Chapter - 5
DETERMINANTS OF PROFITABILITY

While analysing the market structure-conduct-performance relationship, performance can be assessed in terms of profitability, efficiency, growth and welfare. A number of studies on determinants of profitability have been done over the years. In this chapter, issues on concepts and measurement of profitability are mentioned in brief. Review of some leading research studies has been done to understand how profitability analysis is guided in the field of industrial organization. This is followed by analysis of profitability of the Indian cement industry.

Profitability of a firm indicates the financial stability and determines its future growth. At the industry level, high profitability encourages the existing firms to expand and attracts new investment leading to economic gains. Hence, investors are interested in knowing the profitability over time and across firms and/or industries at a given moment of time. Moreover, economists and policy makers are examining trend and determinants of profitability in order to identify the crucial factors which explain profitability, impact of government controls and other measures and suggest actions for earning reasonable rate of return and enable future growth.
CONCEPT AND MEASUREMENT OF PROFITABILITY:

There are differences in the viewpoints of economists and accountants with the definition of 'Profit'. The most important points that lack correspondence between accounting and economic profits are:

First, depreciation practices vary considerably among firms and industries and do not adjust asset valuations for changes in price levels. Accounting rates of return are thus affected by inter-firm and inter-industry differences in accounting conventions and the age and durability of capital assets.

Second, advertising and research and development expenditures are treated as current expenses rather than as investment in depreciable, intangible capital stock.

Third, executive salaries and emoluments may, to varying degrees, contain a portion of economic profits as well as a payment for labour services. This will be more true for small firms managed by a proprietor himself. But in the case of large corporations where there is complete separation between ownership and management,

there will not be any implicit costs and the economic profit will be close to accounting profit.

Fourth, economic profit is net of all opportunity costs including the opportunity cost of invested capital, while accounting profit is not.

Economists consider profit not as a pure residual but as earnings on stock holders' capital including interest and risk premium. Economic ideas of income, assets and net worth all look to the future for their meaning while the corresponding financial accounts are all histories of past transactions.

Among economists, there is no consensus about the definition and occurrence of profit. Economic theories mention profits as a reward for bearing risks and uncertainties, innovative skills and consequence of imperfections and dynamic changes in the market. It is to be mentioned here that profitability is determined by various factors and to identify a source is rather difficult. Whatever may be the source, it is essential a firm earns profit for its survival, stability and growth.

There are four possible measures which are widely used in empirical studies. Gross measures of profit refers to the total returns to capital after direct costs and
Net measures to the returns to capital over and above normal profits.

They are defined as below:

<table>
<thead>
<tr>
<th>Gross</th>
<th>Net</th>
</tr>
</thead>
<tbody>
<tr>
<td>R - D</td>
<td>R - C</td>
</tr>
</tbody>
</table>

Profit on Capital

\[
\frac{R - D}{K} = \frac{R - C}{K}
\]

Price cost margin

\[
\frac{R - D}{R} = \frac{R - C}{R}
\]

Where,

\[ R = \text{Revenue} \]
\[ C = \text{Cost } ; \quad C = Kg + D \]
\[ D = \text{Direct Cost} \]

\[ Kg = \text{Capital costs on capital stock 'K' requiring a return 'g' to cover depreciation, interest and risk premium appropriate to the industry.} \]

The choice of profit rates or price-cost margins depends on the objective of the study. A shareholder will be interested in return on networth while a salaried employee may prefer to compute return on sales since he may be concerned with effective utilization of all resources. The return of total assets will give us long term perspective of profitability. Price-cost margin is used to study market structure-profitability.
relationship on the assumption that monopoly power enables firms to get price above marginal cost. It is price-cost margins that are of interest in examining the allocative aspects of industrial structure. Studies on attraction of entrants, diversification and size examine the return on capital rather than the market-oriented measure of margins.

It is to be mentioned here that even on return on capital, rate of return on equity is preferred to return on total capital because it is what managers acting in the owners' best interest would seek to maximize. Rates of return on assets would differ between industries even in perfectly competitive long-run equilibrium depending on optimal capital structure. Thus, there is a lot of controversy over the appropriate measure of profitability. Researcher will have to choose a consistent measure depending on the objective pursued.

DETERMINANTS OF PROFITABILITY - THEORETICAL FRAMEWORK:

There are some important theoretical considerations related to profitability analysis which have been developed by extensive research over the years. The major development has been the establishment of the link between market structure and profitability. It has been argued that the market structure as measured by
seller concentration, barriers to entry, market share and economies of scale, etc., has a strong impact on market conduct, which in turn influences performance. Economist tried to explain inter industry differences in profitability in terms of seller concentration. The concentration - profitability hypothesis as advanced by Bain is as follows:

"The average profit rate of firms in oligopolistic industries of a high concentration will lead to be significantly larger than that of firms in less concentrated oligopolies or in industries in atomistic structure".

The study of concentration is of great significance because it is useful in formulation of guidelines for regulating industries depending on monopoly power.

Apart from concentration, profitability, is determined by the condition of entry in industry which in turn depends on the other elements of market structure such as economies of scale, product differentiation and brand loyalty. The major constituents of market structure namely concentration, economies of scale and product

differentiation have considerable influence on profitability at firm as well as industry levels. For a meaningful study of the relationship between market structure and profitability all the relevant constituents of market structure are to be taken into account rather than anyone of them.

To cite few such relationships, concentration and product differentiation account for inter-industry and inter-firm differences in profitability. Economies of scale acts as a powerful barrier to entry making the existing firms more profitable than the new entrants. Bain considered three basic sources of barriers to entry: absolute cost advantages, product differentiation advantages and economies of scale. The condition of entry measures the 'height' of entry barriers in a particular market. Further entry barriers can be high, substantial and moderate to low. High barriers to entry lead to high profits.

Growth in industry demand is another variable which influence profitability. Rapid growth in demand will maintain pressure and tend to increase margin. This will be possible only if there is sufficient lag in creation of additional capacity on the assumption that industry demand growth will be sustained. It is argued that in a situation of rapidly increasing demand, price discipline
will be difficult to maintain and margins will tend to be lower.

Some oligopolists will cut their margin in order to have a larger share in the market growth. Thus, the relationship between industry demand and profitability is ambiguous.

Absolute or relative firm size explains profitability. Economists who professed this theory believe that high rates of return result from superior firm efficiency or innovativeness and not from oligopolistic collusion and joint profit maximisation. This theory is supported by others who assume that high market shares indicate high barriers to entry and this result in higher profitability.

3 Gale points out that the effect of share on profitability depends on the degree of concentration and rate of growth in the industries in which the firm competes, and on the absolute size of the firm.

Another variable which determines profitability is the growth of firm. There is a two-way relationship between growth and profitability. Firstly, profitability is one of the vital contributions towards the ability of the firm to grow; not only that higher profitability

provides greater possibilities of internally financed growth, but also the high level of profitability will serve as a superior attraction for external finance.

Secondly, at any one time the rate of growth of the firm will determine the level of profitability attainable commensurate with that the rate of expansion. The economic environment imposes a variety of cross sectional, intertemporal and even psychological constraints upon it. The growth of the firm with respect to a given level of profitability will be influenced by the nature of management, the growth state and growth of aggregate and industrial demand, the competitive structure of industries and the technological parameters within the firm and the industry. Often these factors will explain a greater proportion of the variance of the growth rate than will profitability. The significance of all these factors may be expected to vary between industries, over time, and between different types of firms within an industry (small-large; long established-4 new entrant, highly diversified-uniproduct).

Another important variable on determinand of profitability is risk differentials. There are, however, considerable differences in beliefs about appropriate

measure of risk. Three different measures of risk namely variability of return over time, financial leverage and non-diversifiable risk are considered. The traditional theory relating risk and rate of return assumes that most stockholders are "risk averters" and therefore require a higher return, a risk "risk premium", for taking on more risk. Using profit variability for risk, its correlation with the rate of return should be positive under this "risk premium hypothesis". However, firms with market power can enjoy high rates of return and still can have low variance over time. This implies that those forego some portion of possible earnings in return for control over variability of profit.

Leverage has been used as a measure of risk. A firm with more borrowed capital represents a greater financial risk to equity holders than a firm with relatively less debt. Gale however, argues that firms have low debt because they operate in industries with high degrees of business risk and thus expects a negative leverage-return relationship if owners are risk averse.

Another measure of risk incorporated into market structure-profitability relationship is "the beta

5. B.T.Gale, op.cit.
coefficient" based on Capital Asset Pricing Model (CAPM) of Sharpe and Lintner. The basic proposition is that risk averse investors will seek to reduce risk by holding diversified portfolios. If so, the only measure of risk that should matter for any given investment is that which cannot be eliminated through diversification. Then, the expected return required by investors to continue to hold that firm's stock in their portfolios, becomes a function of the degree of non-diversifiable systematic risk associated with the return on the firm's stock. The above three measures are used by researchers in empirical studies.

Profitability of the industry is influenced by inventory turnover ratio (sales to inventory). If this ratio is high, it can be interpreted in two ways. Firstly, that the products of the industry are not much in demand and the inventories are piling up resulting in high inventory costs and low profitability. The other possible argument can be that the producers are hoarding the stocks with the expectation of higher prices in future to increase the profitability.

There are other factors such as capital-intensity, business cycle trends, availability of critical raw materials and capacity utilisation, industrial peace, debtors turnover ratio, etc, which may be relevant for...
profitability analysis. Their choice as determinants of profitability is governed, by and large, through heuristic considerations rather than systematic theoretical deductions.

Government policies have impact on profitability. In India, licensing and price and distribution controls are the two important direct controls. The latter directly affects profitability. Government fixes the price based on certain predetermined rate of return, level of capacity utilization and norms of operation. Those who do not work upto the level efficiency fail to earn assured rate of return. Regulation is imposed only when market forces fail.

On the whole, number theoretical and empirical works explain the determinants of profitability. It may not be relevant to take all the factors at a time in empirical analysis. A partial approach is required considering important variables which might fit with the existing theory and advance the scope of further investigation. Moreover, wherever there is scope, policy implications can be inquired with a view to rationalise existing policy frame work.

There are vast amount of empirical research done on market structure-conduct-profitability relationship.
Some of them are studied at industry level while others are at firm level. Similarly, different measures of profitability are employed. Choice and measurement of the explanatory variables have also varied depending on nature of study. Both cross-section and time series are used for studying relationship.

Review of empirical studies:

6 Bain (1951) studied the relationship between concentration and profitability. Using eight firm concentration ratios for a sample of 42 U.S 4-digit industries, he found that there exists a positive relationship between after-tax profits as a percentage of shareholders equity and concentration ratio.

7 Stigler (1963) observed that very small firms produce a smaller proportion of the output of concentrated industries than of unconcentrated. Such firms are more likely to absorb profits in the form of larger implicit salaries for owner-managers showing a lower profit rate. He established the negative and significant relationship between the rate of profit and the share of output of smaller firms. By adjusting the profit rates for such


accounting discrepancies between larger and smaller firms, Stigler found no relationship between profitability and four-firm concentration ratio in the 3-digit U.S. manufacturing industries for the years 1947 to 1964. This is in contradiction to Bain's work. However, concentration is one of the important structural variables and failure to include other variables will therefore bear the results of regression analysis of the relation of concentration and profitability in an unpredictable way.

8 Bain (1956) examined whether profitability is determined by elements of industry structure which affects entry into the industry. He studied this with respect to three types of barriers in the 20 U.S. manufacturing industries for the periods 1936-40 and 1947-51. He analysed industries according to qualitative classification - "high", "substantial", and "moderate-to-low". Bain's result was that the main determinant of returns was barrier to entry. High barriers to entry lead to high profit rates, though the differences between 'Substantial' and 'Moderate-to-low' was not so clear. Seller concentration was not a good predictor of profitability. Bain identified product diversification and advertising as the main causes of

8. J.S. Bain, Barriers to new competition, 1956.
high barriers. Micheal Mann found average after-tax return on equity of leading firms significantly associated with concentration and barriers to entry in 30 U.S. manufacturing industries for the period 1950-60. Thus, the result supported Bain's work.

Comanor and Wilson refined earlier works by using quantitative measures and applying multiple regression technique to assess the statistical significance. They found advertising intensity as a major determinant of profitability (average after-tax return on equity) in 35 U.S. consumer industries for the period 1954-57. This formed the basis for much subsequent empirical work in this field.

Collins and Preston in their two important studies on price-cost margin in U.S. four-digit industries for the years 1958-60 and 1963 examined the effect of concentration, asset size and capital-output ratio in


price-cost margins for industries. They found price-cost margins consistent but weakly related to concentration ratio whether or not the differences in capital output ratio and other variables were taken into account.

Hall and Weiss study found firm size as the major determinant of profitability. They hypothesized that large enterprises should earn high profit rates even in the long run and even in the absence of barriers to entry other than those directly associated with availability of capital. Using data of 341 firms for the years 1956 to 1962, they concluded that size tend to result in high profit rates.

Singh and Whittington found that the variability of profit rates was larger for small firms than for large ones in the same sector. They also found some evidence persisting in firm profitability, where above-average firms tend to remain above average.

Shepard examined whether firm's market position defined by its share-industry concentration and barriers


to entry affects its attainable degree of profitability.
Data on a panel of 231 large U.S. industrial firms
during 1960-69 was used for the purpose. In static
models, market share emerged as the main element,
independent of the leading firm group and entry
barriers. The comparative static model showed that the
trend of profit rate is associated primarily with
initial profits. He confirmed neoclassical presumption
that increased market share implies greater
profitability. Structural variables, except perhaps for
advertising/sales ratio, are weak both as to magnitude
and statistical significance.

15
Gale examined the effect of market share on the rate
of return of selected firms operating in different
market environment using data of 106 firms. He found
that high market share is associated with high rates of
return and that the effect of share on profitability,
depends on other firm and industry characteristics such
as degree of concentration and rate of growth in the
industries in which the firm competes and on the
absolute size of the firm. He emphasised that
theoretical and empirical considerations of interaction
effects are important to a better understanding of firm
and industry behaviour and performance. He also found

15. B.T.Gale, 1972, op.cit
the relation between rate of return on equity and the equity to capital ratio (a measure of risk in an inter-
industry sample of firms) to be positive and significant.

16 G.J. Hurdle developed theoretical model relating leverage, market structure, risk and profitability and tested the model using cross-sectional data on 228 U.S. manufacturing firms and 85 industries data covering the 1960s. He used a three equations-simultaneous model to test the hypotheses of his study. He found that while firms with market power do have lower risk, they do not have higher debt than low market-power firms. The high profit firms earned this because of market structure and not through capital structure.

17 Manke examined the causes of interfirm profitability differences by performing empirical tests on data generated by a simplified model of the corporate sector of an economy and verifies with the data generated by large U.S. firms. He found firm size, market share and growth as factors for differences in profitability.


Khalilzadeh-Shiraji considered in his model the explanatory variables such as (a) concentration ratio, (b) capital output ratio, (c) growth of demand, (d) product differentiation, (e) minimum economic size (f) imports, (g) exports and (h) foreign direct investment. Of these, capital-output ratio, product differentiation, minimum economic scale and exports were found significant for the variation in price-cost margin using three digit industry data for 1963.

Cowling and Waterson (1976) found a positive effect of concentration (as measured by the Hirschman-Herfindahl index) on price-cost margins by examining changes in such margins in 1963-69. They justified omission of certain variables such as the market price elasticity of demand on the grounds that such variables are constant in time. Their study has shown a positive association between profitability and concentration index.

Bothwell and Keeler integrated the risk-return relationship of the Sharpe-Linter Capital asset pricing


model into the market structure-performance equation. The results of the model confirm both the capital asset pricing model and the market structure-performance relationship. This suggests that correct incorporation of risk into the market structure-performance equation should improve the accuracy of estimates of the relationship.

Bothwell, Cooley and Hall points out that at the level of theoretical abstraction typically considered in market-structure-performance studies, data on cross sections of firms or industries are unlikely to be sufficiently informative to make such empirical analysis useful. They suggested returning to industry specific studies. It is to be mentioned here that industry specific studies will be more useful in understanding performance of an industry both in competitive and regulated environment. This will help for evaluating industry policy measure and merit studying on the basis of nature and importance of the industry, level of competition and extent of regulation and controls. In this study, Bothwell and others considered seller concentration, barriers to entry, firm size, risk-measured in terms of variability of return over time, financial leverage and beta, advertising intensity and

growth as major determinants of profitability. Advertising intensity and market share showed significant positive relationship with profitability.

Aaker and Jacobson examined the role of risk in explaining cross-sectional differences in the profitability of business units. They disaggregated risk into two components—systematic and unsystematic—in order to find whether they have different effects on return. They found that each component of risk have substantial, significant and different impact on return.

There are number of works on determinants of profitability in India. Subramanian and Papola studied the relationship between profitability and growth of firms in Indian chemical industry during the period 1960-69 with data of 27 companies quoted in stock exchange. They found that most of the firms want to grow in an expanding market with differing intensities and that those who have ability aided by profit continued to grow faster. Sawhney and Sawhney found


capacity utilisation as a major significant factor affecting profit rates and concentration was also significant in large number of industries.

25 Agarwal studied relationship between profitability measured as profit/networth and profit/net assets and size expressed as total sales for seven Indian manufacturing industries namely, cotton spinning and weaving, cotton ginning, jute textiles, paper and pump, sugar and aluminium for the period 1962-72. The relationship between profitability and size was observed in cotton spinning industry, jute textile industry, sugar and brewing industry and aluminium industry, while in case of cement and cotton spinning and ginning industry no such relationship was observed.

26 Asha Jain examined the variation in price-cost margin over time in ten two-digit Indian industries. Price-cost margin was used as measure of profitability. Cost factors emerged as significant determinants of profitability while the structural variables like concentration ratio, capacity utilisation, growth and


capital intensity showed mixed pattern. Results varied among industries.

Agarwal analysed the behaviour and determinants of profit and in particular to examine the impact of price control on the profitability of firms in the automobile industry. The study was based on data for the period 1959-60 to 1978-79. He found that profits in the car sector depended on sales, capacity utilisation, product prices and factor prices. Market share and lagged investment appeared to be significant at the firm level but not at sector level. However, both market share and lagged investment were significant for non-car sector. He has also concluded that price control has adversely affected profit in the car sector.

Above review of empirical works facilitate to understand that various structural and non-structural variables determine profitability. It gives an idea on extensive and diversified works on determinants of profitability. Researchers have verified and extended the results over the years. Further works on reaffirmation of these relationships based on improved research methodology are being done. Moreover, depending on the nature and position of industries and for policy prescription and evaluation further works are being undertaken.

27. R.N. Agarwal, Corporate investment and financing behaviour, Commonwealth publishing, Delhi, 1987.
On the basis of above theoretical discussion and review of empirical studies, certain variables are chosen for analysing determinants of profitability in Indian cement industry. Since there are a number of factors which explain profitability and measurement of variables employed are also different, it is important to mention variables and how they are measured. Some of the variables may be significant over a period of time while others may be prominent in cross-section studies. The object of this study is to identify the factors which explain profitability during the period 1971-86. The variables chosen may be important either in time series or across firms or both. This has to be taken into consideration while pooling time series and cross-section data.

Return on assets and return on sales are widely used measures of profitability. It is assumed that management may be concerned with effective utilisation of all resources and these two measures could be proper in this line of argument. The profit rates measured by sales will give a short-term perspective of profitability because sales are annual flows. On the other hand, the return on assets will give us a long-term perspective of profitability. The shareholders will be interested in return on networth. Since networth of company
fluctuates depending upon earnings of the Company and its accumulation of reserves. In this sense, return on networth gives short run perspective of profitability of firm.

Absolute firm size explains profits. According to Baumol that increase in money capital not only increase absolute profits of the firm but also increase its earning power per unit of investment. This will be true only if large firms are efficient and innovative. Though the positive relationship between size and profitability has been found to be significant, after a point of time, profitability increases at a decreasing rate with proportional increase in size. This could arise when (i) other firms in the market follow similar strategies, (ii) diseconomies and inefficiency due to unmanageable size, and (iii) increased possibility of public criticism of excessive profits as firm becomes larger. Therefore, size is a variable with conflicting expectations about its impact on profitability.

In this study, size is measured as total assets of the company. Generally, two size measures are employed. They are assets and sales turnover. Assets express amount of resources utilised for producing output whereas sales is an output variable. Sales is an annual flow depending upon output produced and sold in the
market. Sales needs to be adjusted for excise payments for more meaningful comparison. It is to be mentioned here that researchers have used both the measures in structure-conduct-performance studies to establish relationship between size and profitability.

The other variable which has drawn considerable attention of economists is growth of firm. There are several theories which link growth of the firm and its profitability. A positive relationship is expected between growth and profitability. It is a two way relationship. Higher profitability may be result of adjustments in capacity which were lagging behind changes in demand and/or improved efficiency of operation. The faster growing firms in an industry are likely to improve their productivity and will tend to be more competitive in terms of price and quality of products. The another reason could be when firms are earning high profits, the adequate finance generated can be used for accelerating growth. When opportunities for growth are restricted in existing line, firms tend to diversify as strategy of growth. However, growth above a certain rate adversely affects profitability. The costs involved in growth increase as rate of growth of firm increases because of competitive environment in the industry and partly because of managerial constraints.
A firm with high leverage ratio represents greater financial risk than a firm with relatively less risk. If competition equalises earnings, then high debt should result in higher return on networth. It is argued that firms have low debt because they operate in industries with high degree of business risk and thus expect a negative leverage relationship, if owners are risk averse. It seems that the relationship between leverage and rate of return is indeterminate apriori. In an intra industry study business risk is assumed to be same and leverage must be a better measure of risk. It is important to note that nature of relationship between profitability and leverage depends on measures used.

Another variable influencing the profitability of the industry is capital turnover ratio which is defined as the ratio of sales to fixed assets. It indicates the relationship between the amount invested in assets and the results in accruing in terms of the sales. It is expected that an increase in this ratio would result in increase in profitability. The capital employed of a firm includes both current and fixed assets. The fixed assets provide the productive base and earning capacity for the firm. But an efficient utilisation of the earning capacity calls for an optimum use of working capital.
The management of working capital involves decisions about the amount and composition of current assets and how they are financed. Such decisions involve a trade-off between solvency and profitability. In inter-firm comparison, the firm with higher current ratio has better liquidity/short-term solvency. A high ratio of current assets to current liabilities may be indicative of slack management practices, as it might signal poor credit management in terms of over-extended accounts receivables. A low ratio is also not desirable since there will be an inadequate margin of safety.

Another variable which can influence the profitability is the inventory turnover ratio. It is the ratio of sales to inventory which indicates the number of times inventory is replaced during the year. Instead of taking year end stock of inventory, an average of the opening and closing stock of inventory is considered. A high ratio implies good inventory management. But low inventory will adversely affect ability of a firm to meet customer demand and in turn will affect profitability. On the other hand, a very low inventory turnover ratio signifies excessive inventory or over-investment in inventory and high carrying cost. The sign of inventory coefficient is ambiguous.
Apart from above discussed factors operating expenses ratio is included as an explanatory variable in this study. A low operating ratio is by and large a test of operational efficiency. The implication of low operating expenses ratio is that relatively a high percentage share of sales is available for meeting financial liabilities like interest, taxes and dividends. Therefore, a negative relationship is expected with operating expenses and profitability.

The model specified for estimating profitability function is as follows:

\[ TT = a_1 + a_2 \text{Size} + a_3 \text{GRTA} + a_4 \text{Lev} + a_5 \text{Inv. turnover} + a_6 \text{assets turnover} + a_7 \text{current ratio} + a_8 \text{op. exp. ratio} \]

Where,

\( TT \) = measure of profitability

\( \text{Size} \) = Total assets in logarithmic form

\( \text{GRTA} \) = Growth in total assets

\( \text{Leverage} \) = Debt/Total assets

\( \text{Inv. turnover} \) = Sales/Inventory

\( \text{Assets turnover} \) = Sales/Net fixed assets

\( \text{Current ratio} \) = Current assets/current liabilities

\( \text{Op. Exp. ratio} \) = Operating Expenses/Sales

Analysis of empirical data:

Trend in the profitability of cement industry during the years 1971-1986 is analysed here. Table on
Profitability of selected industries 1971-72 to 1985-86 is based on finances of medium and large public limited companies by Reserve Bank of India. The profitability in cement industry had been fluctuating. Between 1971-72 and 1976-77, the return on networth was declining over the previous year except in 1975-76. Industry profitability improved significantly in 1975-76 because of implementation of Fourth Tariff Commission recommendation in 1974. In 1972-73, the profit after tax as a percentage of net worth in cement fell to 4.7 percent as against 10.3 per cent in all industries, 12 per cent in paper, 16.3 per cent in chemicals and 9.8 per cent in engineering. In 1973-74 and 1974-75, the cement industry suffered losses while profitability in most other industries improved over that attained in 1972-73. During 70's there were acute problems in the industry owing to rigid controls. Profitability improved in 1977-80 because of price was fixed based on 12 per cent post tax return on networth. But once again in 1980-81, the industry incurred losses. After introduction of partial decontrol, profitability in cement industry rapidly went upto 34 per cent and 23 percent in 1982-83 and 1983-84 respectively. Then, it declined to 6.1 per cent in 1985-86. Thus, the return on networth has a fluctuating trend in cement industry. One interesting observation is that whenever there had
been change in price policy and/or substantial rise in price. Profitability had improved but performance could not be sustained.

Table: 5.1
Profitability of selected industries 1971-72 to 1985-86

<table>
<thead>
<tr>
<th>Year</th>
<th>All Industries</th>
<th>Cement</th>
<th>Paper</th>
<th>Chemicals</th>
<th>Engineering</th>
</tr>
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<tr>
<td>1973-74</td>
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<td>*</td>
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<tr>
<td>1974-75</td>
<td>13.7</td>
<td>*</td>
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</tr>
<tr>
<td>1975-76</td>
<td>8.2</td>
<td>12.0</td>
<td>14.8</td>
<td>13.5</td>
<td>8.5</td>
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<td>1976-77</td>
<td>7.9</td>
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<td>2.6</td>
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<td>1980-81</td>
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<td>1981-82</td>
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<td>1984-85</td>
<td>9.1</td>
<td>8.9</td>
<td>0.4</td>
<td>12.7</td>
<td>9.9</td>
</tr>
<tr>
<td>1985-86</td>
<td>8.0</td>
<td>6.1</td>
<td>--</td>
<td>11.9</td>
<td>6.7</td>
</tr>
</tbody>
</table>

Note:
1. Profitability is profit after tax as percentage of networth.
2. * indicates negative numerator

The above analysis is based on the aggregate industry data of RBI. However, a company's profit would vary from industry ratio because it is found that different cement units in the cement industry in India have widely divergent costs. The High level Committee observed:

"By and large, old and wet process plants do have high production costs, although the lowest cost wet process plants are fairly close in terms of costs to be cost efficient better managed dry process plants. Nonetheless, location and management efficiency are, two of the major factors in the fairly wide variations in the observed (as well as normative) over-all costs of cement production by different units."

The committees also compares profitability of the single product companies producing cement with multiproduct companies producing cement. While profitability of multi-product companies manufacturing was 13.4 per cent and 13 per cent in 1978-79 and 1979-80 respectively, i.e. 5.6 per cent and 2.1 percent in the two years respectively.

29. Ibid p.21
30. Ibid p.20 and p.41
As mentioned earlier, the regression framework is used to examine the factors which determine profitability firms based on firm level data of those companies for which cement is the major product. The choice of variables are explained in the framework of analysis in the above section of this chapter.

The profitability function estimated using the ordinary least square method are given in Table 5.2. Though, the estimated equations are statistically good fit, the explanatory power is not high. The measure of profitability used is return on assets. In the estimated equation for the period 1971-86, leverage, inventory turnover, growth in total assets and ratio of operating expenses to sales are found to be statistically significant in explaining inter-firm differences in profitability.

The significance of operating expenses ratio with a negative coefficient indicates that firms which are operationally efficient has been able to earn more than inefficient firms. Since growth in total assets and leverage ratio have a positive coefficient, it is inferred that profitability has improved because of high debt and growth of firms. Inventory turnover is significant at 10 per cent level in explaining profitability. The coefficient is negative which
<table>
<thead>
<tr>
<th></th>
<th></th>
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<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Return on assets: Net Profit/Total assets</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0.111</td>
<td>0.117</td>
<td>- 0.137</td>
<td>0.634</td>
<td>0.653</td>
<td>0.606</td>
<td>- 0.566</td>
<td></td>
</tr>
<tr>
<td>(1.052)</td>
<td>(1.193)</td>
<td>(- 0.905)</td>
<td>(3.818)</td>
<td>(1.797)</td>
<td>(4.572)</td>
<td>(- 0.389)</td>
<td></td>
</tr>
<tr>
<td>0.024</td>
<td>0.023</td>
<td>0.007</td>
<td>0.026</td>
<td>0.037</td>
<td>- 0.048</td>
<td>0.027</td>
<td></td>
</tr>
<tr>
<td>(2.718)</td>
<td>(2.730)</td>
<td>(0.459)</td>
<td>(2.782)</td>
<td>(2.876)</td>
<td>(- 2.595)</td>
<td>(2.640)</td>
<td></td>
</tr>
<tr>
<td>E/A ratio</td>
<td>0.027</td>
<td>0.027</td>
<td>0.107</td>
<td>- 0.043</td>
<td>- 0.812</td>
<td>- 0.029</td>
<td>0.050</td>
</tr>
<tr>
<td>(1.431)</td>
<td>(1.438)</td>
<td>(3.752)</td>
<td>(- 1.497)</td>
<td>(- 1.263)</td>
<td>(- 1.248)</td>
<td>(1.948)</td>
<td></td>
</tr>
<tr>
<td>Turnover</td>
<td>- 0.011</td>
<td>- 0.012</td>
<td>- 0.005</td>
<td>- 0.009</td>
<td>0.015</td>
<td>- 0.006</td>
<td>- 0.008</td>
</tr>
<tr>
<td>(- 1.817)</td>
<td>(- 1.946)</td>
<td>(- 0.517)</td>
<td>(- 1.239)</td>
<td>(0.715)</td>
<td>(- 1.422)</td>
<td>(- 0.905)</td>
<td></td>
</tr>
<tr>
<td>Sales</td>
<td>- 0.233</td>
<td>- 0.232</td>
<td>- 0.141</td>
<td>- 0.405</td>
<td>- 0.725</td>
<td>- 0.205</td>
<td>0.206</td>
</tr>
<tr>
<td>(- 4.694)</td>
<td>(- 4.708)</td>
<td>(- 2.598)</td>
<td>(- 3.384)</td>
<td>(- 3.014)</td>
<td>(- 2.022)</td>
<td>(- 3.574)</td>
<td></td>
</tr>
<tr>
<td>ETS</td>
<td>0.047</td>
<td>0.047</td>
<td>0.085</td>
<td>- 0.005</td>
<td>- 0.032</td>
<td>- 0.017</td>
<td>0.088</td>
</tr>
<tr>
<td>(1.718)</td>
<td>(1.723)</td>
<td>(1.614)</td>
<td>(- 0.175)</td>
<td>(- 0.468)</td>
<td>(- 0.703)</td>
<td>(2.164)</td>
<td></td>
</tr>
<tr>
<td>ETS</td>
<td>0.004</td>
<td>0.004</td>
<td>- 0.012</td>
<td>+ 0.001</td>
<td>0.011</td>
<td>- 0.010</td>
<td>0.004</td>
</tr>
<tr>
<td>(1.218)</td>
<td>(1.219)</td>
<td>(- 1.514)</td>
<td>(+ 0.225)</td>
<td>(1.128)</td>
<td>(- 3.108)</td>
<td>(0.571)</td>
<td></td>
</tr>
<tr>
<td>- 0.002</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(1.389)</td>
<td>(1.507)</td>
<td>(1.532)</td>
<td>(- 1.214)</td>
<td>(0.479)</td>
<td>(- 2.601)</td>
<td>(1.955)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>0.226</td>
<td>0.226</td>
<td>0.357</td>
<td>0.228</td>
<td>0.419</td>
<td>0.335</td>
<td>0.274</td>
</tr>
<tr>
<td></td>
<td>1.472</td>
<td>1.472</td>
<td>1.443</td>
<td>1.696</td>
<td>2.020</td>
<td>1.593</td>
<td>1.464</td>
</tr>
</tbody>
</table>

* in parenthesis are t-statistic
** refers to significance at 5 percent level
*** refers to significance at 10 percent level.
indicates that inspite of high inventory turnover profitability has been low during this period. The other argument could be inventory piled up because producers hoarded the stock to increase prices. This is not likely in the long run considering the government interference in this industry. Though price dummy shows a negative coefficient, it is not statistically significant. The above results are based on pooled cross section analysis for the period 1971-86. Within this period, there have been substantial change in the pricing policy which will influence profitability of firms. As mentioned above, dummy variable introduced to capture change in price policy in 1982 is not significant. However, it is possible that economic relationships change significantly over time due to changes in environment in which firms are operating. To analyze the consistency of relationship, different sub periods are identified.

During 1971-78, the uniform retention price was in vogue. All the existing units had a uniform price of output on the basis of a return of 14 percent on capital employed. The Bureau of Industrial Costs and Prices recommended that price should be fixed on the basis of post tax return of 12 per cent on networth on capital cost of Rs.650/- per tonne on a debt-equity ratio of
2:1. However, till 1979, the uniform price policy was implemented and profitability of high cost units were considerably affected during this period.

The profitability function estimated for this period 1971-78 is statistically a good fit. The operating expenses ratio and current ratio are found to be significant with a negative and positive coefficients respectively. The implication of operating expenses is that efficient firms have improved their profitability. The positive relationship between current ratio indicates that firms which had better liquidity were more profitable. None of the other explanatory variables are found to be statistically significant. It is interesting to note that current ratio and operating expenses ratio which are important from day-to-day management are prominent variables in explaining differences in profitability among firms. As mentioned earlier, it is during this period, Industry had a phase of sluggish growth in terms of capacity expansion and modernisation.

Another sub period identified for analysing the profitability function is 1979-86. Leverage and operating expenses ratio are significant with a positive and negative coefficients respectively. Though size, growth and current ratio have contradictory sign
compared to the pooled years of 1971-86, they are not statistically significant variables. Considering the major change in price policy during 1982, it would be proper to have 1979-81 and 1982-86 as two different sub periods.

During 1979-81, the three-tier price policy was implemented for existing units. Three tier retention price policy was the main recommendation of the committee under the chairmanship of Laxmial Kumar in 1978. As mentioned earlier, the existing units were classified into low, medium and high cost units and differential prices based on costs were recommended for each group. Similar observation was made by another committee on controls and subsidies in its report in May 1979. This change in methodology of pricing and its consequent impact on firms responses must be reflected in performance of firms. The estimated profitability function shows leverage and operating expenses ratio as prominent variables in explaining interfirm differences in profitability.

To infer whether the profitability function has shifted between the periods 1971-78 and 1979-81, the Chow test is performed. For this purpose, the pooled cross-section estimation for the period 1971-81 has been done. Leverage, current ratio, operating expenses ratio,
growth in total assets and size are found to be statistically significant. Leverage, current ratio and operating expenses ratio have the same nature of relationship as indicated in above sub-period analysis. However, growth in total assets and size were not significant in any of the sub periods explained above. The positive coefficients of growth and size of firms indicate that large firms are efficient and higher growth rate has improved efficiency and profitability. Thus, the above analysis explains for differences in profitability of the firms during 1971-81 in cement industry.

The policy of partial decontrol of cement introduced from 28th February 1982 brought in change in market conditions. Under this policy the existing units were expected to supply two-thirds of their installed capacity as levy while in the case of new units, the levy quantum had been at 50 per cent. Since then, government has reduced levy quota. The availability of more output to sell in open market increased competition among firms. Profitability improved in the year 1982-83 immediately after implementation of partial decontrol.

With the reduction of realisation from open market, profitability declined over the years. Since industry scenario changed with introduction of partial decontrol,
the period 1982-86 is recognised as a sub-period for studying profitability function.

The estimation result for this period is reported in Table 5.2. Though the fit is significant at 1 per cent level, the explanatory power is low. Among the explanatory variables, operating expenses ratio, leverage, size and assets turnover ratio are found to be statistically significant. The negative relationship of operating expenses with profitability is as hypothesised and verified in other periods in this analysis. This indicates that firms which were operationally efficient have improved their earnings.

Leverage, assets turnover and size of firm as measured by total assets in logarithmic form have negative coefficients. The relationship between profitability and leverage is bound to be negative because we have left out interest payments and measured return on assets on profit after tax. However, in other periods, we have positive coefficient of leverage. A possible explanation for such relationship is that some firms earned high returns in regulated environment. It is to be noted that high returns means only above the mean profitability of industry. Moreover, the coefficient leverage is small.
Generally, it is expected that an increase in ratio of sales to net fixed assets would result in higher profitability because of better utilisation of assets. In this study, assets turnover has a negative impact on profitability. This indicates that even though assets turnover had declined, profitability was high. The other argument could be that assets turnover ratio increased but profitability had declined. It is observed while studying investment behaviour that companies invested in creation of additional capacity and modernisation since 1980's. Normally there is a lag in additional investment bringing in higher sales. The trends in profitability shows a decline in 1985 and 1986 by the time when assets created became operational. This justifies negative impact of assets turnover on profitability.

Size is another variable which exhibits similar relationship. It is important to note that in other periods of analysis, size has a positive coefficient. Only the estimated function for the year 1982-86 shows a negative coefficient of size with profitability. This could be because large firms are inefficient and certain diseconomies are associated with large size. Since the coefficient is small, it is concluded that the impact is little.
The Chow tests are performed to infer whether estimated functions are stable. The results of the test are given in Table 5.3.

Table : 5.3 Chow-test for stability of profitability function.

<table>
<thead>
<tr>
<th>Coiled observation (P)</th>
<th>1971-86</th>
<th>1971-81</th>
<th>1979-86</th>
<th>1971-86</th>
</tr>
</thead>
<tbody>
<tr>
<td>Period 1</td>
<td>1971-81</td>
<td>1971-78</td>
<td>1979-81</td>
<td>1971-78</td>
</tr>
<tr>
<td>Period 2</td>
<td>1982-86</td>
<td>1979-81</td>
<td>1982-86</td>
<td>1979-86</td>
</tr>
<tr>
<td>w of e</td>
<td>1.769</td>
<td>1.488</td>
<td>0.658</td>
<td>1.769</td>
</tr>
<tr>
<td>p</td>
<td>1.488</td>
<td>0.832</td>
<td>0.353</td>
<td>0.832</td>
</tr>
<tr>
<td>w of e</td>
<td>0.146</td>
<td>0.353</td>
<td>0.146</td>
<td>0.658</td>
</tr>
<tr>
<td>Calculated F Value</td>
<td>2.408</td>
<td>5.077</td>
<td>4.274</td>
<td>5.457</td>
</tr>
</tbody>
</table>

It is observed that the coefficients of functions have changed in the three periods namely, 1971-78, 1979-81 and 1982-86. Based on this, it is concluded that the explanatory variables are sensitive to changes in price policy.

To sum up, industry profitability had been varying over the years during the period of study i.e., 1971-86. Between 1971-72 and 1981-82 the profitability of cement
companies was low compared to other selected industries and all industries group. It is observed based on trends in profitability that though changes in price policy had improved performance in that year or following year, it could not help companies to sustain high profitability. For example, immediately after partial decontrol profitability went up and by 1986, it had declined over comparable industries. The regression analysis shows leverage, inventory turnover, growth in total assets and ratio of operating expenses to sales as prominent variables in explaining inter-firm differences in profitability. The significance of operating expenses ratio with a negative coefficient indicates that firms which are operationally efficient has been able to earn more. The profitability function are estimated for the sub-periods 1971-78, 1979-81 and 1982-86 and the Chow test indicates that the function has shifted over the periods.