price-cost margin if viewed from the point of view of previous year's price-cost margin.

The parameter \( \beta_6 \) measures the relationship between capacity utilisation and price-cost margin. Price-cost margin should depend considerably on the degree of capacity utilisation. There are two main reasons to expect this relationship. One, better utilisation of capacity reduces cost and wastages under the existing capacity, which in turn, other things remaining the same, would result in a higher price-cost margin and vise-versa. Two, lower rate of capacity utilisation generally will reflect slackening of demand or other internal constraints and therefore would be associated with lower price-cost margins, other things being equal. The opposite will be true when higher demand results in better capacity utilisation \[15\]. Thus \( \beta_6 \) is expected to assume greater than zero but less than one magnitude.

4.7. A REVIEW OF SELECT STUDIES

The empirical studies on Price-Cost Margin / Profitability is voluminous. We will hence, concentrate in this section, a review of select studies which will be fairly representative, in order to get an idea of the main trends of research in this field.

Most of the empirical studies which were conducted during the last few decades mainly were heuristic in nature. Based on the conventional hypothesis of industrial economics i.e., the link between 'market structure, market conduct and market performance', certain structural or conduct variables were chosen in the individual studies to find their impact on price-cost margin and profitability.

Schwartzman\[16\] in his study has investigated the effect of monopoly price on the price-cost margin. His main concern was to analyse the effect of market concentration on the average price-cost margin in the 61 American and Canadian
four digit manufacturing industries. He found a significant but faint positive relationship between price-cost margin and four-firm concentration ratio for the industries.

Collins and Preston[17] observed that four firm concentration appeared to be significantly associated with intra-industry differences in price-cost margin whether or not differences in capital-output ratios and other variables were taken into account. The association was substantially stronger in consumer goods industries than in the producer goods. Concentration proved to be particularly significant in explaining the margin of four largest firms in consumer goods industries, in which such firms had higher margins than all other firms. Marginal concentration appeared to have some negative impact on margins in industries within the intermediate (30-70 per cent) range of four firm concentration values and led the marginal concentration to strengthen competitive pressure in this range of market structure.


Rhodes and Cleaver[19] had repeated the Collins and Preston[20] experiment by using 1967 data. The results confirmed that four firm concentration was not significant in explaining variations in the price-cost margin in unconcentrated sectors, but had significance in more concentrated sectors. The discontinuity was confirmed by Meehan and Duchesneau[21] who showed that an eight firm concentration ratio of 70 per cent was a better discrimination than the equivalent four firm measure of 55 per cent.
In Holterman's[22] study none of the structural variables appeared to be significant because of the different specification of the variables employed. The major difference was in the sample size. He tried to include all three digit industries in his analysis. Khalilzadeh Shirazi[23] in particular excluded all industries with low product specialisation and poor concentration levels. Some of the industries were too heterogeneous to be appropriate for economic analysis, while for others the estimates of the explanatory variables have turned out to be unimportant. Inevitably this has affected the study in arriving at significant results. Secondly, this study did not give much importance for foreign trade, while recent studies in U.K on price-cost margin generally suggested that non-competitive market structure being associated with high profit margins once allowances were made for foreign trade. On the basis of these studies, it was not possible to isolate the individual effects of concentration and entry barriers because of their multicollinerity.

Cowlings and Waterson[24] indicated that concentration might have an independent effect on the price-cost margin. Their data covered changes in structure and performance over the period 1958-68 and indicated a significant positive association between changes in concentration levels and changes in price-cost margin. Generally the Herfindhal index appeared to be more useful than the concentration ratio in identifying changes in competitive structure.

Fama and Laffer[25], Orenstein[26], expected in their study no relationship between concentration and price-cost margins. The evidence suggested that the census measure of price-cost margin was particularly a poor measure in predicting excess profits. It was biased upwards for large firms with high fixed and variable costs. As result it produced a positive correlation with concentration. Orenstein[27] corrected price-cost margin by removing additional identifiable cost elements. After correcting the error and segmenting the sample more carefully, he found that there was no consistent association between concentration and the margin.
Phillips[28] in his study on “A Critique of Empirical Studies Between Market Structure and Profitability” observed that very little from empirical studies was known on the relation between market structure and profitability. Market concentration may be a cause of high profits or conversely market concentration and high profits may be the result of superior performance by few firms. In his study, he did not find reliable results showing the relationship between price-cost margin and concentration. Better theory, better data, above all, better econometric tools he felt are needed before policy can be based on anything other than institutional studies on particular markets.

Valamemmel and Brabander[29] have found that in the field of industrial organisation there seemed to be a need for a contingent theory in order to resolve the empirical inconsistencies produced so far between the relationship of price-cost margin and concentration. So inorder to sort out the relationship between price-cost margin and market structure, they gave a contingency approach. However, such an effort according to them could be successful only if the methodology was able to catch the contingencies covered in the data. In most of the studies, the analysis was restricted to the single regression equation. Such a model presupposes a straightforward approach to explain the underlying phenomenon. Hence, approaches based on simultaneous equation models could help to discover the so far undetected direct and indirect causalities.

Qualls[30] made a study on "Market Structure and Cyclical Flexibility of Price-Cost Margins". In this study he has hypothesised that the relationship between industrial concentration and cyclical flexibility of prices (or price-cost margins) to be positive rather than negative as conventionally held. This study dealt with issues by investigating the trend adjusted cyclical flexibility of price-cost margins for a sample of 79 four digit manufacturing industries for the period 1958-78. He found a
significant and positive relationship between industrial concentration and the cyclical 
flexibility of margin and as a pure statistical matter, the traditional hypothesis of a 
negative relationship between price-cost margin flexibility and concentration 
appeared to be rejected more strongly in the empirical results than an alternative 
hypothesis of no relationship between margin flexibility and concentration.

Waterson[31] tried to investigate the industry's price-cost margin of firms in 
downstream industries having seller market power. A theoretical model had been 
developed based upon Cournot's model, which predicted that margins were raised by 
an increase in successive market power. This prediction contrasted with the work of 
Lustagarten[32] who found that bilateral market power depressing the margins. 
Waterson found the successive market power had an independent role in explaining 
the observed trends in the margins.

In economic literature we come across a number of studies on profitability. In 
most studies profitability was used as the dependent variable. In these studies price-
cost margin was taken as a proportion of total cost or sales or equity to analyse the 
effect of market structure or conduct variables on it. Various measures of profit rates 
showed close correlation among themselves. It was therefore, not inconsistent to 
treat them as an approximate transformation or proxy to measure the price-cost 
margin.

Bain[33] in his pioneering profit-concentration study, found a negative 
relationship between profit and concentration for 42 U.S manufacturing industries. 
In other study, Bain[34] estimated barriers to entry in addition to concentration for 
20 U.S manufacturing industries for two periods of 1936-40 and 1947-51 and found 
that concentrated industries have had relatively higher returns when entry barriers 
were high or medium.
Stigler[35] found the four firm concentration ratio being positively associated with profitability in some years, but absent in others in the U.S manufacturing industries during the period 1950-1960. Bain[36] and Mann[37] have reported that profitability of industries with high entry barriers had different rates of margins from other industries. However no difference was found when substantial or low entry barrier were present in the industries.

Weiss[38] made a review work on "Case Studies in American Industry". In this work he reviewed over thirty studies on concentration. These studies were found reporting a significant but fairly weak positive correlation between the levels of concentration and profit. The relationship became statistically weaker when entry barriers were included as an additional independent variable. But, this was perhaps due to the correlation between barriers and concentration. If, the barriers were represented by discrete classed concentration then the conclusion appeared to have a greater effect on profitability when entry barriers were accommodated.

Shepherd[39] tried a number of market structure variables to see how they have affected the profitability in 231 large U.S corporations for the period of 1960-69. He found the rates of return were closely associated with market share, but less closely with concentration and entry barriers.

Leech and Grnat[40] in their study on "Profitability and Concentration in Australian Manufacturing Industries, 1970-71 to 1972-73 : A Further Examination", found that in the Australian manufacturing industries sales based measures (operating profit/sales) were linked positively and significantly with concentration but the fund based measures (operating profit/funds employed) showed a negative relationship. The main drawback of this study was the measure of profitability itself i.e., the defects in historical cost accounting has affected both its numerator and the denominator.
Round[41] in his study on "Profitability and concentration in Australian Manufacturing Industries, 1970-71 to 1972-73; A Further Examination", observed that Leech and Grant adjusted profitability ratios, which partly allowed for the effects of inflation had yielded a weaker and less significant relationship between profitability and concentration than was found in his work. When their basic model was more appropriately specified by including a capital-output variable, there has been even less evidence for a significant relationship between profitability and concentration. In general results on profit studies confirmed the results obtained on price-cost margin studies.

Baraburd[42] in his study on "Price-Cost Margin in Producer Goods Industries and the Importance of Being Unimportant" described the basis for a theoretical link between price-cost margins and cost-importance. He developed a measure of industry cost-importance based on data contained in the input-output table. He found a significant effect of cost-importance on industry price-cost margins for a large sample of well defined intermediate producer goods industries. The results are interesting for many reasons. They add a new variable, cost importance, to the industrial organisation arsenal of independent variables, one that contribute significantly to the explanatory power of the regression equations in this study. This result is particularly interesting in that cost importance is a market structural variable that has a significant impact on industry price-cost margins. It seemed for all practical purposes completely beyond the reach of policy intervention. The results shed some light on the role played by transaction costs in buyer-seller relations in producer goods industries and indicated moderate levels of transaction costs. Finally, and perhaps most importantly, the results provide information on the mechanism through which high concentration may affect manufacturing price-cost margins.
Ravenscraft[43] in his study on "Structure-Profit Relationships at the Line of Business and Industry Levels" has used the unusually rich and detailed FTC's (Federal Trade Commission) line of business data and provided several new insights into industry structure-profit relationships. These insights are consistent with a view that sees the economy as predominantly competitive. The profit-concentration relationship in industry regressions almost surely reflected the advantages that the larger sellers have enjoyed relative to smaller rivals were different. Concentration's effect, on profit was negative in the LB (Line of Business) regression and in some cases significantly negative, when the positive effect of market share is taken into account. Higher returns to advertising and assets, for sellers with larger market shares underlined a positive profit-market shares relationship. This, perhaps reflects higher product quality and lower unit costs in relatively large business units. Lower costs, rather than collusion to barriers to entry, appear to explain the positive returns attributable to vertically integrated diversified LBs, since in other LBs as the industry integrate or diversify, the advantage was less, instead of being high.

Berger and Hannan[44] made a study on "The Price-Concentration Relationship in Banking". By examining the price-concentration relationship they tested the structure-performance hypothesis in a manner that excluded the efficient-structure hypothesis as an alternative explanation of the results. The results strongly supported the structure-performance hypothesis and are robust with respect to model specification, measurement of concentration, and sound econometric technique.

There are relatively few studies done on price-cost margin in the Indian context. In the following section we examine such studies.

Asha[45] in her study of 'Price Cost Margin in Indian Manufacturing Industries' observed the cost factors in general to be more significant in determining profitability, i.e. price-cost margin. While the structural variables like concentration
ratio, capacity utilisation, output growth and capital intensity have yielded mixed pattern of influence in that in some were significant and in others not significant.

Gupta[46] made a study on "Cost-Functions, Concentration and Barriers to Entry in Twenty Nine Manufacturing Industries of India". The main findings of this study was the 'L' shaped long-run cost function in some manufacturing industries in India. The study also tested the hypothesis of a positive association between rate of profit and the type of entry barriers. He observed that none of the barriers were found to be significantly correlated either with the accounting rate of profit in the largest four plants or with the actual concentration ratio. This did not however enable us to reject or accept the hypothesis of a strong positive association to exist between the rate of profit and the entry barriers.

Hajra[47] in his work on price-cost relationship has revealed that hike in the price of industrial products only resulted in raising wage costs and has not affected the price-cost margin. The evidence in his study suggested no relationship binding the unit wage and material cost with the price of the industrial products. His study also found the growth of labour productivity not lagging behind the raise in wages.

Barathwal[48] made an attempt to identify the determinants of profitability in Indian cotton textile industry in four regions of country for the year 1972. Among the determinants specified, the past profitability and cost leverage factors have emerged as the major determinants of profitability for the industries in all the regions. The other factors like size, capital were not significant or explained less than 25 per cent of variation in the profitability. The pattern of determination and their relationship with profitability was found to be more or less identical for the regions studied.
Katrak[49] has examined the influence of industry concentration, foreign trade and protection on the price-cost margins in Indian manufacturing industries by using multiple regression analysis. The tests showed that import competition had dampened the margins while protection had the opposite effect. Moreover industries with relatively higher exports appear to have higher margins. Industry concentration has shown an inverted-U shaped influence. This result was argued to reflect the restraints by large firms that apprehend anti-monopoly regulation. However, empirical tests have also suggested that the result could be due to the effect of X-inefficiency and/or higher wages in the more concentrated industries.

The studies summarised above by and large have reported a positive relationship between price-cost margin or profitability and market concentration. Capacity utilisation proved theoretically and statistically to be a significant explanatory variable in predicting price-cost margin for CIM (Census of Indian Manufacture, Published by CSO, GOI) group of industries. Almost no consensus is reached about the significance of other elements of market structure like the firm size, entry barriers, capital/output ratio etc. Similarly, there was no definite result about the relevance of certain 'conduct' variables like advertising intensity, collusion etc., on the price-cost margin or profitability. The studies differ in the coverage of industries and time period. Moreover, the procedure of computing price-cost margin or profitability was not uniform. They differ in their specifications, and the type of regression models employed. With all such limitations it is difficult to compare the results of one study with that of the other. Nevertheless, we get an insight from the empirical literature on the market behaviour in the context of price-cost margin from these studies. It will take time to generalise the findings of these empirical studies. The large number of empirical studies made on price-cost margin or profitability indicate that it is an important area of further research, because of the high degree of practical relevance is associated with it.
4.8. RESULTS AND DISCUSSION

In the present study, in the light of the major trends in research relating to price-cost margin, we recognised the importance of examining the time pattern of behaviour as an important theme for the analysis. It is because such a treatment will help to capture, besides the general characteristic features of the three digit manufacturing industries of the Indian Non-Electrical(35) and Electrical Machinery (36) products, the importance and the influence of the macro economics performance of the nation on the price-cost margin of the industries during 1873-74 to 1988-89. Further to enhance the analytical and theoretical strength of the study, an attempt is also made to examine the factors determining the behavioural tendencies of the price-cost margin by fitting an econometric model, based on the neo-classical theoretical foundation.

4.8.1 BEHAVIOURAL TRENDS IN PRICE-COST MARGIN

In table 4.1 we have presented the estimated gross price-cost margin for the Indian Non-Electrical Machinery(35) industries for the period 1973-74 to 1988-89. The estimate of gross price-cost margin used for measuring the short-run gross profitability of the three digit level disaggregated industries engaged in the manufacture of Non-Electrical machinery(35) products has obtained an aggregate mean magnitude at around 17.04 per cent for the reference period. The individual industry's mean gross profitability has defined deviation from the aggregate mean value by around 16.30 per cent coefficient of variation. This is reflective of a certain degree of uniformity characterising the short-run profitability across the constituent industries in reference. However, it is apparent from the table that in general the mean profitability of the period was relatively high with magnitudes around 21.46, 20.76 and 18.99 per cent respectively in the industries engaged in the manufacture of the Accounting and office computing machinery(358), the Machine Tools and Parts(357) and the Repair and Alteration of General Non-Electrical Machinery(356)
products. The period's mean short-run gross profitability with a magnitude around 13.0 per cent was found defining a relative minimum in the Manufacture of Agriculture Machinery and Equipment and Parts(350) and the Refrigerators, Air-Conditioners and Fire Fighting Equipments(355) industry.

The yearly deviations from the period's mean rate of gross price-cost margin has been captured for the industries at three digit disaggregation by estimating the trend coefficient of variation. This is done to examine the degree of stability that has characterised the gross price-cost margin of the industries during the reference period. On the whole the Non-Electrical Machinery(35) industry is characterised with a fair degree of stability in the gross price-cost margin during 1973-74 to 1988-89, since the associated mean coefficient of variation took the magnitude around 18.66 per cent. A study of the individual industries in this regard reveals a very high degree of stability having prevailed in the gross price-cost margin in respect of the Repair and Alteration of General Non-Electrical Machinery(356) industry. In contrast the gross price-cost margin was found to be highly volatile in the Food and Textile Machineries(353) since the trend coefficient of variation was around 39.92 per cent from the period's mean rate of 17.66 per cent. On the whole, we notice a high degree of heterogeneity characterising the ten constituent industries in regard to their yearly rates of gross price-cost margin viewed from their respective period's mean during the study period. The estimates of the annual average rate of growth in gross price-cost margin, except for the Food and Textile Machineries(353) have been associated with retrogression in the other three digit industries of the Non-Electrical Machinery(35) manufactures in India during 1973-74 to 1988-89. A highly divergent nature of growth in the Gross price-cost margin across the three digit industries became apparent in our analysis in the Indian Non-Electrical Machinery(35) industry.
In order to examine the inter-industry variations in regard to the gross price-cost margin during 1973-74 to 1988-89, mean and coefficient of variation were computed for the cross-section data. The mean value of short-run gross profitability has implied the years 1974-75, 1976-77, 1978-79, 1984-85 and 1985-86 being associated with better rates than the aggregate mean gross profitability. These years are characterised with better rates of economic growth in the Indian economy. A high degree of inter-industry variation in the gross price-cost margin across the three digit industry categories of the Non-Electrical Machinery(35) was noticed during 1978-79 and 1984-85. Though, these years are marked by better rates of industrial growth, not all three digit industries seem to have succeeded in securing uniform rates of gross price-cost margin. In general, a careful examination of the coefficient of variation indicate the eighties being characterised with greater uniformity in the gross price-cost margin of the three digit industries than during the seventies.

In table 4.2 we have presented the yearly trends in the gross price-cost margin of the industries constituting the Electrical Machinery(36) category during 1973-74 to 1988-89. The magnitude of gross price-cost margin i.e., the short-run gross profitability of the nine three digit level disaggregated industries of the Electrical Machinery(36) manufacturing category has obtained mean rate around 15.92 per cent and has been associated with 19.99 per cent of coefficient of variation across the industries. This magnitude explains the individual industry's mean gross profitability of the period revealing a moderate degree of variation from the aggregate mean rate. The period's average short-term gross profitability was found at a relatively high magnitude of around 20.58, 20.39 and 18.19 per cent respectively in the industries engaged in the manufacture of the Electronic Computers Control Instruments and 'Other' Equipments (366), the Electronic Components and 'Other' Accessories(367) and the Electrical Machinery and Parts (360). The period's mean short-run gross profitability was at a relative minimum in the Electrical Machinery and Parts(360), the Manufacture of Electrical Apparatus, Appliances and 'Other'
The yearly deviation of the gross price-cost margin from the respective period's mean magnitude, for individual industries was found registering 25.70 per cent coefficient of variation on the average. Hence, we could observe the Electrical Machinery(36) industries being characterised with a moderate degree of instability in their gross price-cost margin during the period 1973-74 to 1988-89. A study of the individual industries in this regard reveals a very high degree of stability having prevailed in the gross price-cost margin of the Radio and Television Transmitting and Receiving Sets(364) manufacturing industry. In contrast, the gross price-cost margin was found to be highly unstable during the reference period in the case of Refrigerators, Air-Conditioners and Fire Fighting Equipments(355) industry, as the coefficient of variation in them was respectively was of the order of 86.58 per cent from the period's mean viz., 12.38 per cent. On the whole, we observe a moderate level of heterogeneity characterising the nine three digit industries of the Electrical Machinery(36) category in regard to their yearly rates of gross price-cost margin when viewed from their respective period's mean. The estimates of the annual average rate of growth in the gross price-cost margin reveals that with the exclusion of the industries Manufacturing Insulated Wires and Cables(361) and the Electrical Apparatus, Appliances and 'Other' Parts(363), in the remaining industry categories a retrogressive tendency became apparent. On the whole the growth of gross price-cost margin is marked by a general deceleration in a majority of industries belonging to the Indian Electrical Machinery(36) manufactures during the study period.

The cross-sectional mean values estimated for studying inter-industry variations in the gross price-cost margin has characterised better rates in the years viz., 1973-74, 1974-75, 1976-77, 1981-82, 1983-84 and 1984-85. Economic revival that prevailed during these years, perhaps provides the reason for this better short-
run gross profitability. The coefficient of variation of the gross price-cost margin across the industries from the yearly average rates has indicated a high degree of variation across the industries during 1974-75, 1975-76, 1976-77 and 1977-78 in the seventies and 1984-85, 1985-86 and 1986-87 during the eighties. A careful examination of the coefficient of variation reveals the eighties relatively being characterised with better uniformity in the short term gross profitability across the three digit disaggregation in the Electrical Machinery(36) industries in India than during the seventies.

The estimates of net price-cost margin (Short-term net profitability) for the Indian Non-Electrical Machinery(35) manufacturing industries for the period 1973-74 to 1988-89 are portrayed in the table 4.3. The aggregate mean of the period has implied the net price-cost margin i.e., short-term net profitability to be around 13.96 per cent in the Indian Non-Electrical Machinery(35) manufacturing industries. The period's mean of the individual industries has defined a variation by around 16.73 per cent from the grand mean. This estimated coefficient of variation thus marks a slightly high degree of diversity characterising the net price-cost margin across the ten Non-Electrical Machinery(35) industries. If, viewed from the grand mean i.e., 13.96 per cent, we observe the period reflecting relatively better average net price-cost margin in the Accounting and Office Computing Machinery(358) industry. The Repair and Alteration of General Non-Electrical Machinery(356), the Construction and Mining Machinery(351), the Machine Tools and Parts(357) and the Food and Textile Machinery(353) manufactures also have had their period's mean net price-cost margin above the average value of all the industries taken together and implied better profitability secured by them.

For tracing the yearly movements of the net price-cost margin form the period's mean for the individual industries, we have computed the trend coefficient of variation. The mean value with 45.01 per cent has implied a highly divergent
trend across the Indian the Non-Electrical Machinery(35) industries. Further examination of the trend coefficient of variation of the individual industries portrays relatively high degree of instability with magnitudes above 22.85 per cent in the following Non-Electrical Machinery(35) manufacturers in India. These include the Construction and Mining Machinery(351), the Prime Movers, Boilers, Diesel Engines and Parts (352), the Food and Textile Machineries(353), the Machinery Other than Food and Textile Industries(354) and the Refrigerators, Air-Conditioners and Fire Fighting Equipments(355) industrial categories. The estimates of the annual average rates of growth in the short-term net profitability marks retrogressive tendency in all the constituent three digit industries except that of the Agriculture Machinery and Equipment and Parts (350) with 0.32 per cent and the Machine Tools and Parts(357) with 0.36 per cent.

We have examined the behavioural trends of the estimated net price-cost margin and coefficient of variation for the cross section data to understand inter-industry variations among the industries engaged in the Indian Non-Electrical Machinery(35) manufacturing. From the aggregate mean value of the short-run net profitability i.e., 13.96 per cent, our analysis shows that the following years viz., 1973-74, 1979-80, 1980-81, 1981-82, 1982-83, 1984-85, 1986-87, 1987-88 and 1988-89 being associated with a low mean rate of net price-cost margin. The associated measure of coefficient of variation has implied lack of uniformity in the net price cost margin across the three digit industries during the years viz., 1974-75, 1983-84, 1984-85, 1988-89 and 1987-88. A certain degree of inter-industry variation was found to be more pronounced in a number of years in the seventies vis-à-vis the eighties in the Indian Non-Electrical Machinery(35) industry.

In table 4.4 we have presented the estimated yearly trends in the net price-cost margin of the Indian Electrical Machinery(36) manufacturing industries for the period 1973-74 to 1988-89. The industries engaged in the Electrical Machinery(36)
manufacturing on the aggregate, during the reference period at three digit industry level has been characterised with an overall annual mean rate of net price-cost margin around 12.76 per cent. The constituent industries have defined 26.54 per cent coefficient of variation from the mean rate. This level of coefficient of variation reveals lack of uniformity in the short-run net profitability among the three digit industry categories during the study period. Viewed from the over all mean value of the net price-cost margin, we observe a higher mean rate of profitability for the period in the Electrical Machinery and Parts(360), the Dry and Wet Batteries(362), the Radio and Television Transmitting and Receiving Sets(364), the Electronic Computers Control Instruments and 'Other' Equipment(366) and the Electronic Components and 'Other' Accessories(367) manufacturing industries. In contrast the industries engaged in the manufacturing of Insulated Wires and Cables(361), the Electrical Apparatus, Appliances and 'Other' Parts(363), the Manufacture and Repair of Radiographic X-ray Apparatus and Tubes and Parts(365) and the 'Other' Electrical Machineries and Parts(369) have been associated with a relatively lower net price-cost margin during the period 1973-74 to 1988-89.

In order to understand the stability of the estimated yearly trends in the Net price-cost margin, we have calculated the trend coefficient of variation for the individual industries. Coefficient of variation of the nine industries in the Electrical Machinery(36) manufacturing from the mean viz., 39.12 per cent by assuming a magnitude around 82.30 per cent clearly brings to focus, lack of stability in regard to their net price-cost margin during 1973-74 to 1988-89. A study of individual industries in this regard reveals considerable degree of volatility during the reference period particularly in the Manufacture and Repair of Radiographic X-ray Apparatus and Tubes and Parts(365). This magnitude was due to the sudden negative rates in the short-run net profitability during the years 1984-85, 1985-86 and 1986-87. We also observe a high degree of instability in the net price-cost margin of the Manufacture of Electrical Apparatus, Appliances and 'Other' Parts(363) industry with
74.43 per cent. In the remaining industries the trend coefficient of variation was indicative of a fair degree of stability in the net price cost margin. From the estimates of the compounded annual average growth rate, the net price-cost margin in the following industries viz., the Manufacture of Insulated Wires and Cables(361), the Manufacture of Dry and Wet Batteries(362), the Manufacture of Electrical Apparatus, Appliances and 'Other' Parts(363) and the Manufacture of Electronic Computers Control Instruments and 'Other' Equipment (366) was found registering positive growth during the study period 1973-74 to 1988-89 in the Indian Electrical Machinery(36) industries.

We have calculated yearly cross-sectional average rates of net price-cost margin and the corresponding magnitude of the coefficient of variation measuring inter-industry deviation inorder to understand their behavioural characteristic. Our analysis shows only during 1973-74 and 1978-79 of the seventies being marked by a high rates net price-cost margin. In the case of the eighties such higher levels of net price-cost margin was observed during 1981-82 to 1984-85. The net price-cost margin of the Electrical Machinery(36) on the average recorded low rates from 1985-86 onwards. The cross-sectional magnitude of the coefficient of variation, on the whole implied inter-industry variation being specifically dictated by the overall economic scenario associated with the specific years. Hence, no general tendency was forthcoming from our analysis.

The estimates of gross return on capital i.e. long term profitability of the ten constituent three digit industries of the Indian Non-Electrical Machinery(35) manufacturers are presented in table 4.5 for the period 1973-74 to 1988-89. On the aggregate, the period's mean long term gross profitability of the industries engaged in the Non-Electrical Machinery(35) manufacturing for the reference period has defined a rate around 71.20 per cent. The associated period's mean value of the long term profitability in the three digit industries was observed defining coefficient of variation
around 21.27 per cent. This estimated magnitude reveals a fair degree of uniformity in the long term profitability of the Non-Electrical Machinery(35) manufacturing industries as a salient feature. The period reflects relatively better average Gross return on capital in the Accounting and Office Computing Machinery (358), the Refrigerators, Air-Conditioners and Fire Fighting Equipments(355), the Food and Textile Machineries(353), the Construction and Mining Machinery(351) and the Manufacture of Prime Movers, Boilers, Diesel Engines and Parts(352) industries.

The pattern of yearly movements in the Gross return on capital from the period's mean for the respective industries engaged in the Non-Electrical Machinery(35) manufacturing has been captured by the computed trend coefficient of variation. The Non-Electrical Machinery(35) manufacturing industries were associated with a mean value in this regard by around 29.98 per cent. This magnitude reveals the constituent industries in the Non-Electrical Machinery(35) manufacturing being characterised by a consistent and stable trend behaviour. It is also empirically well supported by the estimated coefficient of variation across the three digit industries. However, the industries belonging to the Food and Textile Machineries(353), the Machinery Other than Food and Textile Industries(354), the Refrigerators, Air-Conditioners and Fire Fighting Equipments(355) and the Machine Tools and Parts(357) have revealed the yearly trends being marked by perceptible instability in the present study. It also became evident that a greater degree of stability as the characteristic feature of the period's gross return on capital in the Repair and Alteration of General Non-Electrical Machinery(356) and to some extent the Manufacture of Agriculture Machinery and Equipment and Parts(350), the Construction and Mining Machinery(351), Manufacture of Prime Movers, Boilers, Diesel Engines and Parts(352), the Accounting and Office Computing Machinery (358) and the Sewing, Merchandising, Washing and Cleaning Machinery(359) industries. From the estimated annual compounded growth rates a retrogression was observed in the gross return on capital in the Construction and Mining Machinery
(351), Manufacture of Prime Movers, Boilers, Diesel Engines and Parts (352), the Food and Textile Machineries (353), the Refrigerators, Air-Conditioners and Fire Fighting Equipments(355) and the Accounting and Office Computing Machinery (358) industries in the Non-Electrical Machinery (35) manufactures in India during the period 1973-74 to 1988-89. A highly divergent nature of growth in the Gross return on capital across the three digit industries became obvious in our analysis.

From the aggregate mean value of Gross return on capital viz., 71.20 per cent, a comparative analysis of the cross section mean rates have shown the following years viz., 1973-74, 1974--75, 1976-77, 1979-80, 1986-87, 1987-88 and 1988-89 having a low average rate of gross return on capital characterising the Non-Electrical Machinery (35) manufacturing industries in India. This is reflective of the various internal and external destabilisation forces like the oil crises in 1973-74, the general economic slump of the 1975-76 in the 70's and the crises of the mid 80's having affected the gross return on capital. Further, a high degree of inter-industry variations in a number of years viz., 1973-74, 1974-75, 1977-78, 1978-79 during the seventies was observed. However, the eighties due to general improvements in the macro economic performance, a fair degree of uniformly across the constituent three digit industries has emerged as a distinguishing tendency.

In table 4.6, we have presented the estimated gross return on capital i.e. long-run profitability for the Indian Electrical Machinery(36) products manufacturing industries during the study period viz.1973-74 to 1988-89.

The industries engaged in the Non-Electrical Machinery(35) on the aggregate for reference period, were characterised with mean rate of Gross return on capital around 69.64 per cent. The deviation of the constituent industries from this mean rate has yielded an estimate of 27.29 per cent coefficient of variation. This low magnitude outlines a high degree of uniformity in the gross return on capital in the
Electrical Machinery(36) industries, for the reference period. Viewed from this mean value, it was observed that the estimated period's mean gross return on capital was relatively high in the Dry and Wet Batteries(362) manufacturing industries. Along this line the 'Other' Electrical Machineries and Parts(369), the Manufacture of Electronic Computers Control Instruments and 'Other' Equipment (366) and the Electrical Machinery and Parts(360) have also secured better rates of gross return on capital. A low rate of gross return on capital has characterised in the Insulated Wires and Cables(361), the Manufacture of Electrical Apparatus, Appliances and 'Other' Parts(363), the Radio and Television Transmitting and Receiving Sets(364), the Manufacture and Repair of Radiographic X-ray Apparatus and Tubes and Parts (365) and the Electronic Components and 'Other' Accessories(367) manufacturing industries.

In order to study the stability of the industries in regard to their yearly rate of gross return on capital during the study period, the trend coefficient of variation was computed. While the mean of the trend coefficient of variation as regards the gross return on capital in the Indian the Electrical Machinery(36) manufacturing industries was around 33.38 per cent, the deviation of the individual industries from this magnitude by assuming 72.39 per cent of variation, outlined a high degree of diversity across the three digit industries. The industry engaged in the Manufacture and Repair of Radiographic X-ray Apparatus and Tubes and Parts(365) has been marked by a high degree of yearly fluctuations from its periods mean rate of gross return on capital. A high degree of stability in gross return on capital on the other hand was observed in the Manufacture of Radio and Television Transmitting and Receiving Sets(364) and the Electrical Machinery and Parts(360) industry categories. In the remaining industries, a moderate level of stability has characterised the gross return on capital during the study period. The estimated rate of annual compounded growth witnessed an average retrogression in the gross return on capital in the Electrical Machinery and Parts(360), the Manufacture of Radio and Television
Transmitting and Receiving Sets (364), the Manufacture and Repair of Radiographic X-ray Apparatus and Tubes and Parts (365) and the Manufacture of Electronic Components and 'Other' Accessories (367). On the whole the Electrical Machinery (36) industry has been associated with a positive annual average growth rate in its gross return on capital with an estimated magnitude of 0.60 per cent in India during 1973-74 to 1988-89.

For studying the inter-industry variations in the long run profitability of the nine three digit level industries in the Electrical Machinery (36) manufactures, cross section mean rates and the corresponding measures of coefficient of variation were computed. Our analysis points out, the mean rate of gross return on capital to be high in the years 1979-80 to 1984-85 and 1988-89. These years in India, generally correspond with economic revival which has enabled the industries in reference to secure better rates of gross return on capital. From the period's cross sectional coefficient of variation, a high degree of inter-industry variation became apparent during 80's rather than 70's.

Table 4.7 presents the estimates of the yearly trends in the net return on capital (i.e. Long-Run Net Profitability) in the Indian Non-Electrical Machinery (35) manufacturing industries for the period 1973-74 to 1988-89.

On the whole the industries engaged in the manufacture of Non-Electrical Machinery (35) products for the period have secured an average rate of net return on capital at around 59.66 per cent with an associated inter-industry deviation being around 26.24 per cent coefficient of variation. This level of coefficient of variation reveals relatively better uniformity characterising the ten three digit level Non-Electrical Machinery (35) manufacturing industries in regard to their net return on capital. If, viewed from this mean value, we notice the period being characterised with relatively better average net return on capital in the Construction and Mining...
Machinery(351), Manufacture of Prime Movers, Boilers, Diesel Engines and Parts (352), the Food and Textile Machineries(353), the Refrigerators, Air-Conditioners and Fire Fighting Equipments(355) and the Accounting and Office Computing Machinery(358) manufacturing industries in India for the study period in our analysis.

The trend coefficient of variation has been computed for the three digit industries inorder examine the nature of the yearly deviations in the net return on capital from the point of view of the period's mean. The grand mean rate of this coefficient of variation for the ten three digit industries by defining a magnitude around 33.38 per cent and inter-industry variation around 13.41 per cent has implied a good deal of stability having prevailed during the study period 1973-74 to 1988-89 in regard to the yearly rates of net return on capital in the Non-Electrical Machinery(35) manufactures. A high degree of stability was observed as the salient feature of the period as regards the net return on capital in the Repair and Alteration of General Non-Electrical Machinery(356) industry. A similar stability was also seen the industries viz. the Sewing, Merchandising, Washing and Cleaning Machinery(359), the Food and Textile Machineries(353), the Accounting and Office Computing Machinery(358), the Manufacture of Agriculture Machinery and Equipment and Parts(350) and the Machine Tools and Parts(357). The average annual growth rate in the net return on capital was positive in the Agriculture Machinery and Equipment and Parts(350), the Machinery Other than Food and Textile Industries(354), the Repair and Alteration of General Non-Electrical Machinery(356) and the Machine Tools and Parts(357) manufacturing industries. In the remaining six industries belonging to the Non-Electrical Machinery (35), a negative rate of growth in the net return on capital became evident during the study period. On the whole 0.60 per cent per annum has marked the growth as the average net return on capital in the Non-Electrical Machinery(35) industrial category during the study period viz. 1973-74 to 1988-89. Across the ten three digit industries, a highly divergent nature of growth in the long-run profitability became evident.
From the aggregate mean value of net return on capital which was around 59.66 per cent, our analysis shows the cross section mean values in the following years viz., 1976-77, 1977-78, 1978-79, 1980-81, 1981-82, 1982-83, 1983-84 and 1985-86 being associated with better mean rates in the net return on capital in the Indian Non-Electrical Machinery(35) industries. This reflects the industrial revival after the mid 70's, having enabled the constituent industries to secure better rates of net return on capital. The inter-industry variations during the years viz., 1973-74, 1974-75, 1977-78, 1978-79, 1979-80, 1980-81, 1982-83 and 1983-84 was marked by lack of uniformity among the three digit industries in regard to their long-run net profitability. It is evident from the above that 80's as a period has been associated with greater degree of uniformity in the net return on capital across the three digit industries of the Non-Electrical Machinery(35) manufactures than the 70's.

The table 4.8, portrays the yearly trends in the estimated net return on capital for the Indian Electrical Machinery(36) industries for the period 1973-74 to 1988-89. It can be seen that the estimated value of the net return on capital, in the Indian Electrical Machinery(36) industry as a whole has yielded a mean value around 57.66 per cent. This, among the constituent three digit industries has been characterised by inter-industry variations by around 33.58 per cent. This value reveals better rate of long-run profitability with moderate level of uniformity having prevailed among the three digit industries during the study period. The following industries are characterised with better average rates of long-run profitability during 1973-74 to 1988-89 viz., the Electrical Machinery and Parts(360), the Manufacture of Dry and Wet Batteries(362), the Electronic Computers Control Instruments and 'Other' Equipment(366) and the 'Other' Electrical Machineries and Parts(369) manufactures. The period's mean long-run net profitability was at a relatively low level in the Manufacture of Insulated Wires and Cables(361), the Manufacture of Electrical Apparatus, Appliances and 'Other' Parts(363), the Radio and Television Transmitting
and Receiving Sets (364), the Manufacture and Repair of Radiographic X-ray Apparatus and Tubes and Parts (365) and the Manufacture of Electronic Components and 'Other' Accessories (367) industrial categories.

The trend coefficient of variation has been computed for tracing the yearly movements in the net return on capital from the period's mean magnitude for the respective three digit industries so as to examine the stability. The overall mean coefficient of variation in this regard was around 47.62 per cent. It is associated with an estimated measure of inter-industry variation around 68.80 per cent. The trend coefficient of variation, was found revealing a high degree of year to year fluctuations in the industries engaged in the Manufacture and Repair of Radiographic X-ray Apparatus and Tubes and Parts (365), the Electrical Apparatus, Appliances and 'Other' Parts (363), the 'Other' Electrical Machineries and Parts (369) and the Electronic Components and 'Other' Accessories (367). By comparison, a greater degree of stability was observed characterising the period's net return on capital in the Electrical Machinery and Parts (360), the Insulated Wires and Cables (361), the Dry and Wet Batteries (362), the Radio and Television Transmitting and Receiving Sets (364) and the Electronic Computers Control Instruments and 'Other' Equipment (366) industry categories. From the estimated annual compounded growth rates, retrogressions in the net return on capital in the Radio and Television Transmitting and Receiving Sets (364), the Manufacture and Repair of Radiographic X-ray Apparatus and Tubes and Parts (365) and the Electronic Computers Control Instruments and 'Other' Equipment (366) manufacturing industries became evident. In the remaining six industries a positive annual growth rate in the net return on capital was observed for the period 1973-74 to 1988-89. On the whole, the Electrical Machinery (36) industry has registered 0.78 per cent of average annual growth in the net return on capital. Across the industries highly divergent nature of growth was seen in the Electrical Machinery (36) manufacturing industries.
The aggregate mean rate value of the net return on capital, when viewed with the cross section mean of the industries, one finds the following years viz., 1978-79 to 1984-85 and 1988-89 being marked by relatively high rates of net return on capital in the Electrical Machinery(36) manufactures. A high degree of inter-industry variation was associated with the years viz., 1974-75, 1985-86, and 1986-87. These years, hence may be viewed as years in which the general economic conditions that prevailed in the nation being not uniformly absorbed by the constituent three digit industries in the Indian Electrical Machinery(36) manufacturing and hence inter-industry variation in the long-run net profitability became the characteristic feature.

4.8.2 DETERMINANTS OF GROSS PRICE-COST MARGIN

The empirical estimates of the multiple regression model fit to study the factors determining the price-cost margin in the Indian Non-Electrical(35) and Electrical(36) machinery manufacturing industries are presented in Table 4.9.

The coefficient of multiple determination (R^2) has emerged with an explanatory power of more than 70.00 percent in all the industries except the Food and Textile Machineries(353) and the Sewing, Merchandising, Washing and Cleaning Machinery(359) indicating the variation in price-cost margin being determined by the independent variables. In the Manufacture and Repair of Radiographic X-ray Apparatus and Tubes and Parts(365) and the 'Other' Electrical Machineries and Parts(369), the R^2 was found to be more than 0.95 indicating the highest rate of the explanatory power of the model. The corresponding 'F' ratio has revealed the significant fit of the model for the time series data in nearly 84 per cent of the industries in reference.
The $\beta_1$ parameter, which measures the impact of the K/Q variable has assumed the specified negative sign in 12 industries implying higher levels of its capital productivity positively accounting for the growth of price-cost margin. These include the Construction and Mining Machinery(351), Manufacture of Prime Movers, Boilers, Diesel Engines and Parts(352), the Machinery Other than Food and Textile Industries(354), the Refrigerators, Air-Conditioners and Fire Fighting Equipments (355), the Repair and Alteration of General Non-Electrical Machinery(356), the Machine Tools and Parts(357), the Accounting and Office Computing Machinery (358), the Manufacture of Insulated Wires and Cables(361), the Manufacture of Dry and Wet Batteries(362), the Manufacture of Electrical Apparatus, Appliances and 'Other' Parts(363), the Manufacture and Repair of Radiographic X-ray Apparatus and Tubes and Parts(365) and the 'Other' Electrical Machineries and Parts(369). In the following seven industries the K/Q has defined a positive impact implying even if, capital productivity were to decline no adverse effect being seen on the price-cost margin of the Manufacture of Agriculture Machinery and Equipment and Parts(350), the Food and Textile Machineries(353), the Sewing, Merchandising, Washing and Cleaning Machinery(359), the Electrical Machinery and Parts(360), the Manufacture of Radio and Television Transmitting and Receiving Sets(364), the Manufacture of Electronic Computers Control Instruments and 'Other' Equipment(366) and the Manufacture of Electronic Components and 'Other' Accessories(367) industries. However, only in three industries viz., the Machinery Other than Food and Textile Industries(354), the Manufacture of Dry and Wet Batteries(362) and the Manufacture and Repair of Radiographic X-ray Apparatus and Tubes and Parts(365) the statistical significance of the underlying hypothesis has emerged different from zero.

The $\beta_2$ parameter associated with output-labour ratio(Q/L) viz., labour productivity has obtained with the expected positive sign in 15 of 19 three digit Non-Electrical(35) and the Electrical(36) machinery manufacturing industries. These include the Manufacture of Agriculture Machinery and Equipment and Parts(350),
the Construction and Mining Machinery(351), Manufacture of Prime Movers, Boilers, Diesel Engines and Parts(352), the Machinery Other than Food and Textile Industries (354), the Refrigerators, Air-Conditioners and Fire Fighting Equipments(355), the Repair and Alteration of General Non-Electrical Machinery(356), the Machine Tools and Parts(357), the Accounting and Office Computing Machinery(358) in Non-Electrical(35) machinery category and the Manufacture of Insulated Wires and Cables(361), the Manufacture of Dry and Wet Batteries(362), the Manufacture of Electrical Apparatus, Appliances and 'Other' Parts(363), the Manufacture and Repair of Radiographic X-ray Apparatus and Tubes and Parts(365), the Manufacture of Electronic Computers Control Instruments and 'Other' Equipment(366), the Manufacture of Electronic Components and 'Other' Accessories(367) and the 'Other' Electrical Machineries and Parts(369) in the Electrical Machinery(36) category. The labour productivity parameter has implied negative impact on the price-cost margin in the Food and Textile Machineries(353), the Sewing, Merchandising, Washing and Cleaning Machinery(359), the Electrical Machinery and Parts(360) and the Manufacture of Radio and Television Transmitting and Receiving Sets(364). On the whole, the statistical significance of the coefficient was confirmed only in three industries viz., the Machine Tools and Parts(357), the Manufacture and Repair of Radiographic X-ray Apparatus and Tubes and Parts(365) and the 'Other' Electrical Machineries and Parts(369).

The influence of the variable viz. The capital-labour(K/L) ratio (the $\beta_3$ coefficient) on the price-cost margin was positive in the industries engaged in the Manufacture of Agriculture Machinery and Equipment and Parts(350), the Construction and Mining Machinery(351), Manufacture of Prime Movers, Boilers, Diesel Engines and Parts(352), the Machinery Other than Food and Textile Industries (354), the Refrigerators, Air-Conditioners and Fire Fighting Equipments(355), the Repair and Alteration of General Non-Electrical Machinery(356), the Machine Tools and Parts(357) and the Sewing, Merchandising, Washing and Cleaning Machinery(359)
in Non-Electrical(35) machinery and the Electrical Machinery and Parts(360), the Manufacture of Electrical Apparatus, Appliances and 'Other' Parts(363), the Manufacture of Radio and Television Transmitting and Receiving Sets(364), the Manufacture and Repair of Radiographic X-ray Apparatus and Tubes and Parts(365), the Manufacture of Electronic Components and 'Other' Accessories(367) and the 'Other' Electrical Machineries and Parts(369) in the Electrical(36) machinery category. Thus, the technology factor has been confirmed of its positive contribution to the price-cost margin in nearly 73.68 per cent of the Non-Electrical(35) and Electrical(36) machinery manufacturing industries of India during 1973-74 to 1988-89. In five industries viz., the Food and Textile Machineries(353), the Accounting and Office Computing Machinery(358), the Manufacture of Insulated Wires and Cables(361), the Manufacture of Dry and Wet Batteries(362), the Manufacture of Electronic Computers Control Instruments and 'Other' Equipment(366), the $\beta_3$ coefficient has implied a negative relationship with price-cost margin. Despite the positive influence of technology on price-cost margin being deducted in a majority of the industries, the coefficient was statistically significant from zero in only four industries in reference.

The $\beta_4$ parameter, associated with wage rate has emerged with the predicted negative sign in nearly 84.0 per cent of the industries in reference. However, in the following three industries, viz., the Manufacture of Agriculture Machinery and Equipment and Parts(350), the Food and Textile Machineries(353) and the Accounting and Office Computing Machinery(358) the parameter has implied increase in wage bill not affecting the price-cost margin. The parameter $\beta_4$ was statistically significant in 11 of the 19 industries. Hence, the underlying theoretical hypothesis, that an increase in wage bill will cause a downward pressure on the price-cost margin, has been empirically confirmed in nearly 57.90 per cent of the three digit manufacturing industries belonging to the Indian Non-Electrical(35) and the Electrical (36) machinery products.
The parameter $\beta_5$, associated with the variable viz., price-cost margin lagged by one year ($\text{GPCM}_{t-1}$) has implied a positive impact on the current year price-cost margin in the Manufacture of Agriculture Machinery and Equipment and Parts (350), the Food and Textile Machineries (353), the Machinery Other than Food and Textile Industries (354), the Refrigerators, Air-Conditioners and Fire Fighting Equipments (355), the Repair and Alteration of General Non-Electrical Machinery (356), the Machine Tools and Parts (357), the Accounting and Office Computing Machinery (358) and the Sewing, Merchandising, Washing and Cleaning Machinery (359) belonging to the Non-Electrical (35) machinery category and the Electrical Machinery and Parts (360), the Manufacture of Insulated Wires and Cables (361), the Manufacture of Dry and Wet Batteries (362), the Manufacture of Electrical Apparatus, Appliances and 'Other' Parts (363), the Manufacture of Radio and Television Transmitting and Receiving Sets (364) and the Manufacture and Repair of Radiographic X-ray Apparatus and Tubes and Parts (365) in the case of the Electrical (36) machinery manufacturing industries.

The parameter $\beta_5$ has defined a negative influence on the current year price-cost margin in the Construction and Mining Machinery (351), Manufacture of Prime Movers, Boilers, Diesel Engines and Parts (352), the Manufacture of Electronic Computers Control Instruments and 'Other' Equipment (366), the Manufacture of Electronic Components and 'Other' Accessories (367) and the 'Other' Electrical Machineries and Parts (369) industries. The parameter $\beta_5$ was statistically significant in only two industries viz., the Repair and Alteration of General Non-Electrical Machinery (356) with a positive sign and the Electronic Computers Control Instruments and 'Other' Equipment (366) with a negative sign.

The parameter $\beta_6$, captures the impact of the changes in the rate of capacity utilisation on the price-cost margin. As per the model specification, $\beta_6$ was positive in sign in 16 industries viz., the Construction and Mining Machinery (351), Manufacture
of Prime Movers, Boilers, Diesel Engines and Parts (352), the Food and Textile Machineries (353), the Machinery Other than Food and Textile Industries (354), the Repair and Alteration of General Non-Electrical Machinery (356), the Machine Tools and Parts (357), the Accounting and Office Computing Machinery (358) and the Sewing, Merchandising, Washing and Cleaning Machinery (359) in the Non-Electrical (35) machinery manufacturing and the Electrical Machinery and Parts (360), the Manufacture of Insulated Wires and Cables (361), the Manufacture of Dry and Wet Batteries (362), the Manufacture of Electrical Apparatus, Appliances and 'Other' Parts (363), the Manufacture of Radio and Television Transmitting and Receiving Sets (364), the Manufacture and Repair of Radiographic X-ray Apparatus and Tubes and Parts (365), the Manufacture of Electronic Computers Control Instruments and 'Other' Equipment (366), the Manufacture of Electronic Components and 'Other' Accessories (367) and the 'Other' Electrical Machineries and Parts (369) in the Electrical (36) machinery manufactures. Thus, in as much as 89.47 per cent of the industries in reference, the positive influence of the capacity utilisation variable on the price-cost margin has emerged from the fit model.

The parameter $\beta_6$ defined a negative impact of capacity utilisation variable on the price-cost margin of the Manufacture of Agriculture Machinery and Equipment and Parts (350) and the Refrigerators, Air-Conditioners and Fire Fighting Equipments (355) industries. The parameter $\beta_6$ was statistically significant in nine of the 19 three digit industries and thereby confirmed the empirical relevance of the capacity utilisation in determining the trends in price-cost margin in the Non-Electrical (35) and the Electrical (36) machinery industries in India during 1973-74 to 1988-89.

Among the six independent variables included in the model to study their impact, the empirical finding strongly suggests, the price-cost margin being influenced more by the wage rate and capacity utilisation levels during the study period.
NOTES AND REFERENCES


5. Eckstein, O, and Fromm, G(1968), Ibid.


TABLE 4.1


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Source: Computed from the ASI Factory Sector, Summary Results, Various Reports, C.S.O., Government of India, New Delhi

Note:
The Growth rate is estimated by fitting least square linear trend line to the Logarithmic Annual Vale of the variables in the relevant period. The regression equation takes the forms of log(Xt)=A+B(t) i.e., where this is equivalent to the logarithmic transformation of the compounded growth rate equation, X(t)=Xo (1+r)^t. In this equation X(t) is the variable 't' is the time and A=Log Xo and B=Log(1+r) are parameters estimated. Et is the error term. The growth rate r=Antilog ((B-1)*100, X = Arithmatic Mean, C.V. = Coefficient of Variation
### TABLE 4.2


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**Source:** Computed from the ASI Factory Sector, Summary Results, Various Reports, C.S.O., Government of India, New Delhi

**Note:**

The Growth rate is estimated by fitting least square linear trend line to the Logarithmic Annual Value of the variables in the relevant period. The regression equation takes the forms of log(Xt)=A+B(t) i.e., where this is equivalent to the logarithmic transformation of the compounded growth rate equation, Xt-Xo (1+rt). In this equation Xt is the variable ‘t’ is the time and A=Log Xt and B=Log(1+r) are parameters estimated. Et is the error term. The growth rate r=Antilog ((B)-1)*100, X = Arithmatic Mean, C.V. = Coefficient of Variation.
TABLE 4.3


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Note: The growth rate is estimated by fitting least square linear trend line to the Logarithmic Annual Value of the variables in the relevant period. The regression equation takes the forms of \( \text{log}(X_t) = A + Bt \) i.e., where this is equivalent to the logarithmic transformation of the compounded growth rate equation, \( X_t = X_o (1+r)^t \). In this equation, \( X_0 \) is the variable t is the time and A=Log \( X_0 \), B=Log(1+r) are parameters estimated. E_t is the error term. The growth rate \( r = \text{Antilog} (B) - 1 \), X = Arithmetic Mean, C.V. = Coefficient of Variation.

Source: Computed from the ASI Factory Sector, Summary Results, Various Reports, C.S.O., Government of India, New Delhi.
### TABLE 4.4


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**Source:** Computed from the ASI Factory Sector, Summary Results, Various Reports, C.S.O., Government of India, New Delhi

**Note:**
The Growth rate is estimated by fitting least square linear trend line to the Logarithmic Annual Vale of the variables in the relevant period. The regression equation takes the forms of log(Xt)=A+B(t) i.e.; where this is equivalent to the logarithmic transformation of the compounded growth rate equation, Xt-Xo (1+r). In this equation Xt is the variable 't' is the time and A=Log X1 and B=Log(1+r) are parameters estimated. Et is the error term. The growth rate r=Antilog ((B)-1)*100, X = Arithmetic Mean, C.V. = Coefficient of Variation
TABLE 4.5

Yearly Trends in the Gross Return On Capital In The Indian Non-Electrical Machinery(35) Manufacturing Industries at Three Digit Disaggregation During1973-74 To 1988-89

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Source : Computed from the ASI Factory Sector, Summary Results, Various Reports, C.S.O., Government of India, New Delhi

Note: The Growth rate is estimated by fitting least square linear trend line to the Logarithmic Annual Vale of the variables in the relevant period. The regression equation takes the forms of log(Xt)=A+B(t) i.e., where this is equivalent to the logarithmic transformation of the compounded growth rate equation, Xt-Xo (1+rt). In this equation Xt is the variable ‘t’ is the time and A=Log Xt and B=Log(1+r) are parameters estimated. Et is the error term. The growth rate r=Antilog ((B)-1)*100, X = Arithmatic Mean, C.V. = Coefficient of Variation
## Table 4.6

Yearly Trends in the Gross Return On Capital In The Indian Electrical Machinery Manufacturing Industries at Three Digit Disaggregation During 1973-74 To 1988-89

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</table>

| X        | 59.07 | 58.07 | 52.24 | 59.19 | 62.59 | 68.92 | 74.09 | 79.67 | 86.17 | 97.12 | 92.86 | 83.40 | 51.87 | 57.68 | 61.16 | 70.19 | 69.64 | 33.38 | 0.60  |
| C.V.     | 30.78 | 34.32 | 34.88 | 24.20 | 27.75 | 33.96 | 30.36 | 35.41 | 44.97 | 41.66 | 50.43 | 51.00 | 60.68 | 72.29 | 43.60 | 40.51 | 27.29 | 72.39 | 40.92 |

Source: Computed from the ASI Factory Sector, Summary Results, Various Reports, C.S.O., Government of India, New Delhi

Note:
- The Growth rate is estimated by fitting least square linear trend line to the Logarithmic Annual Vale of the variables in the relevant period. The regression equation takes the forms of log(Xt)=A+B(t) i.e., where this is equivalent to the logarithmic transformation of the compounded growth rate equation, X_t-X_0 (1+r). In this equation X_t is the variable 't' is the time and A=Log X_t and B=Log(1+r) are parameters estimated. E_t is the error term. The growth rate r=Antilog ((B)-1)*100, X = Arithmatic Mean, C.V. = Coefficient of Variation
### TABLE 4.7


| Ind Code | 73-74 | 74-75 | 75-76 | 76-77 | 77-78 | 78-79 | 79-80 | 80-81 | 81-82 | 82-83 | 83-84 | 84-85 | 85-86 | 86-87 | 87-88 | 88-89 | X   | C.V | CGR |
|----------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|------|-----|-----|
| 350      | 29.29 | 30.85 | 45.40 | 47.70 | 35.95 | 45.09 | 48.75 | 57.79 | 71.64 | 46.98 | 39.54 | 49.46 | 69.29 | 67.15 | 82.55 | 67.41 | 52.18 | 28.93 | 5.71 |
| 351      | 31.43 | 52.59 | 60.37 | 61.31 | 63.63 | 61.80 | 51.28 | 125.92 | 64.80 | 79.56 | 76.67 | 83.79 | 54.99 | 52.98 | 70.16 | 29.31 | 63.79 | 33.83 | -0.46 |
| 352      | 55.69 | 68.73 | 59.56 | 78.73 | 95.54 | 64.90 | 54.42 | 55.50 | 65.06 | 54.49 | 33.15 | 87.70 | 61.84 | 50.33 | 47.00 | 42.27 | 62.12 | 26.43 | -1.82 |
| 353      | 45.51 | 75.07 | 58.75 | 75.85 | 76.23 | 212.28 | 83.85 | 75.35 | 66.34 | 49.43 | 49.20 | 40.67 | 17.59 | 46.20 | 37.14 | 39.15 | 65.55 | 63.85 | -1.06 |
| 354      | 25.40 | 26.21 | 33.52 | 37.58 | 09.99 | 19.78 | 27.54 | 40.33 | 31.17 | 50.34 | 62.90 | 60.37 | 49.75 | 56.51 | 48.79 | 37.48 | 38.35 | 39.67 | 2.63 |
| 355      | 60.38 | 87.88 | 36.61 | 63.56 | 140.12 | 108.88 | 46.18 | 98.16 | 105.19 | 134.93 | 78.14 | 41.92 | 86.49 | 55.13 | 45.52 | 39.65 | 76.82 | 42.34 | -2.77 |
| 356      | 51.68 | 64.32 | 56.37 | 59.31 | 64.82 | 61.12 | 61.70 | 68.48 | 59.20 | 61.64 | 49.79 | 52.42 | 39.36 | 51.20 | 43.52 | 52.29 | 55.45 | 13.33 | 0.09 |
| 357      | 15.27 | 23.26 | 34.57 | 37.80 | 25.96 | 26.14 | 37.24 | 30.88 | 57.82 | 49.21 | 59.55 | 53.43 | 51.36 | 47.51 | 43.48 | 31.67 | 39.11 | 32.71 | 5.03 |
| 358      | 114.77 | 102.63 | 79.14 | 78.21 | 55.24 | 90.81 | 107.22 | 72.48 | 77.72 | 91.76 | 148.11 | 52.67 | 126.89 | 91.03 | 72.46 | 95.00 | 90.97 | 26.61 | -1.25 |
| 359      | 38.36 | 57.39 | 22.88 | 59.49 | 76.96 | 62.25 | 46.87 | 41.22 | 45.97 | 48.23 | 42.31 | 40.60 | 56.03 | 48.93 | 42.76 | 37.99 | 48.02 | 25.08 | -0.06 |

X: 46.81 58.89 48.66 59.98 63.05 75.32 56.61 66.61 64.49 56.66 69.25 56.11 28.64 40.32 40.49 28.28 44.62 22.52 27.75 40.16 26.24 38.41 453.62

C.V: 56.42 42.65 32.90 24.12 56.88 69.25 38.96 40.95 28.64 40.32 49.20 28.28 44.62 22.52 27.75 40.16 26.24 38.41 453.62

Source: Computed from the ASI Factory Sector, Summary Results, Various Reports, C.S.O., Government of India, New Delhi

Note:
The Growth rate is estimated by fitting least square linear trend line to the Logarithmic Annual Value of the variables in the relevant period. The regression equation takes the forms of log(Xt)=A+B(t) i.e., where this is equivalent to the logarithmic transformation of the compounded growth rate equation, Xt-Xo (1+rt). In this equation Xt is the variable t is the time and A=Log X1 and B=Log(1+r) are parameters estimated. E1 is the error term. The growth rate r=Antilog ((B)-1)*100, X = Arithmetic Mean, C.V. = Coefficient of Variation
### TABLE 4.8


| Ind Code | 73-74 | 74-75 | 75-76 | 76-77 | 77-78 | 78-79 | 79-80 | 80-81 | 81-82 | 82-83 | 83-84 | 84-85 | 85-86 | 86-87 | 87-88 | 88-89 | \( \bar{X} \) | C.V. | CGR |
|----------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|------|------|
| 360      | 57.10 | 45.23 | 62.01 | 60.42 | 55.43 | 56.36 | 56.43 | 68.54 | 64.59 | 72.00 | 72.87 | 104.30 | 61.40 | 59.46 | 71.96 | 60.30 | 64.27 | 19.44 | 3.36 |
| 361      | 36.09 | 56.07 | 53.09 | 48.28 | 45.99 | 65.31 | 74.94 | 89.09 | 64.54 | 56.15 | 55.30 | 38.50 | 24.99 | 45.07 | 55.87 | 59.90 | 54.32 | 27.36 | 3.44 |
| 362      | 67.96 | 47.54 | 60.99 | 78.13 | 89.23 | 99.57 | 98.49 | 93.80 | 134.88 | 149.06 | 150.40 | 128.96 | 88.52 | 47.65 | 97.07 | 109.88 | 96.38 | 32.51 | 3.26 |
| 363      | 35.07 | 53.69 | 28.07 | 35.67 | 38.38 | 42.75 | 63.16 | 62.26 | 70.98 | 64.71 | 44.77 | 56.15 | 40.45 | 53.99 | 33.83 | 53.34 | 41.87 | 66.00 | 2.83 |
| 364      | 60.45 | 68.06 | 55.10 | 46.55 | 61.14 | 48.84 | 47.39 | 33.54 | 44.06 | 51.79 | 47.64 | 43.95 | 73.35 | 54.83 | 54.47 | 46.25 | 52.34 | 18.33 | -1.77 |
| 365      | 41.18 | 11.11 | 25.93 | 41.32 | 63.78 | 79.23 | 72.02 | 108.39 | 53.57 | 110.45 | 187.50 | -0.35 | -60.71 | -47.22 | 27.31 | 13.43 | 45.24 | 130.57 | -7.20 |
| 366      | 21.01 | 45.79 | 53.76 | 44.00 | 35.97 | 68.71 | 67.32 | 72.50 | 100.82 | 114.37 | 76.46 | 89.67 | 53.72 | 90.36 | 60.92 | 71.36 | 66.67 | 35.64 | 8.49 |
| 367      | 37.66 | 47.55 | 30.09 | 22.17 | 39.17 | 20.58 | 16.46 | 18.02 | 11.07 | 21.63 | 16.87 | 50.09 | 11.65 | 09.08 | 23.59 | 23.54 | 24.89 | 49.20 | -3.08 |
| 369      | 79.34 | 83.73 | 12.25 | 54.39 | 30.31 | 40.25 | 69.89 | 66.70 | 129.14 | 126.92 | 73.99 | 130.73 | 65.79 | 100.09 | 15.40 | 87.99 | 72.93 | 49.50 | 0.69 |

\( \bar{X} \) | 48.43 | 39.04 | 42.37 | 47.88 | 51.05 | 57.95 | 62.79 | 68.09 | 74.85 | 85.23 | 80.85 | 70.98 | 39.91 | 45.92 | 48.93 | 58.44 | 57.66 | 47.62 | 0.78 |

C.V. | 36.47 | 96.35 | 40.67 | 31.01 | 34.09 | 38.07 | 33.98 | 39.41 | 50.62 | 46.12 | 63.35 | 60.10 | 105.49 | 89.70 | 50.66 | 48.09 | 33.58 | 68.80 | 544.16 |

Source: Computed from the ASI Factory Sector, Summary Results, Various Reports, C.S.O., Government of India, New Delhi

Note:
The Growth rate is estimated by fitting least square linear trend line to the Logarithmic Annual Value of the variables in the relevant period. The regression equation takes the forms of \( \log(X_t) = A + B(t) \) i.e., where this is equivalent to the logarithmic transformation of the compounded growth rate equation, \( X_t = X_0 (1 + r)^t \). In this equation \( X_t \) is the variable 't' is the time and \( A = \log X_1 \) and \( B = \log(1 + r) \) are parameters estimated. \( E_t \) is the error term. The growth rate \( r = \text{Antilog} ((B)-1) \times 100, X = \text{Arithmatic Mean}, \text{C.V.} = \text{Coefficient of Variation} \)

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NOTE: *'t' - Significant at 5%, **'t' - Significant at 10%, *'F' - Significant at 1% and **'F' - Significant at 5% levels