Chapter II

**Market Power and Competition in the Manufacturing Sector**

**Introduction**

Based mainly on the number of sellers, the standard market model of micro-economic theory distinguishes between two types of market forms, namely, monopoly and perfect competition. Even though in actual practice these two extreme situations are hard to find, the market for industrial goods are characterised by few sellers (defined generally as oligopoly) and adjust via quantity change. This oligopolistic structure often emanates to imperfections in the market which has important consequences for the allocation of resources. The structure of the market influences the conduct of the firms and thus the welfare of the agents involved in the transactions\(^1\).

In this chapter an attempt is made to understand the market structure and its changes induced by the changes in the policy regime over time. Changes in market structure are captured by examining the changes in the magnitude of competition in the industrial sector. The chapter is organised as follows. Section I traces the evolution of the concept of competition. Section II discusses the various measures used to capture the extent of competition in the manufacturing sector. The measure used in the present study, the mark-up, and its treatment in economic theory is provided in section III. Section IV brings out the empirical methodologies used to estimate mark-up. A detailed outline of the methodology used and evidence on competition from Indian manufacturing are presented in section V. Section VI presents the empirical estimates followed by a summary of the chapter.

**I. Competition: the episteme**

Right from its inception as a body of knowledge, since Adam Smith, economics has placed in a central role the concept of competition in the analysis of markets. The

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\(^1\) See Harbger(1954).
concept thus attracted the attention of economists cutting across various schools of thought. While at one level this has contributed to the development of precise analytical models of the working of competitive markets, at another level this has led to the intensification of the vagueness of the concept as economists used different analytical methods and perspectives. The matter is further complicated as ideas change 'between and within' perspectives. However the fact that some of these perspectives incorporate in part the alternate ideas explains to an extent their predominance. This section is devoted to an examination of some of the so-called 'mainstream' perspectives on competition as an understanding of the treatment of the concept in various strands of the literature becomes imperative for the adoption of a working definition in order to facilitate further discussions. The discussions are limited only to the core of the arguments starting from the Classicals to the present day use of the term in models of industrial organisation, avoiding a histiographical sketch of the concept.

In spite of the universality of the acceptance of competition as an organising concept in all approaches to economic theory, Classicals are often credited with developing the characteristics of perfect competition. The main characteristic referred to is the price taking behaviour in the market. Classicals' search for the mechanism, which determined the behaviour of industrial capitalism, culminated in the analysis of the behaviour of markets. This started by Sir William Petty, after refinements took shape in the works of Adam Smith who relied mostly on the concepts of Cantillion and Turgot. Smith analyses the concept in terms of the formation of a natural price which equals to the costs of production. This natural price is taken as a gravitating force around which all the other prices revolve and a persistent element, that is, competition acts as the converging force. This natural price Smith calls as the price out of free competition.

It emerges from Smith's analysis that in a competitive market the actual price might be more if the quantity brought to the market falls short of demand and vice versa if the

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2 This had been the subject of discussion in a series of exchanges between Stigler and McNulty. See Stigler (1957) and McNulty (1967, 1968).

3 By Classicals we mean the contributors to the development of economic theory between 1776 and 1870.
quantity brought exceeds the demand. Smith identifies four causes for prices to be above actual/market prices. They are (1) concealing of extra demand (2) secret technical advantages (3) monopoly granted to a firm or individual in trading/production and (4) exclusive privileges for individuals/corporations which limits the size of competitors to a few. According to him profits like wages might be differentiated between sectors, as landlords, capitalists and workers are agents with mobility in a system, which ensures 'perfect liberty'.

Ricardo departs here and attaches more important role for capital as capitalist diverts funds from less to more profitable activities. This was identified as the factor that prevented market price from converging to the natural price, his analysis being limited to situations where competition operated without restraint. Ricardo uses the term monopoly price which prevails for commodities which face scarcity or some sort of 'fanciful value'. For these commodities there was no connection between price and their natural value. Thus an analysis of the concept of monopoly price entered into the discussions through the work of Ricardo. For both Smith and Ricardo market price departed from the actual price in conditions of monopoly or when the operations of the market gets distorted.

TheClassicals, more concerned with a theory of value and distribution, in the process found it inevitable to provide explanations for the determination of general rate of profit and natural prices. The concept of competition, which according to them imposed a gravitational force, was thus seen as a factor crucial in arriving a theory of value. This however failed to take into account the behavioural aspects of the producers to which Marx accorded priority.

"Classical free competition was defined more in terms of economic behaviour than of market structure. Marx's concept of competition rooted in classical theory of free competition also refers to the behavioural activities of the capitalist firms". The concept

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4 Smith (1776, 1961 edition.)
5 Ricardo (1817, 1951 edition)
6 Semmler (1984)
for Marx embodied capitalist relations of production and related to the dominance of capitalist mode of production. For Marx' free competition is the real development of capital' which had close bearing on a general rate of profit.

Marxian views are derived from his theory of the behaviour of the capitalist firms. The goal of the firm was to grow and expand, rooted deeply in the self-expansion motive of capital. According to him inter-firm rivalry often led to the evolution of new structures via accumulation, growth and the downfall of the old firms. This resembles modern oligopolistic structures with fierce rivalry between a few firms. Firms were conceived as powerful agents countering rival's possible actions and engaged in price setting rather than being passive price takers.

Marx viewed monopoly of firms as temporary phenomena when demand exceeded supply, and as natural monopolies when the ownership of resources was controlled by producers. Reorganisation of the firm and technical change were seen as the main instruments of competition. Technical change and innovation was considered important as it helped to reap supernormal profits, which enhanced the long run growth potential. Moreover, technical change could also result in the co-existence of multiple techniques of production furthering the possibilities of reaping higher profits. Marx visualised capital flowing between sectors and industries seeking higher rates of return. This according to him alters the relative output proportions in industries changing the supply and demand in turn affecting market prices and profits. According to him the long run prices of production acts as centres of gravity for the market prices leading to draw parallels with the Newton's theory of planetary system.

The stability properties of the competitive process were viewed with some apprehension by Marx and he analysed capitalist economy in terms of disequilibrium dynamics. He anticipated intensification of interfirm and interindustry competition with the evolution of capitalism. More importantly his analysis had a bearing on the subsequent writers.

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7 Marx (1973 p.650).
belonging to the post-Marxian era. Post Marxian's were concerned with the delay and hindrances to the attainment of general profit rate. This according to them was the result of the elimination of competition and monopolisation of capital via increase in industrial concentration, limited degree of mobility of capital due to high sunk costs in the investment and collusion among the existing firms. Large firms were conceived as having price setting powers which later on led to theories of mark-up pricing and limit pricing, even though there existed differences regarding the precise manifestation of these monopolistic tendencies. More recent works have however attempted to elaborate on mark-up determination and competition via technical change.  

The Classicals and Marx viewed competition as an outcome or a state ignoring the importance of the process behind. It is in this context that the Classicals are credited with the development of perfect competition as neoclassicals too view competition as a state equating it to market structure. In this aspect Austrian school depart from both Classicals and neo Classicals. Austrian tradition with emphasis on disequilibrium analysis found the concept of perfect competition uneasy. As pointed out by Hayek the concept of perfect competition as discussed by the neo-Classicals described an equilibrium situation and ignores the process, which leads to an equilibrium. The perfect competition situation according to the 'Austrians' does not allow for changes in prices or product differentiation and other forms of dynamic rivalry which are prevalent in a dynamic economic system. This makes the model incapable of explaining the working of a capitalist system apart from ignoring the role of the entrepreneur. These issues later on formed the core Schumpeter's analysis which is taken up in detail subsequently.  

The essence of Austrian thought is summed in the works of Hayek and Krizner. The main dissatisfaction of Austrians stems from the treatment of competition as a state rather than a process. This is in line with the general Austrian critique of economic theory, a critique of equilibrium analysis. The concern of Austrians was more on
the 'processes' rather than the 'situation' achieved after the process. Hayek in his essay was the first to challenge the assumption of equilibrium analysis which identified competition as a situation rather than a process. Hayek's analysis was against the then mainstream view which considered the definition of Cournot as "enormously more precise and elegant than Smith". The criticism extended to the other propositions such as, Clark's concept of workable competition, Chamberlain's monopolistic competition and to some extent Schumpeter's ideas of creative destruction as all the three failed to come to grips with the market process. Austrians were not sympathetic to the concept of monopolistic competition because "its attack on the relevance of the theory of perfect competition tended to strengthen use of the perfectly competitive economy as a norm from which to judge the efficiency of the real world".

Austrian analysis was rooted in the view that 'in order to understand the process one should understand the variety and intensity of the obstacles to the market process'. This warrants an examination from a wider perspective than price competition and should incorporate changing commodities and methods of production. Austrians identified arbitrary impediments to entry as something which prevented market participants from competing. This later formed the foundations of the analysis of the role of entrepreneur in initiating the competitive process by entering into production. Austrian views on the concept of monopoly too are centred around the impediments to competitive process as the monopolist was viewed as controlling the resources. The concept of monopoly for Austrians was the outcome of resource ownership being controlled by a particular market participant which affected the outcome of the market process. Thus the true dangers of monopoly were hidden in the resource monopoly as acquiring monopoly control over the resources helps to maintain market position indefinitely for the producer. Schumpeter

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10 See Hayek (1948).
11 See Stigler (1957 p.5).
12 Krizner (1973 p.92).
proceeds his analysis strengthening the Austrian notions placing a central role for the entrepreneur.

Schumpeter's views on competition were an offshoot of the explanations offered for the working of capitalist economy. The departure is clearly the role of entrepreneur, a neglected figure by the Classicals as well as neo-Classicals. In Schumpeter's analysis the central force that drives competition is innovations. Innovations were seen as a part of entrepreneurial activity which triggered a disequilibrating force disrupting the existing technology and production system.

Schumpeter visualised a capitalist system in terms of evolutionary process and for this reason capitalism for him could never be stationary. The prime movers according to him were not the changes in the social and economic life caused by the changes in the existing environment like war but "the fundamental impulse that sets and keeps the capitalist engine in motion comes from the new consumers' goods the new methods of production or transportation, the new markets, the new forms of industrial organisation the capitalist enterprise creates" (Schumpeter 1942: pp.82-83). This 'new forms' according to him was innovations introduced by the entrepreneur. These innovations were characterised as an "industrial mutation process that incessantly revolutionises the economic structure from within". The process of competition as noted by Schumpeter gets manifested in the innovations which produced periods of discrete rushes separated by comparative quite periods. The lull was often used to absorb the results of earlier innovations. This formed the business cycles. The system thus was subjected to a 'perennial gale of creative destruction' with which the existing structures got replaced by new ones and the system continued the process of creating and destroying. This draws parallel to the Austrian concept of the existence of disequilibrium.

13 A plethora of studies which examined the market structure-innovation hypothesis however reduces innovations to R&D activity partly because of the ease of empirical quantification. Innovation in the Schumpeterian sense is broad and could take diverse forms.

14 Schumpeter (1943:p.83)
The characterisation of economic system in terms of 'gales of creative destruction' produced a new explanation of the working of competition. It broke the shackles of conventional dominant view of equating competition to price competition. *Modus operandi* of competition embraced newer dimensions incorporating non-price factors such as quality. The focus was shifted from price to cost as innovations were intended for accruing advantages from cost reductions and quality changes.

Unlike the Classicals and Austrians, the neo-Classicals developed precise formal models of competition. The Neo classical notions of competition confines itself to the characterisation of market to perfect competition and otherwise. The discussions on competition for them centre around the existence of market forms of which the perfect competition is considered as the ideal. The discussions limited to the debate between perfect competition and monopoly with the use of formal models to illustrate the virtues of the former and any departure from the perfectly competitive form of market was considered as inefficient.

Neo classical analysis proceeds with the identification of Classicals as the forerunners of a theory of perfect competition. This however was contested by the subsequent writers notably McNulty. The foundations of a formal analysis of perfect competition started with the Cournot's (1838) analysis using differential calculus. Cournot's analysis was in consonance with the theory of oligopoly which predicted the excess of price over marginal costs as the number of producers tended to decrease. In other words Cournot established that the market departed from competition as the price departed from marginal cost.

More systematic and rigorous definitions of perfect competition evolved with the work of Edgeworth (1881). Conditions for the existence of perfect competition were spelt out more clearly in the definition of Edgeworth. The extent of the number of traders was important in the analysis even though the concept of competition was limited to within the market. The conditions and features of perfect competition were further refined in the
subsequent works of Clark (1899) and Knight (1921). Even though the importance of mobility of resources was stressed by Clark, the economy was assumed to be in a stationary state. This in a sort netted out the dynamic effects due to innovations and growth of capital making the definition simpler. Dissatisfaction over this stationary economy led Schumpeter to his explanations of the dynamic elements centring around innovations. Thus Clark's view was termed as a sort of 'stagnant competition'. As against the ideas of Clark, Knight assigned crucial role to the flow of information in his definitions of competition. Cost less continuous communication between agents was expected to make the prices uniform at the same point of time. Thus with the explicit statements of the conditions for the existence of competition, perfectly competitive model became the standard model of economic theory.

The adoption of perfect competition as a standard model led to a change in the use of price, earlier a variable. Price became a parameter from the point of a firm as competition was equated to situations when price does not vary with quantity. This was a departure to the extent that in the earlier situation market moved towards equilibrium through active price responses. Neo Classicals attached more importance to the effects of competition rather than on the actual working, this was in line of defining competition as a state and not as a process.

Neo-Classicals regard competition as a state or a type of market structure with absence of rivalry in the purest form, in the case of perfect competition. Absence of entry barriers, large number of buyers and sellers and homogenous products lead to price taking behaviour by the firms. Dynamic elements enter through the models of imperfect competition, mainly oligopoly models where a firm's decision is influenced by the behaviour of competitors. Oligopoly models are in a sense forerunners of industrial organisation theory, early models of which analysed structure, conduct and performance on neoclassical lines. While, recent models of industrial organisation have analysed competition in terms of departure from perfect competition arising due to increases in concentration.
Gleanings from economic theory suggest that competition can be viewed as a process as well as an outcome in the form of emergence of new structures. The later has prompted to equate competition to a particular market structure with well-defined characteristics. This often precludes the possibilities of existence of competitive pressures in other market situations. Oligopolistic markets with few producers too exhibit a certain degree of competition as revealed by the price wars and strategic behaviour of the firms. Recent developments in the theory of non-cooperative games provide some insights into the analysis of competition outside the purview of conventional notions.

Models of game theory view competition in terms of strategies to describe the behaviour of each decision maker, the firm, and the decision generally being on output and price. Competition is modelled in terms of describing how firms frame their strategies and how these strategies determine the values of the concerned variable. A distinction is made between cooperative and non-cooperative games on the basis of whether firms make agreement to cooperate or act independently. Noncooperative games are used in two versions the strategic or the normal form and the extensive form with the concept of Nash equilibrium\textsuperscript{15} being central to the game.

In the strategic form Cournot and Stackelberg equilibrium are described in terms of Nash equilibrium mainly using single period games. Whereas the extensive form a game is characterised by the order of play, payoffs and a probability distribution for moves\textsuperscript{16} and depending on the length of the sequence of the moves, can be finite or infinite with repeated\textsuperscript{17} or non repeated structure. Multiperiod games have tried to model competition more realistically as the single period game assumes that the rival's strategy is given and cannot influence it which implies that deviations from collusive agreements go unpunished making these agreements unsustainable. However if the game is played

\textsuperscript{15} Nash (1951)
\textsuperscript{17} Repeated games are also called super games as a player can adopt a strategy over many one period games. However a super game is in a stationary worlds where firms repeatedly interact in the same environment with the only link between the periods being the memory the players have of the actions chosen by them and the rivals.
Repeatedly firms can influence its rivals' strategies by sending signals. Repeated games also satisfy the condition of 'subgame perfect' which implies that the threats conveyed as signals to the rival are credible ones. A set of subgame perfect Nash equilibrium for infinitely repeated games in which there is little or no time discounting is provided by the Folk theorem\textsuperscript{18}. Starting from Selten (1975) much of the recent research has concentrated on subgame perfection.

Rivalry among few as is found in the oligopolistic market can also be modelled using the theory of cooperative games. The main point is the way in which the players bargain over the division of payoffs and not on achieving payoffs. Equilibria can be of two forms (a) value and (b) core with the former determining the vector of payoffs by taking into account the threat capabilities of the players and the latter being a set of all payoff vectors acceptable by all players. Competition is also viewed in terms of the power to monopolise in a market analysed using games by way of indicators of probability of market monopolisation\textsuperscript{19}.

The above examination of the treatment of the concept of competition in economic theory facilitates the adoption of a working definition of the concept. The concept even from the perspective of industrial organisation can be defined as "a rivalry between individuals (or group or nations), and it arises whenever two or more parties strive for something that all cannot obtain" (Stigler (1987) as quoted in Vickers 1995). The advantage of this definition is as noted by Vickers is its breadth to include all forms of rivalry, instruments of rivalry, objects of rivalry as well as types of rival\textsuperscript{20}. Moreover, the definition helps to capture competition both as a process and the state of the market.

\textsuperscript{18} The Folk Theorem states that "any combination of output levels could be repeated infinitely as long as each firm's profit at these levels will be at least as large as the minimum that each firm can earn in a one period game" (Chakravarthy 1995 p.60).

\textsuperscript{19} See d'Aspremont and Jacquemin (1985) for an illustration of this.

The foregoing discussion of the concept of competition leads one to ponder as to what drives competition. As is clear from the review of the various strands of literature the urge to enhance profits, increase the market share and thereby enhance the market power of the firms seems uppermost. Firms engaged in this rivalry are often subjected to a number of factors, which sets new equilibrium. Porter (1980) has identified the following factors as the driving force of competition. Porter (1980) explains competition in terms of five forces these being (1) threat of entry (2) threat of rivalry (3) the threat of substitutes (4) threat of suppliers and (5) the threat of buyers. Firms develop strategies depending on the level of these threats in the industry. Certain indicators are used to assess the extent of these threats. Competition viewed as a process is captured by these five forces and the resulting state describes the structure of the market. The process aspect is more relevant while discussing the threat of rivalry and the structure of the market for the threat of entry, even though the precise channels of causation could take alternate routes. The five forces framework though it fails to explain the existence of a particular market structure provides useful clues for the measurement issues.

II. Measuring Competition: The Theory

Various postulates on market structure and the behaviour of firms that have come up in industrial organisation lay considerable emphasis on the extent of competition and its ramifications on industrial performance. This is evident from the fact that a major concern of all the theoretical paradigms in industrial organisation has been the measurement of market power, that is, the extent of competition and its determinants to infer about the structure of the market. Two routes are made use of to infer the extent of competition. It can be viewed either in terms of a process or an outcome. The former relies on observable instruments of rivalry and tries to quantify these, for aiding comparisons. The later is through the examination of exante outcomes. The first approach generally tries to characterise competition in terms of theoretical models and the second one is more empirically grounded. The extensive use of game theory and

21 For a detailed discussion of these concepts and the indicators used to capture the threats see Porter(1980).
various dynamic models of entry barriers form the core of first set of studies. Often price, the most visible instrument of rivalry and its use in the competitive process is modelled in an attempt to capture the dynamic element of competition viewed as a process.

In the course of capturing the dynamic elements the methodology adopted is comparative statics. This in turn raises doubts of the extent of the processes captured by these models. The reliance on outcomes provides us an idea of the extent of competition in the previous period. The realisation of market power and its sources is the procedure adopted in these set of studies. Thus the empirical quantification becomes easier minimising the extent of arbitrariness usually associated with the use of unobservable instruments of rivalry. Moreover, the causal links are clearly spelt out as outcomes are the end result of some processes while the direction of causation poses problems while observing the current levels of rivalry. For the present analysis we thus attempt to infer the extent of competition by examining the observable levels of market power and its changes over time. Market power is captured by performance indicators. A discussion of these indicators of performance and their treatment in empirical studies is thus taken up.

II.1 Measures of Market Power

The most straightforward measure of market power or the extent of monopoly power is examining the number of sellers. This approach, however, ignores other aspects of the market, as there can be a high degree of monopoly even when there are many sellers if one or two sellers control a large proportion of the total supply. Another measure often suggested is the concentration ratio based on the size of market shares of the firms. The problem with this measure is that it fails to capture the demand aspects of the product. An industry with high concentration ratio may be competitive if the cross elasticity of

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22 For a review of the empirical studies see Breshnan (1989).

23 The most commonly used measures of concentration include k-firm concentration ratio, Herfindahl index and the Herfindhal-Hirschman index of concentration. For an elaboration of the properties of these indices and some other alternate measures see Chakravarty (1995).
demand for its product are extremely high due to the existence of close substitutes. Similarly, an industry with a low concentration ratio may be less competitive if the demand for the product is very inelastic \(^{24}\).

Measures of industry performance describe the major elements of market structure and capture the ways in which the market departs from the conditions of perfect competition. In the standard market models "the market structure determines market conduct and behavioural rules followed by the buyers and sellers and potential entrants to choose the variables under their control. Market performance is assessed by comparing the results of market conduct to the first best ideals such as perfect competition or feasible alternatives\(^{25}\). Thus an analysis of the performance measures throws some light on the structure of the market and the market power or the extent of competition in the market. The usual measures regard the perfectly competitive framework as the benchmark and determine how close is the performance of an industry to that of the benchmark. A higher value of the measure will indicate a lower degree of performance and the measure achieves minimum value if the market is perfectly competitive.

Profitability measures are used to capture the industry performance. Most commonly used measures applied usually to the cross section data can be classified into four classes. One measure, as argued by Bain (1951,1956) is the ability of the firms to hold the price above long-run average cost. The cost term is defined to include competitive returns on capital as well. In the case of firms producing multiple products the ratio of excess profit to sales revenue is used. This measure provides an idea on the structure of the market as higher the price above the average cost more oligopolistic the market is and vice versa. But, operationalising this measure runs into difficulties as it requires an estimate of the competitive rate of return on the capital employed.

\(^{24}\) As pointed out by Kriesler (1987,p. 24).

\(^{25}\) Schmalensee (1989 p.954)
A second measure used quite often, is the accounting rates of return on assets. Rate of return of a firm is its earning as a fraction of total investments. The theoretical argument for this measure is that in a competitive market a firm may earn just the normal profit, that is, the profit that opportunity cost attributes to all the resources of the firm. Opportunity cost values each resource at its most profitable alternative use. Any accounting profit over and above the normal profit is its net profit. This will increase as the market moves away from perfect competition. Thus profit

\[ \delta = \text{revenues less labour, material and capital costs}. \]

Measuring revenues, labour and material costs are straightforward. The difficulty lies in the measurement of capital costs. These costs are given by the rental costs of capital services. This will be readily available only if there exists well-developed capital markets. Moreover, the calculation of the rate of return is sensitive to the accounting concept of depreciation leading to biased results especially if there is a price appreciation of the capital.

The third measure of performance considers the market value of a firm's securities assuming the hypothesis of capital market efficiency. This measure banks on the notion that the market value of a firm's securities reflects all available information about its future profitability\(^ {26} \). Tobin's q and Excess Value Ratio (EVR) are two other commonly employed measures. Tobin's q is defined as the ratio of the market value of a firm to the replacement cost of its assets. The measure will take the minimum value of 1 only if the firm is earning competitive rate of return. If the value of q is more than 1 then, the firm is earning excess profits, i.e., the rate of return is higher than that justified by the replacement cost of its assets. Thomadakis(1977) introduced the concept of Excess Value Ratio (EVR) as a measure of the ratio of (capitalised) excess profits to sales. EVR is defined as \((\text{Market Value} - \text{Book Value}) / \text{Revenue}\).

\(^{26}\) Stigler (1963) uses market value of firms assets or equity to its inflation adjusted book value.
Empirical illustration of these measures poses serious problems mainly because these measures involve the calculation of market value of firm's assets. The usual practice is to sum up the values of the securities that a firm has issued. Moreover, for Tobin's q an estimate of the replacement cost of its assets is needed. Apart from the problem that a firm might possess intangible assets an accurate estimation of the values of used equipments is needed. The estimation of replacement costs of these assets is quite difficult.

The fourth measure is the widely employed mark-up. As suggested by Lerner(1934), this ratio of price minus marginal cost to price shows the extent of monopoly power. Suppose a firm has long run constant returns to scale and let

\[ V = \text{variable cost per unit}, \]
\[ \alpha = \text{depreciation rate of capital}, \]
\[ \pi = \text{competitive rate of return}, \]
\[ P = \text{price}, \]
\[ Q = \text{output and} \]
\[ K = \text{money value of the capital employed}, \]

then mark-up of price over long run average (and marginal cost) is

\[
\frac{P - V - (\pi+\alpha)(K/Q)}{P} = \frac{PQ - VQ}{PQ} - \frac{(\pi+\alpha)K}{PQ}
\]

The first quantity on the right hand side, that is, \((\text{revenue - variable cost})/\text{revenue}\), is the price cost margin (PCM). Under competitive conditions PCM should on average be equal to the second quantity on the right hand side of the equation. As it is difficult to obtain an accurate estimate of marginal cost the cost measure often used to calculate PCM is not the marginal cost but the average cost as used by Collins and Preston (1968).

While Lerner concentrated on the divergence between price and marginal cost, Bain computed the difference between price and average total cost and Collins and Preston calculated the difference between price and average variable cost. However, Hall(1986) proposes an alternate methodology to compute the mark-up using marginal cost which is made use of in the present study. An exposition of this is provided in the next section.
Another measure is the use of cross-elasticity to approximate the extent of monopoly power. The focus here is on the issue whether one firm by lowering its price could penetrate the markets of other firms and whether a firm is insulated from the price cutting of its rivals. The theoretical rationale of this measure is questionable when one considers the two extremes of market situations because in pure monopoly there are no close substitutes for the seller's product and in pure competition the product is homogenous.

Drawing insights from Chamberlin (1933); Rothchild (1942) proposed an alternate measure of market power. According to him the extent of monopoly power for a specific product can be measured by dividing the slope value of the firm's demand curve by the slope value of the market demand curve. The values range between one for monopoly, i.e., when the demand curve for a firm and market are coexistent, their slopes being the same and zero for a competitive market when the firm's demand curve is horizontal. However, operationalising this measure runs into difficulties as the demand estimations involve imposing stringent assumptions.

Utton (1995) discusses market dominance and the antitrust response to it in terms of the theoretical significance. The analysis discusses market dominance in terms of horizontal and vertical issues with priorities for antitrust policies. His analysis brings out that isolating market power by means of profit figures could be misleading even if firms use the same rules for allocating costs.

Figure 2.1 shows that two firms having the same market share and same costs may register quite different profit levels because of different demand characteristics. Consider two firms each with the entire market they operate. Both have same costs as shown by ATC and MC also assume that their marginal revenue curves cut at marginal costs at the same point. For both firms the profit maximising output is $Q_M$. Prices differ because of the position of the demand curves. Thus the excess profits in the first market $P_1BCE$ are lower than in the second market $P_2ACE$. Thus the same level of investments yields
different level of excess profits. However, it can be noted that the greater profit margin in case 1 is a reflection of smaller elasticity and greater market power. The point to be noted is that analysing profit margins alone without taking into consideration the demand aspects could be erroneous.

**Figure 2.1 Excess profits and market power.**

The above discussion on the measures of competition based mainly on the performance indicators reveals that most of these measures depend heavily on accurate estimates of rates of return on capital, capital costs and replacement cost of capital. The problems regarding the estimation of capital stock are well documented. The extent of arbitrariness in the calculation of replacement cost and the rates of return are well known. Thus measures of performance devoid of these limitations are the price cost margin/mark-up. The present study makes use of this measure.

**III. Mark-ups in Economic Theory: An Informal Discussion**

The first systematic treatment of the concept of monopoly and monopoly power can be seen in the works of Lerner\(^{27}\). However, the origins of this can be traced back to the work

\(^{27}\)Lerner (1934)
of Joan Robinson. Even though Robinson's main concern was a theory of value, references can often be seen as to how one could arrive at a measure of the degree of competition. As Lerner's concern was a measure of welfare he attempts to measure the welfare cost to society due to monopoly. Lerner (1934) begins with the concept of monopoly. According to him there is complete monopoly if there is actually one seller and the degree of monopoly diminishes as the number of sellers increase. This has resemblance to the ideas expressed in Cournot (1838). Lerner demonstrates that unlike in other market structures, under monopoly equating marginal revenue to marginal cost for arriving an equilibrium is absent as the price charged (i.e. the marginal revenue) exceeds marginal cost. This divergence between price and marginal cost is termed as the "loss involved in monopoly" by him.

Lerner attempts to measure the degree of monopoly by calculating "the divergence of the system from the social optimum that is reached in perfect competition". For this he proposes the ratio of the difference between price and marginal cost to price as a measure. Suppose P is price and MC is the marginal cost, then the measure of the degree of monopoly, \( \mu \), is

\[
\mu = \frac{P - MC}{P} \quad \text{(1)}
\]

This is related to the elasticity of demand (\( \delta \)) in the following way

\[
\delta = \frac{P}{P - MR}
\]

Where MR is the marginal revenue

Therefore

\[
\frac{1}{\delta} = \frac{P - MR}{P} \quad \text{(2)}
\]

In equilibrium MR = MC, so (2) becomes

\[
\frac{1}{\delta} = \frac{P - MC}{P} = \mu
\]

Thus in equilibrium, the measure of the degree of monopoly is equal to the inverse of the elasticity of demand for the product.
The ingredients of the cost component became a debatable issue as the discussions on selling costs assumed importance\textsuperscript{28}. The debate was on the inclusion of selling costs in the cost of production. Thus the degree of monopoly was modified as:

$$\mu = \frac{\text{Average Net Receipts} - \text{Net Costs}}{\text{Average Net Receipts}}$$

Where Average Net Receipts is the maximum residual for a given output of price minus average selling costs and Net Costs included costs other than selling costs.

Lerner's measure of the degree of monopoly was not free from problems. The main criticism levelled being that his analysis relies on static assumptions which might not be relevant for imperfectly competitive situations\textsuperscript{29}. The measure is based on short-period profit-maximisation. Asimakopulos makes a distinction between short period profit maximisation and profit maximisation for a monopolist or a firm in imperfectly competitive situation. Lerner's work however had important influence on subsequent work especially that of Michael Kalecki.

III.1 Kalecki's View on Mark-up and Pricing

Unlike Lerner, Kalecki's analysis of the degree of monopoly was not for its welfare implications. He was more interested in the analysis of the relationship of the degree of monopoly with costs and prices around the trade cycle and its implications for income distribution. Lerner's interest was mainly on the optimal resource allocation and the deviations from it and did not believe that an average degree of monopoly could be found for the economy as a whole. Kalecki focused on it as a measure of market imperfection in the sense of deviation from perfect competition, which is closer to the concerns of the present study as well. The focus here is limited to Kalecki's analysis of pricing alone. As in Lerner's analysis Kalecki also uses net price which is revenue per unit of product after the deduction of advertisement costs for the formulation of price.

\textsuperscript{28} See Kriesler (1987)

\textsuperscript{29} See Kriesler (1987)
Regarding marginal costs only production costs are considered, selling costs and transport costs are excluded.

Kalecki divides the economy into two sectors, the raw materials sector which comprises of agriculture and mining and an imperfectly competitive manufacturing sector. The raw materials sector which is competitive, has increasing marginal cost curves and is subjected to decreasing returns. The prices are 'demand responsive' as increase in demand results in higher prices due to inelastic supply. As the market for raw materials is competitive no single buyer can influence the price. On this basis Kalecki assumes that average raw materials prices for each enterprise will remain constant as output varies or the average and marginal costs move together if the aggregate demand changes.

Regarding the manufacturing sector, the prices are cost determined and as the supply is inelastic and increase in demand is met by stepping up the production. This sector in Kalecki's view operates near constant returns to scale. He also assumes that there exist constant average variable costs and hence marginal costs. Implied here is the notion that marginal cost does not differ from the sum of average wage and raw material costs at levels less than 'normal' capacity utilisation.

Kalecki's analysis, even though based on short run, holds good in the long run too. He suggests that in the long run the ratio of price to marginal cost for a given degree of monopoly is constant and equal to the reciprocal of one minus the degree of monopoly. In other words

\[ \mu = \frac{P - M}{P} = \frac{1 - M}{P} \quad \text{so} \quad \frac{P}{M} = \frac{1}{1 - \mu} \]

Here prime costs consists of wage and raw material costs. The difference between total net revenues and prime costs represents profits, interest, depreciation and salaries. Kalecki employs the term 'normal' in the discussion of this variable. According to him normal profit is defined as that level of profits within an industry which provides no incentives for any expansion or contraction within that industry and normal price and
normal use are the corresponding price and use of equipment. "The long run equilibrium is represented by the normal use of such types of equipment that with a given degree of monopoly it is impossible to earn profits higher than normal in employing plants of different type" (Kalecki 1938 p.105). With the degree of monopoly remaining unchanged the relationship between prime and average labour and raw material costs will remain unchanged. This further points to the fact that capacity utilisation will not be to the full extent and the factor distribution will remain unchanged. These rest on the crucial assumption that degree of monopoly remains unchanged. Thus the components of prices can be decomposed in the following way:

**Figure 2.2: Components of Price**

![Diagram showing components of price](source Rothschild (1961, p.176))

Determined by 'degree of monopoly'

- Gross Profits i.e. Net profits, Interests
- Salaries, Depreciation
- Raw Material Costs
- Price of the product
- Wages

Prime Costs

Kalecki in his subsequent works (1969 p.13) realises that i.e. \((p-c)/p\) defined as the degree of monopoly in his earlier works is not a measure of the degree of monopoly in any 'strict' sense but only 'reflects' it. As Kriesler points out the equality of price and marginal cost is an equilibrium condition of perfectly competitive markets with 'U' shaped average cost curve. When perfect competition does not exist and equilibrium between price and marginal cost is violated then this deviation of price from marginal cost as a measure of deviation of the firm from perfect competition also becomes dubious. Thus, it is more appropriate to define \(i\) as simply the mark-up. This is brought out in Kalecki (1971). To quote " Each firm in an industry arrives at the price of the product by 'marking up' its direct cost consisting of average cost of wages plus raw
materials in order to cover overheads and achieve profits. But this mark-up is dependent on the 'competition' i.e. on [the] relation of the ensuing price to the weighted average price of this product for the industry as a whole" (Kalecki 1971 p.160).

From the above discussion it emerges that average (prime) costs are the basis on which pricing decisions are made and such decisions reflect the competitiveness of the economic environment facing the decision maker. The evidence also points to the fact that a host of factors affect the mark-up. Kalecki highlights four important factors namely the variations in concentration in the industry, non-price competition through sales promotion, variations in the level of overheads relative to prime costs and the influence of powerful trade unions.

Even though Kalecki provides a fastidious discussion of the degree of monopoly, his analysis is not devoid of flaws. As Kalecki himself admits the basic assumption of the entire analysis, i.e., the division of the economy into competitive raw materials sector and imperfectly competitive manufacturing sector holds good for highly developed industrial economies. Moreover, his concept of degree of monopoly is strictly measured by production costs and not the revenue. Thus the activities not directly related to production costs exert little influence in Kalecki's analysis. The relevance of his measure becomes doubtful as his analysis of price determination starts from a weak foundation, as the concept of industry is not properly developed. However, as Kriesler notes the relevant market situation for Kalecki's analysis is monopolistic competition with its emphasis on differentiated products.

The vagueness of the definitions as in the case of defining industry applies equally for some of the other crucial variables of his analysis as well. At a first glance overheads may appear to correspond to fixed and variable costs which they are not as seen in

30 “The most frequent criticism of Kalecki’s theory has been that it is tautological and thus unable to provide any hypothesis capable of empirical challenge” (Riach 1971 p.51). This is not taken up for discussion here. See Kriesler (1987) for an extensive discussion of this.

31 See Kalecki (1938, p.101).
different points of his analysis\textsuperscript{32}. In a similar fashion the determination of the level of output is left open in his analysis\textsuperscript{33}.

The inverse relationship between elasticity of demand and the degree of monopoly as noted by both Lerner and Kalecki holds good only in the absence of advertising. Advertising poses problems as the price one uses to calculate the degree of monopoly will differ from the price used to compute the elasticity of demand if firms engage in day-to-day advertising\textsuperscript{34}. King and Reagen(1976) note that this inverse relationship holds good only if we admit that the firms act as neoclassical profit maximisers. However, Kalecki's works did have a strong influence on the subsequent developments in price analysis\textsuperscript{35}.

The empirical studies on industrial pricing incorporating the theoretical tenets of imperfect competition unambiguously show that prices are determined by marking up on costs. Even though there was a proliferation of studies using the cost-plus model a systematic theory on the determinants of the size of the mark-up was absent till the influential works of Eichner\textsuperscript{36}. Eichner (1973) provides an explanation as to what determines the size of the plus factor in the cost-plus model.

Eichner's unit of analysis is an industry and not a firm. He emphasises the importance of understanding the conditions affecting the industry as a whole in the long run and not the conditions affecting an individual firm in the short run. As time assumes importance the pricing decisions cannot be divorced from the industry's investment planning. The

\textsuperscript{32} Asimakopulos (1978) provide a useful discussion of this.

\textsuperscript{33} See Halevi (1978 p.175).

\textsuperscript{34} Kalecki realises this as seen in Kalecki 1970 "The second major influence is the development of sales promotion through advertisements, selling agents etc. These practices also will obviously cause a rise in the degree of monopoly (Kalecki 1970 p.50.)."

\textsuperscript{35} The works of Sweezy (1939), Steindl (1945), Sylos-Labini (1962), Robinson (1950) and Cowling (1983) have been influenced by the works of Kalecki.

\textsuperscript{36} See Eichner (1973, 1976).
pricing decision in his framework of analysis, the mega corporations in an oligopolistic industry is intimately bound up with the capital accumulation process.

The analysis is an attempt to provide explanation as to why certain large corporations behave as price setters rather than price takers as assumed in the conventional micro-economic models. The Chamberlin-Robinson model of determining prices in non-competitive markets is criticised as it fails to provide a satisfactory explanation to this phenomenon. Eichner questions the basic premise of the Chamberlin-Robinson model, equating marginal costs with marginal revenue and thereby arriving at the price. He points out three basic flaws with this hypothesis, (1) As marginal costs exceeds zero, marginal revenue will also exceed zero, (2) If the marginal revenue is to be positive the firm must be operating along the elastic portion of its revenue curve, (3) It is doubtful whether the large corporations operate along the elastic portion of the revenue curve. The cost-plus pricing model is thus proposed as an alternative.

The explanation offered by Eichner as to what determines the size of the mark-up is that it "depends on the demand for and supply of additional investment funds by the firm or group of firms with price setting power within the industry " (Eichner 1973, pp.1189-1190). According to him the change in the margin above costs is determined by the marginal efficiency of investment funds relative to the marginal supply cost of those funds both internal and external. This explanation put forth is linked theoretically to the managerial models as well as to the post-Keynesian macro dynamic theory through the price determination mechanism and aggregate savings function.

Eventhough Eichner provides theoretical explanations to the determinants of mark-up, the empirical verifications of these provide mixed evidence. The argument that "more than 90 percent of investment in manufacturing is financed internally from the margin above costs set precisely for that purpose" (Eichner 1973, p.1196), has been disputed in recent times as firms increasingly seek external sources of financing through borrowings and equities. The development of financial markets has facilitated this process. The
corner stone of his analysis, i.e., the existence of a 'leader-follower' approach in oligopoly has changed over a period of time. The existence of 'dominant-fringe' framework where the dominant firms i.e., the mega corporations operate on one set of rules and the fringe (smaller firms) operate on another set of rules and yet the industry might have the characteristics of oligopoly is closer to reality in the developing countries\textsuperscript{37}.

This brief survey conveys that ambiguity exists in the literature on the issues relating to the estimation and behaviour of mark-up. However, there were interesting developments on the empirical front too.

IV. Empirical Models of Determination of Mark-up

The empirical studies focus mainly on two set of issues (1) issues in the estimation of mark-up and (2) behaviour of mark-up. The first set of studies shows that mark-up provides crucial information about the functioning of the economy and that it is central to the measurement of welfare losses due to monopoly as shown by Harberger (1954). However, the main obstacle to estimating the mark-up is that marginal cost is unobserved. Faced with this difficulty the vast majority of the studies have used the profit rate as a measure of mark-up. The literature is too large to summarise here adequately as studies focus on different countries and different time points. Schmalensee (1989) provides a review of these works. These studies assume that marginal and average cost are equal an excessively restrictive assumption as pointed out by Scherer and Ross (1990). A comprehensive analysis of market power can be seen in Shepherd (1970). After a review of the changing debates and concepts of competition Shepherd evaluates the actual extent of market power in United States and its probable forms. As the focus of analysis is characterising the market structure the emphasis is its determinant broadly drawn from analysing product markets, financial markets and other markets. By

\textsuperscript{37} Recent developments in New Keynesian Economics have provided explanations for the countercyclical behaviour of mark-up giving emphasis for informational imperfections and asymmetries. The attempt however, is limited to providing explanations for real rigidities and not on the determination of mark-up \emph{per se}, for which reason we do not incorporate this development in our discussions. See Benassi et al (1994) for discussions on these.
examining market shares and size distribution of firms the study brings out the extent of market power in computer and automobile industries. The study, however, falls broadly into the tradition of Bain emphasising on the structural characteristics.

A new approach for measuring mark-up has been proposed by Robert E. Hall in his 1986 and 1988 papers. Hall uses the definition of marginal cost as the increase in input cost arising from a change in output to estimate the mark-up from industry time series data. We will elaborate this methodology in the next section where we use this to compute mark-up in Indian industry.

The debate over the variability of the mark-up is primarily empirical in nature and the major area of contention is the demand sensitivity of mark-up. The proponents of cyclically fluctuating mark-up consider both cost and demand determinants of mark-up and focus on the income elasticity of demand to explain mark-ups that rise during the expansion phase of the business cycle and decline during contraction. On the other hand, there are the cost dominated theories of mark-up, which predominantly argue that mark-up is constant over the cycle. However, both these theories have successfully explained the stylised facts of cyclical mark-up trajectory. It is in this connection that Hall (1986) suggests that capacity utilisation fluctuations were closely linked to mark-up levels.

Bils (1987) and Domowitz et al (1987,1988) have studied the cyclical behaviour of mark-up using models allowing for fluctuations. Domowitz et al conclude that the mark-up behaves pro-cyclically in US industries. Shapiro (1988) arrives at the conclusion that economies of scale and other cost conditions affect the mark-up. Chirinko and Fazzari (1994) explore these issues using firm level data and arrive at the conclusion of procyclical market power and connection between mark-up and scale economies. But, Rotemberg and Saloner (1986) find that mark-up is countercyclical because in booms

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38 Two variants are the standard volume target return pricing model and the wage cost mark-up model.
marginal cost increases more rapidly than price with the expansion of production and vice-versa in a down turn.

Morrison (1992) constructs a production theory based model of firms' mark-up behaviour based on generalised Leontief cost and expenditure functions\(^{39}\). The specification allows for both demand and supply shocks which can be assessed through elasticities. Adjusting for both labour and capital costs and economies of scale the estimation is done for US and Japanese firms. The results show that mark-ups in both the economies have increased with different cyclical behaviour stemming from differential investment behaviour. It was also found that capacity utilisation and returns to scale counteract with mark-up behaviour along with supply and demand shocks. These estimations however demand accurate estimates of cost of capital.

IV.1. Studies in the Indian Context

In the Indian context the issues relating to market power and competition are analysed mostly by using concentration ratios\(^{40}\). However, studies do exist using prices-cost margins to analyse competition at the sectoral level\(^{41}\). The studies can be broadly classified into two sets: (1) studies which examine the behaviour of mark-up in the context of industrial pricing along with its inflationary impact and (2) studies which examine the relationship between concentration and price-cost margins. We take up these two sets of studies for a closer scrutiny.

In the first set of studies industrial price-setting is examined using cost-plus pricing models. The inflationary impact of pricing behaviour is analysed by analysing the behaviour of the mark-up over the cycle. However conflicting conclusions exist regarding the behaviour of mark-up. Madhur and Roy (1986) argue that mark-up

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\(^{39}\) Some of the earlier studies too have used production and cost functions to estimates mark-ups. Some of these studies have tested for price taking behaviour for firms to infer on the oligopolistic nature of the markets. See Applebaum (1979) for example.

\(^{40}\) See Mani (1985), Baskar (1992) among others.

\(^{41}\) For example Sen (1992) uses price-cost margin to examine the extent of competition in tyre industry.
behaves procyclically, while, Chatterji (1989) finds evidence of constant mark-ups. Balakrishnan (1992) analyses the behaviour of mark-up using an 'error-correction mechanism' model and finds that mark-up behaves countercyclically. However, Suresh Babu (1994) shows that mark-up behaves as a constant over the cycle, supporting the hypothesis of Chatterji (1989). Even though this controversy on the empirical behaviour of mark-up seems to be far from settled, systematic studies on the mark-up as a measure of monopoly power is absent in the Indian context. Studies mostly consider mark-up only in industrial price equations and debate only on the cyclical behaviour, not on level of the mark-up.

Regarding the relationship between price-cost margins and concentration, even though a number of works\textsuperscript{42} have suggested that high concentration may pave the way for higher mark-ups, Sawhney and Sawhney (1973) argue that if firms fear government action or anti-monopoly regulation, an increase in concentration beyond some point may have no further effect on the margins. They present evidence of an inverted 'U' shaped behaviour of concentration and mark-ups from the Indian industry\textsuperscript{43}. This was attributed to the fear of government action, such as monopoly regulation leading to restraint by large firms with respect to margins.

Indirectly the extent of competition in the industrial sector is analysed using persistence of profit analysis. Two studies need to be discussed in this context. Vaidya (1993) tries to understand the competitive process in Indian corporate sector by analysing the corporate profits over the period 1960 to 1987. The methodology followed is on lines with Geroski and Jacquemin (1988) and Geroski (1990), with the underlying logic that profit above or below the competitive norm would disappear if the competitive process is relatively fast and effective. According to him in the Indian corporate sector competitive process push the profit rates towards the norm very slowly. Srivastava (1994) using a panel of firms drawn from the Reserve Bank of India data estimates price-marginal cost margins. The

\textsuperscript{42} See Strickland and Weiss (1976).

\textsuperscript{43} Katrak (1981) also present similar results.
methodology followed is that of Hall (1988). His estimates vary from 0.86 for jute textiles to 1.27 for chemical products. At the aggregate level there is no evidence to suggest an increasing in competition, as a squeeze of margins is absent. The study however concludes in 1989 without incorporating the changes in 1990s. An analysis of the competitive process using persistence of profit differentials by Kambhampati (1995) reveals that persistence is higher in fast growing industries and in industries with high strategic barriers. Her analysis however concludes that government controls are effective in discouraging such persistence.

Two issues emerge from the above survey. Firstly, even though the role of mark-up has been examined in the Indian context, mark-up as a measure to understand the competitive process is conspicuously absent in the Indian context. Second, comprehensive analysis of the competitive process in relation with the liberalisation measures needs closer scrutiny as the policy changes are in one way or the other intended to bring about changes in the industrial structure. This would justify a fresh look into the issue.

V. A Formal Model of Estimating Mark-up

A formal model of estimating mark-up was developed by Hall (1986, 88). According to Hall if the mark-up ratio, that is, the excess of price over marginal cost, exceeds one then the null hypothesis of competition is rejected. Hall assumes that the monopoly power is dynamically constant despite nonconstant productivity residual. This implies that technical progress defined in terms of the Solow residual has randomness. However, while estimating the methodology assumes procyclicality of Solow residual and this spurious procyclicality often provides evidence against competition.

Hall’s methodology suffers from two drawbacks on the estimation front (a) it suffers from observational equivalence and (b) an element of arbitrariness creeps in the selection of instruments. Moreover, the statistical equation can be expressed in two different forms and cannot identify their own instruments. This questions the validity of the arguments
on the basis of these estimations. Domowitz et. al, (1988) though they apply Hall's method to a more disaggregated set of industries, however follow the same estimation strategy making it susceptible to the same flaws of that of Hall.

The methodology followed here is similar to that of Hall (1986,1988). We start with Hall's definition of marginal cost as "The increase in input costs arising from a change in output".

For the sake of simplicity let us assume that labour is the only input.

If total costs are C, then marginal cost MC = ΔC / ΔY

Where C= WN, W= Hourly Cost of Labour, N = Labour Hours

Then \[ \frac{MC}{\Delta Y} = W \Delta N \] \[ (1) \]

Defining Mark-up as \( i = \frac{P}{MC} \), the ratio of price to marginal cost, we get

\[ \mu = \frac{P \Delta Y}{W \Delta N} \] \[ (2) \]

i.e. Mark-up of price over marginal cost is the value of extra good sold over the cost of extra input required.

(2) can be re-arranged as \[ \frac{\Delta Y}{Y} = \frac{\mu}{P} \frac{W N \Delta N}{N} \] \[ (3) \]

Since Y N W and P are observable we can estimate i from (3).

So far we have considered only marginal cost, we now extend the definition of marginal cost in two ways. First we allow for the cost of increased capital inputs and second we allow for technical progress and other exogenous factors that cause output to rise net of increased inputs.

Therefore we extend (1) to \[ MC = \frac{W \Delta N + r \Delta K}{\Delta Y - \theta Y} \] \[ (4) \]
\[ r = \text{marginal cost of capital input} \]
\[ \theta = \text{growth of technical progress and other factors}. \]

Since we use value added data for the empirical work we do not consider inputs of materials in (4). From (4) it follows that

\[
\frac{\Delta Y}{Y} = \theta + \frac{WN}{MC.Y} \frac{\Delta N}{N} \frac{rK}{MC.Y} \frac{\Delta K}{K} \tag{5}
\]

We assume Constant Returns to Scale.

Using (5) the definition of mark-up we then have is

\[
\Delta(y-k) = \theta + \mu \sigma \Delta(l + h- k) \tag{6}
\]

\(\Delta(y-k)\) and \(\Delta(l + h- k)\) are the growth rates of the output-capital and labour capital ratios respectively.

\(\sigma\) is the share of wage payments in revenue
\(l\) is employment
\(h\) is hours

Lower case roman letters denote logarithms. We use equation (6) in our empirical work

V.1. Evidence on Competition

In this section we present some evidence to understand the nature of competitive process in Indian industry. As the discussion on competition is carried out with the changes in economic policy in the backdrop we present evidence for two time points. First, for the eighties till early nineties considering the fact that the early attempts to deregulate the industrial sector started in the mid-eighties. This analysis consider 1985 as the cut-off year for comparisons with pre-1985 period termed as pre-reform era and post 1985 as the reform era. For examining the changes induced by the full-fledged reform process of the early nineties we consider 1991 as the cut-off year for the analysis. The econometric exercises using the Annual Survey of Industries (ASI) are limited till 1995 using time series data but are supplemented with firm level data drawn from the CMIE wherever possible.
The most straightforward indicator to infer on the extent of competition is the number of factories. This in turn reveals the extent of producers vying for higher market shares. As the number of producers increases the prices tend to be close to the marginal cost of production. We examine the number of factories and its growth in Table 2.1. It can be seen that at an aggregate level the number of factories grew at a rate of 2.9 per cent for the period 1981 to 1993 and at a rate of 2.57 per cent from 1994 to 1997. At the disaggregate level industries like non-metallic minerals, leather, rubber and petroleum based industries along with wood and furniture industries registered higher growth. It should be noted that this growth in the number of factories coincides with the first phase of deregulation and delicensing in the industrial sector. In this phase the process of setting up a unit was made more easy along with easier access to technology and finance. These measures invited new producers along with the existing producers contributing to the growth of the number of factories.

The number of factories also reveals the structural change in the industrial sector. It can be noted that in the seventies and eighties the number of factories was highest in industries like food and beverages and textiles. These two industries alone accounted for more than 50 percent of the total number of factories. However, the trend is reversed in the next period. The share of food and beverages which alone accounted for 45.5 percent of the total number of factories in the industrial sector in 1971 declined to 29.1 percent in 1993. During the same period the share of industries like Rubber and petroleum based industries, Non metallic minerals, Chemicals, and Wood and furniture industries increased substantially.

It should be noted that the growth in the number of factories is net of the total exit as revealed by the figures for paper and paper products. The growth rate in this sector is negative 0.5 indicating a net exit enabling a few producers to achieve higher market shares. Inspite of this, even a higher growth rate of firms, might not reveal the extent of competition if a few producers corner a major share in the market. Thus for a better
understanding one has to examine the market share of the major producers in the industrial groups.

Table 2.1. Industry- by-Industry Number of Factories (June End)

<table>
<thead>
<tr>
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<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Food &amp; Beverages</td>
<td>40639</td>
<td>46956</td>
<td>58913</td>
<td>60223</td>
<td>2.1</td>
<td>3.42</td>
</tr>
<tr>
<td>Textiles</td>
<td>9389</td>
<td>19272</td>
<td>24204</td>
<td>22964</td>
<td>1.5</td>
<td>1.54</td>
</tr>
<tr>
<td>Wood &amp; cork, Furni.</td>
<td>6526</td>
<td>12975</td>
<td>22234</td>
<td>22854</td>
<td>4.8</td>
<td>1.51</td>
</tr>
<tr>
<td>Paper &amp; paper pdts</td>
<td>4955</td>
<td>9182</td>
<td>9679</td>
<td>8624</td>
<td>-0.5</td>
<td>0.51</td>
</tr>
<tr>
<td>Leather</td>
<td>580</td>
<td>917</td>
<td>1568</td>
<td>1706</td>
<td>5.3</td>
<td>-1.85</td>
</tr>
<tr>
<td>Rubber, Petroleum etc</td>
<td>1745</td>
<td>4405</td>
<td>7866</td>
<td>8558</td>
<td>5.7</td>
<td>5.09</td>
</tr>
<tr>
<td>Chemicals &amp; Chem.pdts</td>
<td>2709</td>
<td>6033</td>
<td>9675</td>
<td>9590</td>
<td>3.9</td>
<td>2.04</td>
</tr>
<tr>
<td>Non Metallic minerals</td>
<td>3809</td>
<td>6467</td>
<td>13460</td>
<td>15018</td>
<td>7.3</td>
<td>1.14</td>
</tr>
<tr>
<td>Basic metals</td>
<td>3188</td>
<td>6015</td>
<td>8567</td>
<td>8554</td>
<td>3.0</td>
<td>1.54</td>
</tr>
<tr>
<td>Metal pdts</td>
<td>4956</td>
<td>8589</td>
<td>12855</td>
<td>13133</td>
<td>3.6</td>
<td>2.13</td>
</tr>
<tr>
<td>Machinery &amp; equip.</td>
<td>7339</td>
<td>13538</td>
<td>16870</td>
<td>16968</td>
<td>1.9</td>
<td>0.07</td>
</tr>
<tr>
<td>Transport equip.</td>
<td>1388</td>
<td>2269</td>
<td>3437</td>
<td>3457</td>
<td>3.6</td>
<td>-1.06</td>
</tr>
<tr>
<td>Misc. ind.</td>
<td>1213</td>
<td>1602</td>
<td>2075</td>
<td>2455</td>
<td>3.6</td>
<td>1.56</td>
</tr>
<tr>
<td>All Industries</td>
<td>89249</td>
<td>146428</td>
<td>204026</td>
<td>207204</td>
<td>2.9</td>
<td>2.57</td>
</tr>
</tbody>
</table>

Note: The percentages does not add upto 100 as we have considered only the manufacturing sector, which is defined as all industries minus electricity, gas and steam, repair services and other industries. CARG denotes compound annual rate of growth and AARG annual average rate of growth. Source: CMIE (1996), India's Industrial Sector an ASI various issues.
As the official statistics on industrial sector in India does not report data on market shares we rely on the CMIE's figures on market size and shares. As the data reported by CMIE does not tally with the two-digit level of disaggregation of the ASI we consider ten major sub-groups within the two-digit category. The share of top five firms in the industry cornered around 41 percent on an average in all the industrial groups in 1979, which increased to 49 percent in 1987. In the nineties we notice a further increase. In 1990/91 on an average the top five firms had 59 percent of the market, which continued to remain the same in 1994/95 even after the onset of economic reforms.

An analysis at the disaggregate level reveal more striking results. Only three industries, cotton fabrics, paints and varnishes and drugs & pharmaceuticals, witnessed a decline in the market shares of the top five firms. Top five firms in light commercial vehicles, pistons and filament yarn accounted for 96.3, 92.7 and 87.4 percent of the market respectively indicating that the extent of competition, other than among themselves, is likely to be the lowest in those sectors. The decline in market shares in the industries belonging to textiles and chemical industries can partly be attributed to the entry of new producers into these sectors, which has contributed to an increase in the volume of output as well. The fact that in majority of the industries the top firms were able to either maintain or increase the market shares in the post nineties period, when entry restrictions were eased, point to the fact that the new entrants have not been able to penetrate into the market.

The evidence of more than fifty percent of market being accounted by five firms leads one to look beyond the conventional straitjacketed market structures to characterise the market structure of Indian industry. This shows that a small number of large firms play a 'dominant' role and that there is a 'fringe' of small firms which may be competitive in structure. The dominant firms set the price and the fringe behave as price takers. We

44 Issues regarding to these factors are discussed in the next chapter.

45 An earliest model of this feature was developed by Stigler(1950). See Basu (1993) for further discussions.
however, do not venture into an analysis of the price setting behaviour of these firms but recognise that this has implication for the behaviour of mark-up.

### Table 2.2. Market Share of the Top Five Firms in The Industry

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Vanaspati</td>
<td>43.5</td>
<td>33.1</td>
<td>58.5</td>
<td>49.2</td>
<td>38.5</td>
</tr>
<tr>
<td>Cotton Fabrics</td>
<td>14.2</td>
<td>4.1</td>
<td>2.7</td>
<td>2.9</td>
<td>1.8</td>
</tr>
<tr>
<td>Filament Yarn (Viscose)</td>
<td>14.1</td>
<td>88.9</td>
<td>87.8</td>
<td>87.4</td>
<td>91.5</td>
</tr>
<tr>
<td>Paints and Varnishes</td>
<td>70.8</td>
<td>59.5</td>
<td>49</td>
<td>51</td>
<td>78.5</td>
</tr>
<tr>
<td>Drugs &amp; Pharmaceuticals</td>
<td>48.2</td>
<td>27.2</td>
<td>16.9</td>
<td>19.7</td>
<td>13.9</td>
</tr>
<tr>
<td>Machine Tools</td>
<td>50.3</td>
<td>53.7</td>
<td>58.7</td>
<td>52.8</td>
<td>17</td>
</tr>
<tr>
<td>Textile Machinery</td>
<td>47.4</td>
<td>57.5</td>
<td>80.7</td>
<td>76.1</td>
<td>25.4</td>
</tr>
<tr>
<td>Television Receivers</td>
<td>-</td>
<td>12.3</td>
<td>50.9</td>
<td>70.5</td>
<td>57.4</td>
</tr>
<tr>
<td>Light Commercial Vehicles</td>
<td>-</td>
<td>88.6</td>
<td>88.5</td>
<td>96.3</td>
<td>97.8</td>
</tr>
<tr>
<td>Pistons (Auto Ancillaries)</td>
<td>-</td>
<td>67.2*</td>
<td>98.3</td>
<td>92.7</td>
<td>55</td>
</tr>
</tbody>
</table>

Note: * Indicates market share of top four firms
Source: Compiled from various issues of CMIE, market and market shares

The fact that five firms account for nearly fifty percent of the market does not preclude the possibility of competition among these five firms. This is reflected in the changes in the composition of the top five firms over the years. However, these changes imply that competition is restricted among a few players in the market. Another route often used by the big firms to maintain their dominant position in the market is through mergers, take-overs and amalgamations. The extent of mergers and take-overs in India is examined in Table 2.3.

The easing of restriction in the form of licenses allowed business houses to undertake the hitherto forbidden expansion by entering into a new market and/or by expanding in the existing market. Mergers and acquisitions were taken as a route to this. The arguments for fostering more of mergers and take-overs being that it induces competitive pressures
into the economy and finally the inefficient firms unable to survive in the market would be extinct. Thus allowing more mergers and take-overs was intended to foster healthy competition in the industrial sector. This however, had adverse consequences too. Often aggressive competitors were taken over in a 'hostile' process of buying out through the stock market after resorting to unfair trade practices.

<table>
<thead>
<tr>
<th>Year</th>
<th>Mergers</th>
<th>Take-overs</th>
</tr>
</thead>
<tbody>
<tr>
<td>1974 to 1979</td>
<td>156</td>
<td>11</td>
</tr>
<tr>
<td>1980 to 1984</td>
<td>156</td>
<td>15</td>
</tr>
<tr>
<td>1985 to 1989</td>
<td>113</td>
<td>91</td>
</tr>
<tr>
<td>1990 to 1994</td>
<td>236</td>
<td>55</td>
</tr>
<tr>
<td>1996</td>
<td>37</td>
<td>41</td>
</tr>
</tbody>
</table>

Source: Adapted from Mandal (1995) and Beena (2000).

As mergers unregulated might lead to the concentration of economic power, the MRTP act\(^46\) necessitated an approval of the merger by the central government\(^47\) if the merger concluded in a dominant undertaking\(^48\). This however, was considered as hindrance for the growth of big business in India forcing time-to-time revisions in the MRTP act. The changes in the clauses of the MRTP Act created waves of mergers as shown by the figure in Table 2.3. The average number of mergers in India in the period 1974 to 1979 was 31, which increased to 37 in 1980/84 period. Even though there was decline in the number of mergers in 1985/89 period it increased substantially in 1990/94 period which witnessed an average of 47 mergers. The figures for take-over too reveal same picture.

\(^{46}\) Prior to the amendments of 1991.

\(^{47}\) If chapter III, Part A of the MRTP Act 1969 is violated the approval of the Central Government under section 23 was needed.

\(^{48}\) Dominant undertaking is defined an undertaking which either by itself or along with interconnected undertakings (1) produces, supplies, distributes or otherwise controls not less than one third of the total goods of any description that are produced, supplied or distributed in India or any substantial part thereof; or (2) provides or otherwise controls not less than one-third of any services that are rendered in India or any substantial part thereof.
It can also be noted that since the amendments of MRTP act there has been an acceleration in the mergers as revealed by the figures for the period 1990-94. The number of take-overs too increased reaching a peak in 1996 when 41 cases of take-over was reported. The easing of restrictions while on one hand helped the firms and business houses restructure in the face of new competition contributed to the growth of concentration. This got manifested in the assets of the business houses as well as in the product concentration. Both of these are examined separately.

Table 2.4. Assets of top ten Business Houses in India (Rs. Crores)

<table>
<thead>
<tr>
<th>Name</th>
<th>1975</th>
<th>1980</th>
<th>1985</th>
<th>1990</th>
</tr>
</thead>
<tbody>
<tr>
<td>Birla</td>
<td>905</td>
<td>1432</td>
<td>4111</td>
<td>6974</td>
</tr>
<tr>
<td>Tata</td>
<td>924</td>
<td>1539</td>
<td>3699</td>
<td>6621</td>
</tr>
<tr>
<td>Thapar</td>
<td>198</td>
<td>348</td>
<td>1068</td>
<td>1763</td>
</tr>
<tr>
<td>JKS</td>
<td>210</td>
<td>413</td>
<td>1057</td>
<td>1829</td>
</tr>
<tr>
<td>Reliance</td>
<td>-</td>
<td>166</td>
<td>1056</td>
<td>3241</td>
</tr>
<tr>
<td>Mafatlal</td>
<td>244</td>
<td>428</td>
<td>965</td>
<td>1297</td>
</tr>
<tr>
<td>Modi</td>
<td>115</td>
<td>199</td>
<td>819</td>
<td>1192</td>
</tr>
<tr>
<td>ACC</td>
<td>160</td>
<td>275</td>
<td>743</td>
<td>909</td>
</tr>
<tr>
<td>L&amp;T</td>
<td>138</td>
<td>216</td>
<td>715</td>
<td>1130</td>
</tr>
<tr>
<td>Bangur</td>
<td>172</td>
<td>264</td>
<td>651</td>
<td>657</td>
</tr>
</tbody>
</table>

Source: CII, Handbook of Indian Industry

Market shares, even though, provide an idea of the extent of competition does not capture the changes in market structure for which concentration ratio is a more appropriate measure. This acquires significance especially after the dilution of the industrial policies as entry is eased. We examine the trends in concentration in light of the negative relationship between entry and concentration as postulated in theory.

Earliest evidence on the levels of concentration can be traced from the monopolies enquiry commission's report as portrayed in Table 2.5. It can be seen that concentration
is highest in the industries such as chemicals and machines\(^{49}\). One possible reason for this is that India being late in industrialisation was forced to depend on developed countries for acquiring frontier technology. The optimal scale of new technology geared to the larger markets of developed economies has often been large relative to the size of domestic market. In such a situation only few firms could sustain.

**Table 2.5. Product-wise Concentration Across Industry Group**

<table>
<thead>
<tr>
<th>Product group</th>
<th>Number of products enquired into</th>
<th>Products with a 3-firm CR &gt; 75 per cent</th>
<th>Of which, products produced by 1 firm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Food, drink, tobacco &amp; textiles</td>
<td>55</td>
<td>19</td>
<td>2</td>
</tr>
<tr>
<td>Machinery, tools &amp; engineering equipment</td>
<td>415</td>
<td>368</td>
<td>133</td>
</tr>
<tr>
<td>Metallurgical products</td>
<td>102</td>
<td>91</td>
<td>27</td>
</tr>
<tr>
<td>Chemicals &amp; Petrochemical products</td>
<td>520</td>
<td>496</td>
<td>217</td>
</tr>
<tr>
<td>Other Products</td>
<td>167</td>
<td>135</td>
<td>37</td>
</tr>
<tr>
<td>All Products</td>
<td>1259</td>
<td>1109</td>
<td>416</td>
</tr>
</tbody>
</table>


Technological barriers were cited as one of the reasons for this high levels of concentration apart from barriers like minimum size of plant necessary for the production unit to remain viable and commercial barriers like promotional expenditure in the early phases of industrialisation. Technological barriers were prominent in the case of capital goods. Planned industrialisation strategy, of which licensing in the sectors earmarked for private enterprises, was an important aspect, which added some institutionalised barriers as well. This has often led to the conclusion that government control had a role to play in accentuating concentration\(^{50}\).

Comprehensive analysis of concentration in the industrial sector after the MIC report was carried out by Swaminathan (1982) for the period 1975-80. Her analysis revealed that out of the 51 product groups chosen the leading firms could maintain/improve the concentration.

\(^{49}\) A study, by Vijayabhaskar (1992), also reveals that concentration has not come down significantly in these industries.

\(^{50}\) See Ghosh (1975), Apte and Vaidyanathan (1982).
shares in 40 product groups. The analysis also revealed that even in those industries, which registered a decline in concentration, there were very little improvements in competition as the new producers could manage meager market shares. Analysing concentration in the manufacturing sector for the period 1970 to 1990, Baskar (1992) found that the share of the assets of the top twenty business houses in total private corporate sector assets remained more or less steady for the period 1970 to 1979 and increased thereafter. The study also reports only a marginal decline in the average three firm concentration ratio with no reduction in the percentage of products with high concentration levels. Thus the policy changes in the first half of eighties did not affect the overall levels of concentration and failed to promote competition.

The available evidence on concentration till 1990 shows that concentration has remained more or less steady till early 1980s and increased then onwards. This increase in concentration coincides with the initial phase of liberalisation in the industrial sector. Thus the removal of the restrictions in the industrial sector enabled the dominant firms to further enhance the market shares.

**Table 2.6. Concentration in the Industrial Sector**

<table>
<thead>
<tr>
<th>Industries</th>
<th>'78-79</th>
<th>'81-82</th>
<th>'83-84</th>
<th>'87-88</th>
<th>'91-92</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cotton Tex.</td>
<td>6.5</td>
<td>7.8</td>
<td>11.04</td>
<td>5.95</td>
<td>2.1</td>
</tr>
<tr>
<td>Chemicals</td>
<td>64.72</td>
<td>74.87</td>
<td>62.29</td>
<td>78.66</td>
<td>78.61</td>
</tr>
<tr>
<td>Machinery (non electrical)</td>
<td>59.95</td>
<td>58.6</td>
<td>60.56</td>
<td>70.24</td>
<td>78.48</td>
</tr>
<tr>
<td>Machinery (Electrical)</td>
<td>55.35</td>
<td>54.08</td>
<td>63.28</td>
<td>61.39</td>
<td>59.14</td>
</tr>
<tr>
<td>Transport Equip.</td>
<td>85.73</td>
<td>76.81</td>
<td>86.4</td>
<td>90.39</td>
<td>95.87</td>
</tr>
</tbody>
</table>

Note: Three firm concentration ratios, adapted from Vijaya Baskar (1992).

It can be noticed from Table 2.6 that in all the industrial groups except cotton textiles concentration has increased in the eighties. As the data does not permit us to examine the levels concentration corresponding to the two-digit classification of NIC 1987 we focus on five major industrial groups within the manufacturing sector. It is striking that
four out of the five industries considered had already high levels of concentration, which has been increased further. Thus in the first phase of the reforms big firms could maintain/increase the market shares blocking the percolation of competitive forces.

In order to analyse the scenario after 1991 we examine the same set of industrial groups as previously considered in Table 2.2. These 10 industries form the biggest components within their appropriate two-digit classification. We examine Herfindahl indices of concentration for these

Table 2.7. Concentration in the industrial sector in the nineties

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Vanaspati</td>
<td>0.034</td>
<td>0.037</td>
<td>0.038</td>
<td>0.052</td>
<td>0.050</td>
</tr>
<tr>
<td>Cotton Fabrics*</td>
<td>0.001</td>
<td>0.001</td>
<td>0.002</td>
<td>0.002</td>
<td>0.002</td>
</tr>
<tr>
<td>Filament Yarn (Viscose)</td>
<td>0.182</td>
<td>0.183</td>
<td>0.191</td>
<td>0.197</td>
<td>0.187</td>
</tr>
<tr>
<td>Paints and Varnishes</td>
<td>0.149</td>
<td>0.153</td>
<td>0.168</td>
<td>0.169</td>
<td>0.171</td>
</tr>
<tr>
<td>Drugs &amp; Pharmaceuticals</td>
<td>0.009</td>
<td>0.009</td>
<td>0.008</td>
<td>0.008</td>
<td>0.007</td>
</tr>
<tr>
<td>Machine Tools</td>
<td>0.018</td>
<td>0.011</td>
<td>0.009</td>
<td>0.009</td>
<td>0.007</td>
</tr>
<tr>
<td>Textile Machinery</td>
<td>0.028</td>
<td>0.027</td>
<td>0.033</td>
<td>0.028</td>
<td>0.029</td>
</tr>
<tr>
<td>Television Receivers</td>
<td>0.117</td>
<td>0.139</td>
<td>0.127</td>
<td>0.091</td>
<td>0.087</td>
</tr>
<tr>
<td>Light Commercial Vehicles</td>
<td>0.382</td>
<td>0.424</td>
<td>0.576</td>
<td>0.523</td>
<td>0.540</td>
</tr>
<tr>
<td>Pistons (Auto Ancillaries)</td>
<td>0.246</td>
<td>0.229</td>
<td>0.130</td>
<td>0.095</td>
<td>0.048</td>
</tr>
</tbody>
</table>

Note: Herfindahl indices of concentration. * Indicates figures for spun yarn, as figures were not available for cotton fabrics.

industrial groups. As is well known Herfindahl index of concentration is a summary statistics denoting concentration of market share wrested by few companies. The value of the index falls between zero and one with zero denoting no concentration, indicating that the market is close to competitive conditions and one indicating near monopoly. If there are N companies in an industry and $s_i$ is the market share of the $i^{th}$ company then Herfindahl index is the sum of squares of the market shares of all the companies in the
industry, the advantage being that the information of all the companies are made use of. In the above reported indices imports are not considered and to that extent it could be underestimates. From the above table it emerges that in six out of the ten industrial groups concentration has increased in 1998/99 compared to 1994/95. The highest level of concentration can be observed in light commercial vehicles while cotton fabrics exhibit the lowest levels of concentration. Auto ancillaries and machine tools register a steep decline in concentration over the years. It can also be noticed that industries such as television receivers and drugs and pharmaceuticals too witnessed decline in concentration. Thus it can be concluded that while the overall levels of concentration did not alter much since 1991 with the introduction of a more liberal policy regime, certain industries did register decline in concentration.

VI. Empirical Estimates

In order to analyse the extent of price-cost margin in the manufacturing sector we compute the price-average cost margin as elucidated by Domowitz et al (1987). We compute the price average cost margin as value of output minus material costs minus labour costs standardised by the value of output using data drawn from the ASI. As portrayed by figure 2.3 we notice a decrease in price-cost margin from 1974/75 to 1982/83. However since 1986/87 there has been a steady increase in the margins. The peak can be observed in 1994/95. Thus it can be observed that there has been an increase in price-cost margin since mid-1980s coinciding with the first phase of the liberalisation policies. This corroborates the evidence on concentration, which also showed an increase in the eighties at the aggregate level.
To test the proposition whether the price-cost margin has increased from the mid-eighties or not we undertake a test for acceleration. A semi-log trend equation is fitted for the series with two dummy variables $D_1$ and $D_2$: While $D_1$ enables us to test a shift in the level (constant), $D_2$ provides information on the rate of growth (trend) of price-cost margin starting from 1973/74 through to 1995/96. The results as reported in Table 2.8 shows that the ‘time dummy’ testing for acceleration in price-cost margin growth since 1986/87 is positive and significant indicating a turnaround since 1986/87. This clearly shows that the rate of growth of price-cost margin is higher since 1986/87 coinciding the first phase of liberalisation policies.

Table 2.8. Testing for an acceleration in price-cost margin growth since mid-1980s.

<table>
<thead>
<tr>
<th>Variables</th>
<th>Coefficients</th>
<th>$t$-ratios</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>2.59</td>
<td>(89.07)</td>
</tr>
<tr>
<td>$D_1$</td>
<td>-0.54</td>
<td>(-5.13)</td>
</tr>
<tr>
<td>Trend</td>
<td>-0.007</td>
<td>(-1.96)</td>
</tr>
<tr>
<td>$D_2$</td>
<td>0.04</td>
<td>(6.13)</td>
</tr>
<tr>
<td>R$^2$</td>
<td>0.79</td>
<td></td>
</tr>
<tr>
<td>D-W</td>
<td>2.19</td>
<td></td>
</tr>
</tbody>
</table>

Note: $t$-ratios in parenthesis.
Estimates are semi-log trend equation for price-cost margin.
As there exists the possibility of inter-industry variations in price-average cost margins we undertake an industry level analysis. The levels of price-cost margin for the 18 two digit industries computed using the procedure used at the aggregate level are portrayed in figures 2.4 to 2.9. We notice wide variations at the industry level. The price-cost margin on an average is highest in industries such as machinery and transport equipment and lowest in textile products and leather and leather products. Out of the eighteen industries fourteen show an increase in price-cost margin while four register a decline since mid 1980s. Beverages and tobacco, textile products, paper and paper products, leather and leather products and chemicals show a steady increase since 1986 onwards and wool, silk and synthetic fibre textiles, rubber, plastics and petroleum products exhibit an increase from the late 1980s. Machinery and transport equipment registers a steady price-cost margin of around 16-18 percent for the entire period. Basic metals and alloys and metal products exhibit the maximum fluctuations in price-cost margins with values ranging from 9 percent in 1984/85 to 17 percent in 1995/96.

Figure 2.4
For a clear picture of price-cost margins we examine the average price-cost margin for three sub periods. The period from 1973/74 to 1985/86 indicate the pre-reform period, 1986/87 to 1990/91 the first phase of reforms and 1991/92 to 1995/96 the second accelerated phase of reforms. It is evident from the table that in most of the industries the price-cost margins have increased with the successive doses of reforms. Jute, hemp & mesta textiles, paper & paper products, chemicals, basic metals and alloys, transport equipment and parts and other manufacturing industries witnessed a decline in margins in the second period but the third period witnessed a recovery in most cases more than the previous levels. Only one industry jute, hemp and mesta textiles recorded an absolute decline in price-cost margins over the years. It can also be noted that compared to the second period there has been an increase in price-cost margins in almost all the industries in the third period. While basic metals & alloys, metal products, machinery and transport equipment & parts maintained steady margins, beverages, tobacco & tobacco products, textile products, chemicals, non-metallic mineral products registered the highest margins among the industrial groups. From an examination of price-cost margins thus it can be concluded that there has been an increase in the average margins
over time in the manufacturing sector indicating a departure from the competitive
conditions.

Table 2.9. Price-average cost margins at the industry level

<table>
<thead>
<tr>
<th>Industrial Groups</th>
<th>1973/74</th>
<th>1986/87</th>
<th>1991/92</th>
</tr>
</thead>
<tbody>
<tr>
<td>Food Products (20-21)</td>
<td>7.25</td>
<td>8.73</td>
<td>8.82</td>
</tr>
<tr>
<td>Beverages, Tobacco &amp; Tobacco Products (22)</td>
<td>14.63</td>
<td>17.74</td>
<td>20.12</td>
</tr>
<tr>
<td>Cotton Textiles (23)</td>
<td>9.78</td>
<td>9.86</td>
<td>9.63</td>
</tr>
<tr>
<td>Wool, Silk &amp; Synthetic Fibre Textiles (24)</td>
<td>13.71</td>
<td>14.00</td>
<td>15.69</td>
</tr>
<tr>
<td>Jute, Hemp &amp; Mesta Textiles (25)</td>
<td>6.00</td>
<td>2.32</td>
<td>3.23</td>
</tr>
<tr>
<td>Textile Products (26)</td>
<td>10.16</td>
<td>13.76</td>
<td>19.25</td>
</tr>
<tr>
<td>Wood &amp; Wood Products, Furniture &amp; Fixtures (27)</td>
<td>13.95</td>
<td>12.45</td>
<td>14.90</td>
</tr>
<tr>
<td>Paper &amp; Paper Products, Printing, Publishing etc (28)</td>
<td>16.91</td>
<td>15.70</td>
<td>17.64</td>
</tr>
<tr>
<td>Leather &amp; Leather &amp; Fur Products (29)</td>
<td>7.33</td>
<td>8.92</td>
<td>13.31</td>
</tr>
<tr>
<td>Rubber, Plastic, Petroleum &amp; Coal Products (30)</td>
<td>9.65</td>
<td>12.67</td>
<td>14.96</td>
</tr>
<tr>
<td>Chemicals (31)</td>
<td>17.30</td>
<td>16.44</td>
<td>21.52</td>
</tr>
<tr>
<td>Non-Metallic mineral pdts (32)</td>
<td>17.49</td>
<td>19.89</td>
<td>21.58</td>
</tr>
<tr>
<td>Basic metals &amp; Alloys (33)</td>
<td>13.20</td>
<td>12.80</td>
<td>14.55</td>
</tr>
<tr>
<td>Metal Products (34)</td>
<td>14.09</td>
<td>14.51</td>
<td>14.42</td>
</tr>
<tr>
<td>Machinery (35,36)</td>
<td>16.26</td>
<td>16.57</td>
<td>17.93</td>
</tr>
<tr>
<td>Transport Equipment &amp; Parts (37)</td>
<td>14.11</td>
<td>13.07</td>
<td>14.50</td>
</tr>
<tr>
<td>Other Manuf.industries (38)</td>
<td>18.87</td>
<td>13.93</td>
<td>19.67</td>
</tr>
<tr>
<td>Total Manufacturing</td>
<td>12.78</td>
<td>13.39</td>
<td>15.59</td>
</tr>
</tbody>
</table>

Note: The figures indicate averages for the corresponding periods.

As elucidated in the theory, average costs diverge from marginal costs and an ideal
measure of market power is the divergence of price from marginal costs and average
costs. We thus examine the price marginal cost ratio for a vivid examination of the
market power and competition.

In order to estimate price-marginal cost ratio (mark-up) we use data from the ASI for the
period 1973/74 to 1995/96. The data at the two-digit level have been clubbed for certain
industries for the sake of convenience in variable creation and estimation. Thus cotton
textiles, wool, silk & synthetic fibre textiles and jute, hemp & mesta textiles were
summed up for a category called textiles and electrical and non-electrical machinery
were joined together to form machinery. This reduces the total industrial groups to
fifteen, the summation of which is termed as aggregate manufacturing. We construct the
variables for each of the industrial groups separately and the procedure on these is elaborated in appendix 1.

We estimate the following relationship

\[ \Delta(y-k) = \theta + \mu \sigma \Delta (l+h-k) + \beta \Delta (p_m - p) \]  

(7)

This is slightly modified form of equation 6 as we include the growth rate of relative price of materials and other intermediate inputs. This is done to correct for the biases due to the use of value added data used as the output measure, which is expressed in real terms by deflating with the output price index. As the estimation is done for each industry separately we allow for the possibility of variation in mark-up, \( \mu \) but we assume that it is constant overtime. This is primarily because the available evidence on Indian industry point to constant mark-up over the cycle. The usual procedure of estimation takes two routes. These 15 equations can be stacked to form a single equation and the cross correlation structure of the errors can be exploited. The other method is to estimate separate equations for each industry using appropriate instruments to take care of the collinearity problems. We use the second method the results of which are presented in Table 2.10.

The third column indicated by \( \mu \) denotes the extent of mark-up and the fourth column tests for a decline in mark-ups since 1986/87. It can be noted straight away that in all the industries the mark-up is greater than one pointing the existence of market power. While the parameters on raw material prices turns out to be significant in some cases in some other it is insignificant. As our interest is on mark-up we focus on that. Aggregate mark-up for the manufacturing sector as a whole is computed by multiplying the industry level values with each industry’s share in gross output, averaged for the entire period. Average mark-up for the manufacturing sector turns out to be 2.02. This points to the existence of substantial market power in the manufacturing sector. At the disaggregate level, it can be noted that textile products record the highest mark-up while the lowest is for paper and paper products. With regard to the decline since the first phase of the reforms since the mid-eighties we notice that only two out of fifteen
industries register a decline. While in five industries the mark-up increased since mid-eighties as indicated by positive significant values for the dummy variables, in the rest eight industries there has been no significant change in mark-up. Thus on the whole it can be observed that there has not been a significant decline in mark-up since the onset of the economic reforms. The above results are consistent with that of Srivastava (1994) for the eighties while differ from that of Vaidya (1993), who reports a slow convergence of profits to competitive norms.

Table 2.10. Estimates of a model of price-marginal cost margin

<table>
<thead>
<tr>
<th>Industrial Groups</th>
<th>Constant</th>
<th>$\mu$</th>
<th>$\beta$</th>
<th>D</th>
<th>DW</th>
<th>Overid Test$^a$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Food Products (20-21)</td>
<td>0.63 (2.22)</td>
<td>2.40 (4.49)</td>
<td>1.02 (3.55)</td>
<td>0.03 (0.64)</td>
<td>2.10</td>
<td>6.3</td>
</tr>
<tr>
<td>Beverages, Tobacco &amp; Tobacco Products (22)</td>
<td>0.05 (3.19)</td>
<td>1.50 (4.37)</td>
<td>1.81 (2.48)</td>
<td>0.02 (3.23)</td>
<td>2.07</td>
<td>4.8</td>
</tr>
<tr>
<td>Textiles (23+24+25)</td>
<td>0.04 (3.27)</td>
<td>2.16 (5.13)</td>
<td>0.94 (2.17)</td>
<td>0.04 (0.77)</td>
<td>1.94</td>
<td>4.2</td>
</tr>
<tr>
<td>Textile Products (26)</td>
<td>0.02 (4.49)</td>
<td>4.65 (5.61)</td>
<td>0.78 (0.63)</td>
<td>0.03 (2.51)</td>
<td>2.24</td>
<td>2.4</td>
</tr>
<tr>
<td>Wood &amp; Wood Products, Furniture &amp; Fixtures (27)</td>
<td>0.03 (3.11)</td>
<td>1.82 (2.66)</td>
<td>0.83 (5.44)</td>
<td>-0.02 (-2.43)</td>
<td>2.33</td>
<td>3.8</td>
</tr>
<tr>
<td>Paper &amp; Paper Products, Printing, Publishing etc (28)</td>
<td>0.05 (1.96)</td>
<td>1.27 (4.86)</td>
<td>0.56 (0.47)</td>
<td>0.04 (1.10)</td>
<td>2.50</td>
<td>9.2</td>
</tr>
<tr>
<td>Leather &amp; Leather &amp; Fur Products (29)</td>
<td>0.01 (2.43)</td>
<td>3.38 (4.83)</td>
<td>1.02 (1.42)</td>
<td>-0.06 (-1.99)</td>
<td>2.45</td>
<td>3.6</td>
</tr>
<tr>
<td>Rubber, Plastic, Petroleum &amp; Coal Products (30)</td>
<td>0.05 (2.07)</td>
<td>2.83 (6.22)</td>
<td>0.35 (0.70)</td>
<td>0.05 (0.67)</td>
<td>2.25</td>
<td>0.90</td>
</tr>
<tr>
<td>Chemicals (31)</td>
<td>0.02 (2.19)</td>
<td>1.34 (2.65)</td>
<td>0.96 (2.18)</td>
<td>0.06 (2.05)</td>
<td>2.34</td>
<td>5.3</td>
</tr>
<tr>
<td>Non-Metallic mineral ppts (32)</td>
<td>0.06 (2.10)</td>
<td>1.52 (2.12)</td>
<td>0.69 (1.24)</td>
<td>0.04 (0.94)</td>
<td>1.78</td>
<td>7.1</td>
</tr>
<tr>
<td>Basic metals &amp; Alloys (33)</td>
<td>0.05 (2.23)</td>
<td>2.03 (5.28)</td>
<td>0.46 (2.42)</td>
<td>0.02 (3.47)</td>
<td>1.91</td>
<td>4.8</td>
</tr>
<tr>
<td>Metal Products (34)</td>
<td>0.07 (2.82)</td>
<td>2.23 (5.26)</td>
<td>0.38 (0.73)</td>
<td>0.06 (1.70)</td>
<td>2.19</td>
<td>8.2</td>
</tr>
<tr>
<td>Machinery (35,36)</td>
<td>0.01 (1.99)</td>
<td>1.64 (3.73)</td>
<td>1.39 (3.06)</td>
<td>0.02 (1.06)</td>
<td>2.28</td>
<td>1.9</td>
</tr>
<tr>
<td>Transport Equipment &amp; Parts (37)</td>
<td>0.09 (3.35)</td>
<td>1.74 (5.58)</td>
<td>0.39 (2.93)</td>
<td>0.02 (0.69)</td>
<td>2.14</td>
<td>7.6</td>
</tr>
<tr>
<td>Other Manuf.industries (38)</td>
<td>0.08 (2.14)</td>
<td>1.77 (3.59)</td>
<td>0.26 (0.72)</td>
<td>0.04 (3.32)</td>
<td>2.29</td>
<td>5.1</td>
</tr>
<tr>
<td>Manufacturing average mark-up</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2.02</td>
<td></td>
</tr>
</tbody>
</table>

Note: t values in parentheses. Sample 1973/74 to 1995/96. All estimations done using instrument variables. The instrument set comprises of $\sigma_{\text{w1}}$, $\sigma_{\text{w2}}$, $\Delta(n-k)_1$ and $\Delta(n-k)_2$.

$^a$ critical value 5 percent level of $\chi^2(8) = 15.5$. 

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As the estimation is done using instrument variables we test for the validity of these instruments. This is done using a $\chi^2$ test as suggested by Sargan (1958) and Newey (1985). A regression of the residuals from the first stage regression on the instruments yields the $\chi^2$ test for testing the validity of the instruments. An estimated higher value than the table value of $\chi^2 (8)$ which is 15.5 indicates the rejection of the hypothesis that the instruments accepted are valid. As is evident from the last column of the table in all cases our instruments are valid.

As the rationale provided for the acceleration of economic reforms since 1991 hinges on the arguments that trade liberalisation induces competitive pressures on the domestic industry we consider the likely impact of this phase of reforms on increasing competition. In the literature this has been visualised as stemming from trade liberalisation. The notion here is that international trade increases competition. According to Caves et al. (1990), ‘“The tariff is the mother of trusts” was a charge often heard in United States at the end of the nineteenth century’. It is postulated, 'When faced with intensified international competition, domestic industries which may have reaped oligopoly profits in a protected domestic market are forced to behave more competitively”\textsuperscript{51}. As pointed out by Rodrik (1988) this phenomenon is especially relevant for the developing countries. To examine the changes in competition after 1991 we estimate price-cost margins using equation 7 for a panel of firms assembled from the CMIE’s database PROWESS.

\textsuperscript{51} Levinsohn (1993, p.2)
Table 2.11 Panel estimates of price-marginal cost margin

<table>
<thead>
<tr>
<th>Industrial groups and number of firms</th>
<th>( \mu )</th>
<th>( \beta )</th>
<th>( D )</th>
</tr>
</thead>
<tbody>
<tr>
<td>Food Products (433)</td>
<td>1.01 (13.7)</td>
<td>0.95 (1.30)</td>
<td>0.15 (3.60)</td>
</tr>
<tr>
<td>Beverages, Tobacco &amp; Tobacco Products (55)</td>
<td>1.25 (10.7)</td>
<td>0.21 (1.56)</td>
<td>0.36 (2.55)</td>
</tr>
<tr>
<td>Textiles (415)</td>
<td>1.01 (9.32)</td>
<td>0.92 (8.50)</td>
<td>-0.12 (-2.02)</td>
</tr>
<tr>
<td>Textile Products (166)</td>
<td>1.01 (9.64)</td>
<td>0.59 (8.79)</td>
<td>-0.01 (-0.42)</td>
</tr>
<tr>
<td>Wood &amp; Wood Products, Furniture &amp; Fixtures (16)</td>
<td>1.02 (12.72)</td>
<td>0.59 (7.01)</td>
<td>-0.01 (-2.37)</td>
</tr>
<tr>
<td>Paper &amp; Paper Products, Printing, Publishing etc (119)</td>
<td>1.16 (21.31)</td>
<td>0.30 (5.09)</td>
<td>0.01 (0.34)</td>
</tr>
<tr>
<td>Leather &amp; Leather &amp; Fur Products (41)</td>
<td>1.17 (21.76)</td>
<td>0.25 (4.35)</td>
<td>0.02 (0.80)</td>
</tr>
<tr>
<td>Rubber, Plastic, Petroleum &amp; Coal Products (282)</td>
<td>1.07 (16.01)</td>
<td>0.09 (1.28)</td>
<td>0.02 (1.87)</td>
</tr>
<tr>
<td>Chemicals (619)</td>
<td>1.06 (16.11)</td>
<td>0.15 (2.18)</td>
<td>-0.01 (0.53)</td>
</tr>
<tr>
<td>Non-Metallic mineral pdts (216)</td>
<td>1.26 (11.5)</td>
<td>0.17 (1.45)</td>
<td>0.54 (2.29)</td>
</tr>
<tr>
<td>Basic metals &amp; Alloys (413)</td>
<td>1.00 (14.1)</td>
<td>0.94 (13.3)</td>
<td>0.01 (3.62)</td>
</tr>
<tr>
<td>Metal Products (136)</td>
<td>1.04 (9.24)</td>
<td>0.19 (1.51)</td>
<td>0.15 (0.95)</td>
</tr>
<tr>
<td>Machinery (578)</td>
<td>1.26 (10.4)</td>
<td>0.23 (1.68)</td>
<td>0.57 (1.04)</td>
</tr>
<tr>
<td>Transport Equipment&amp; Parts (178)</td>
<td>1.06 (9.62)</td>
<td>0.13 (3.02)</td>
<td>-0.36 (-3.96)</td>
</tr>
<tr>
<td>Other Manuf.industries (35)</td>
<td>1.27 (11.2)</td>
<td>0.33 (4.43)</td>
<td>0.26 (1.42)</td>
</tr>
</tbody>
</table>

Note: \( t \) values in parentheses. Sample 1989/90 to 1998/99.
Estimations are done using instrument variables and correspond to fixed effects estimators.
D is a dummy variable takes one for the period since 1991 and zero otherwise.

In Table 2.11 are presented the estimates of price-marginal cost ratio for a sample of firms to test for a decline in the variable since 1991. The last column presents the results for a shift in mark-up. It can be observed that in three industries, that is, textiles, wood and wood products and transport equipment and parts there has been a decline in mark-up indicating higher levels of competition since 1991. But in four industries that are food products, beverages and tobacco, non-metallic mineral products and basic metals and alloys there has been an increase in mark-up pointing to declining levels of competition. In the majority of eight industries there is no significant change in the mark-up indicating no appreciable change in competition after the liberalisation policies of 1991. From our empirical examination it can safely be concluded that on the whole there has not been any pronounced change in the levels of competition since the launching of the major package of economic reforms in 1991.
To Sum Up

In this chapter we attempted to examine the extent of competition and its changes in the industrial sector. This was accomplished by examining the levels of market power. Nuanced reading of economic theory suggests measures of performance to understand the extent of market power. Of all the performance indicators, mark-up seemed the most suitable for the rich theoretical underpinning and operational convenience. This led us to examine competition and the extent of changes with successive dismantling of controls using mark-up as a measure.

Our empirical examination began with an examination of the number of factories and market shares of the major firms in industrial groups. This supplemented the information on concentration in the industrial sector. This analysis revealed no appreciable change since the onset of the reforms. The examination of price-cost margin using average costs as the measure of costs too did not show any major change in the levels of competition. We further departed from the existing studies on computing mark-ups to compute the price-marginal cost ratio. Our analysis reveal that there exist considerable market power in the industrial sector even in the reform era, even though at the disaggregate level we noticed declining mark-ups in certain industries. For a closer scrutiny of the reform period we examined a panel of firms, the results of which confirms the time series analysis.

To sum up econometric estimation of mark-up at the aggregate industry level points to the existence of market power in the manufacturing sector. This evidence buttressed with the available evidence on concentration from the industrial sector indicates low levels of competition in the sector as a whole. However it should be noted that in certain industries the mark-up is coming down in the post reform era of the nineties. This in a sense indicates the increase in competition. The fact that the industrial sector witnesses a high degree of market power could be the outcome of the existence of entry barriers in the sector. Easing of entry restrictions has been major component of the reforms. An analysis of the entry barriers and its empirical quantification is taken up in the next chapter.