# CHAPTER THREE

# MARKET CONCENTRATION

1. **Chapter overview**

Market concentration or, more specially, the degree of sellers’ concentration in the market, is an important element of the market structure which plays a dominant role in determining the behaviors of a firm in the market.

**Chapter objectives**

After completing this chapter you must be able to understand;

* The meaning of market concentration
* Market concentration and structure
* Measurement of market concentration.
* Concentration and market performance

**3.1. Introduction**

In this chapter we are going to discuss various concepts associated with market concentration, its measurement, policy aspects and its roles on profitability of a firm. In the coming discussion we will deal with the positive aspects of market concentration, leaving the regulatory or normative side for a later chapter. This chapter will have different sections, each one dealing with a specific aspect of the market concentra­tion. The first section will be devoted to some basic concepts and theoretical implications of concentration, the second one will deal with its measurement aspect, the next two will be devoted to concentration and its impact on firm's behavior and performance and finally the policy implications will be analyzed in brief.

**3.2. Nature of Concentration**

Market concentration or, more specifically, the degree of sellers concentration in the market, is an important element of the market structure. Market concentration plays a dominant role in determining the behavior of a firm in the market. What is, then, market concentration? By market concentration we mean the situation when an industry or markets is controlled by a small number of leading produces who are exclusively, or at least very largely engaged in that industry. Two variables are relevant in determining market concentration. These are: a) number of firms in industry, and b) their relative size distribution.

Market concentration has its own influence on the ownership of the industry, concentration of decision-making power, concentration of firms in a particular location or region, etc. These elements of market concentration may have considerable impact on the market performance of the firms such as profitability, price-cost margin, growth, technological progress and content.

**3.3. Theory of concentration**

Market concentration is a feature of the imperfect competition where one or few firms dominate the entire industry. To understand the mechanism by which market concentration determines the economic behavior of such firm’s vis-à-vis that of others in the industry, we have to examine some theoretical models or deductions.

Let’s assume that there are few large firms along with many smaller firms selling a homogeneous product at a uniform single price. This is called homogeneous oligopoly. The large firms will be having interdependence among themselves in the sense that variations in the price or supply of any one of them will have significant effect on the market supply, equilibrium market price and revenue of all other firms. This is certainly a situation of market concentration affecting the firms. This situation of market concentration can be presented mathematically as follows.

Assume total supply= Q units and market demand function be

 P= f(Q) = f(q1+q2+----------qi+--------qn) ------------------------------------------------(1)

Where P=product price, qi=output of ith firm, i = 1, - - - - n and 

The revenue function for the ith  firm is given by

 RI=P.q------------------------------------------------------------------------------------------------(2) Differentiating equation (2) with respect of qi, the marginal revenue for the ith firm will be

 ------------------------------------------------------------------------ (3)

Where  = 1, since an increase in one unit of output by the firm means one unit increase in the total market supply.

Equation (3) can be written as

  --------------------------------------------------------------------- (4)

Where,  is the market share of the ith firm. Assume that eQ is the market quantity elasticity of price. This is defined as the percentage change in market price with a marginal percentage change in the market quantity supplied, that is, eQ = ------ (5)

Substituting equation (5) in equation (4), we get

= P ----------------------------------------------------------(6)

This equation shows that marginal revenue for the ith firm depends on product price (p), market share in output for the firm and quantity elasticity of price ( eQ). If the firms are of uneven sizes then the average marginal revenue for the firm in the industry be given as

MR=  (MR1) + (MR2) + ---- (MRn) +- - - - - - - - - - ------------------------------(7)

Substituting MR1, MR2, ------- from equation (7) in equation (6), we get

MR = P  or MR = P (1 + H. eQ) ----------------------------------------------------------(8)

 Where  = H is the Herfindahl Index of Concentration

This equation indicates that average marginal revenue depends on product price (p), concentration index (H) and the elasticity coefficient (eQ). If all n firms are of equal size then H= which tends to zero as n becomes greater and greater as in competitive situation. In this case, MR will be almost equal to price (p) i.e. MR=P(1+0.eQ) MR=P(1)=P

If there is only one firm, then, H= = 1. This is the case of monopoly, extreme of market concentration.

**2**. Lets now assume the situation when firms are selling differentiated products with different prices. If a large firm among few firms makes changes in the price and /or quantity of all other firms in the market. How the relative sizes of firms are determined? R.L. Bishop provides the following price and cross elasticity for this.

According to Bishop, when a firm makes changes in its price, all other prices remaining the same, the quantity of output supplied by the firm as well as by other firms will change. The responsiveness of changes in quantity of outputs as a result of the price change is given the price elasticity of demand for the firm and the cross elasticity of demand for the other firms.

Price elasticity of demand = ep = 

Cross price elasticity = eij =  --------------------------------------------------------- (1)

Where j stands for remaining n-1 firms

When total market demand for the closely substituted goods is constant, an increase in the supply of any variety means a decrease in the total supply of all other varieties by the same magnitude. Thus, when the firm gets 5 percent increase in its sales, it means 5 percent reduction in the sales of all other firms. And if there are n-1 remaining firms so each one will get  percent decrease in the sales by one percent decrease in the price of ith firm. This means eij = -. This shows the relationship between own elasticity and cross elasticity, as eij= -  where n is the number of firms assumed to be equal in size.

If n is very large, eij will be very low tending towards zero. The impact on other firms becomes negligible. However, for a small group of firms i.e. concentrated industries, eij will be considerably high.

**3.4. Measures of Concentration**

In order to test empirically the behavioral hypotheses about the firms and industries, we need a measurement of market concentration. Various quantitative indexes have been suggested for this purpose which we are going to summarize in this section. Some of them are used to measure the monopoly power of the firms and some for market concentration.

**3.4.1. Concentration Ratio**

The most popular and perhaps simplest index for measurement of market concentration or monopoly power is the use of the **concentration ratio**. This ratio indicates the share of the market or industry held by some of the largest firms. The market share of such firms may be taken either in production or sales or employment or any other magnitude of the market.

In symbolic form the concentration ration is written as C=  m = 4, 8, 10, 12, - - 20. Where pi=market share of ith firm in descending order. The normal practice is to take the four-firm (m=4) concentration ratio but if the total number of firms operating in the market is large enough then one has to compute the 8-firm or even 20-firm concentration ratio. The higher the concentration ratios, the greater the monopoly power or market concentration exists in the industry.

There are some limitations of this index. It does not take the entire concentration curve into account; it rather indicates market concentration of a point of the curve. Moreover, the concentration ratios depend on how the market is defined. A broad market would tend to reduce the computed concentration ratio where as a narrow one would usually have the opposite effect. Still, it may not be comparable with other industries or countries data. The other limitations are the ratios do not reflect the presence of or absence of potential entry of firms. The ratios do not indicate any thing about the monopoly power of the individual firms in the market and ignore the role of imports in the domestic market.

In spite of the limitations, the ratios are widely used in industrial economics. They are simple to compute, really available for the manufacturing sectors and capable of measuring market concentration with a finer classification of the industries. They are consistent with economic notion of monopoly theory.

**3.4.2. The Hirschman-Herfindahi Index**

It is the sum of the squares of the relative sizes (i.e. market shares) of the firms in the market, where the relative sizes are expressed as proportions of the total size of the market.

Herfindahl Index (H) = 

Where pi =, qi is output of ith firm and Q is total output of all the firms in the market, and n is the total number of firms in the market. This index takes account of all firms in the market (i.e. industry). Their market shares are weighted by the market shares itself. The larger the firm more will be its weight in the index. The maximum value for index is one where only one firm occupies the whole market. This is the case of monopoly, that is,

 H= 

The index will have minimum value when the n firms in the market hold on identical share. This is equal to  that is H= H= 

H decreases as n increases. The index is simple to calculate. It takes account of all firms and their relative sizes. It is, therefore, popular in use and consistent with the theory of oligopoly because of its similarity to measures of monopoly power.

**3.4.3. The Entropy Index**

This index is the recent index of market concentration. The formula is

 E=  log , 0≤ E≤ logn

Where E is defined as ***Entropy Coefficient***, pi is the market share of ith firm and n the number of firms. This coefficient measures the degree of uncertainty faced by the firm in the market. For a monopoly firm (n=1) the Entropy Coefficient takes the value of **zero** which means **no uncertainty** and ***maximum concentration***. Thus, we find opposite (inverse) relationship between the Entropy Coefficient, E, and the degree of market concentration.

If there are n firms, all equal in size, then,

 E=  x log n = log n

The entropy coefficient is a useful measure of market concentration in the sense that the population of the firms for which Entropy Coefficient is to be computed can be decomposed or disagreement into several groups, such as on their basis of sizes, regions, products and the classification of the industry, etc.

**3.4.4. The Dispersion Method**

These measures take into account the dispersion of the market shares across the firms in the industry. One of these types of measures is the Lorenz Curve. The Lorenz Curve shows the variation in cumulative percentage distribution of market share (using sales or output or assets or employment, etc as a variable for this. This is the cumulative percentage distribution of firms from smallest to largest firms in the market.

If the firms are equal in size Lorenz Curve would be a straight line as shown by 00’ diagonal. If there is inequality in the distribution of the market share the Lorenz Curve would then bend away from the diagonal towards x-axis.% of shares (Cumulative By sales)

0’



 ***Fig3.1.The Lorenz Curve for dispersion of the firms and their market shares***

The coefficient, which is called Lorenz Coefficient or Gini Coefficient, is obtained by dividing the area bounded between the Lorenz Curve and the diagonal (00’) i.e. the bounded area by the area of the triangle 00’X. This coefficient varies between 0 to1.

The index has limitations as well as advantages. The first limitation is that sufficient and accurate data about the market share of every firm in market may not be available. The other limitation is that two entirely different Lorenz Curves may give the same Gini Coefficient. If there are two firms with 50% market share each or 1000 firms with 0.001% share each in the market, the result would be the same.

The advantage of the index is that it takes into account all firms in the industry unlike the concentration rations which suffer from this limitation

**3.4.5.The Learner Index**

There are some other indexes which are mainly used to measure monopoly power of a firm but some of them can be applied to the market as a whole with little modification of the existing variables.

The Lerner index is a good example in this case.

 I= 

We know that under perfect competition price is equal to marginal cost (P=MC). If there is a difference between the two, such that price>marginal cost, this is because of market imperfection or what we call as the monopoly power of the firm.

Marginal Revenue (MR) for the monopoly firm is MR=P (1+),

Where ep=price elasticity of demand. For profit maximization, we have the familiar condition MR = Mc  P (1 +) = P+P/*e*p=MC = MC – P

  = 

From these two equations we get the Lerner Index. I =  = - That is the index is inverse of price elasticity of demand. Remember, ep < 0, so, - > 0

The greater the market concentration the greater will be the average Lerner Index for firms. Example, assume P=100 and MC=50, then

I =  =  = . This indicates higher concentration.

Assume P= 100 and MC=96, then

I =  =  this indicates less concentration

The common indexes of measuring market concentration are reviewed above. The question, however, is which is to be used. It is a matter of convenience to judgment which measure to use. It looks that the Herfindahl Index, the Concentration Rations and the Lerner Indexes are comparatively better than other indexes for practical application.

**3.3 Concentration and the Market Performance of a Firm**

The important behavioral hypotheses about concentration and market performance are going to discuss in brief in this section. As we study in microeconomics, a firm with substantial monopoly power will tend to charge high price, produce and sell less output, make high rates of profit, grow faster than others, capable of doing anything it wants in connection with its business such as R&D, advertisement and so on. Let us presume that concentration is an 'appropriate measure of such power, we are then in a position to verify the various propositions of the econo­mic theory which reflect the relationships between concentration and market performance of the firm.

***A. Concentration and Profits***

A firm derives market power or monopoly power in the' situation of con­centration. Such market power, via market conducts activities or directly leads to an increase in the profitability of the firm. It is frequently assumed that persistency of high rates of profits over a long period is the conse­quence of high degree of intra industry concentration. J. S. Bain was the first to make an empirical study of this proposition, who found it valid for the U.S. industries. The relationship was found so strong that Bain was to argue for the profit rate as an index to measure the concentration. Since then there has been a flood of studies on the relationship which by and large supported his argument.

***B. Concentration and Price-cost Margins***

Price-cost margin is another way to define profitability. This is a short ­term view of profitability based on current sales and cost figures. Say, the average price-cost margin is just a ratio of these two magnitudes. Empiri­cal studies particularly those conducted by

Collins and Preston supported the positive relationship between concentration and the price-cost margin for the American four digit industries. Shepherd also confirmed the positive relationship between them for most of the U.S. industries. Koch and Fenili, however, looked at concentration acting as a surrogate for other determinants of price-cost margins because of its being causally linked with them.They found it as .an insignificant predictor of price-cost margins when other relevant indicators of market structure like product differentiation, rate of technological change etc., were also considered side by side.

***C. Concentration and Growth of the Firm***

Here we will just mention how concentration is relevant for the growth of the firm. There are two different streams of thoughts to explain the causal relation­ship between the two variables. According to one view, a firm with market power, as a consequence of concentration, may prefer to maintain its high rate of profit by restricting the output and charging high price. If it grows, it has to sacrifice some profit margin, and lower price which may not be in its interest. Moreover, there will be all kinds of restrictions imposed by the government to stop further growth of such firm. Thus, we expect that higher the monopoly power of the firm lesser may be its growth. The few firms in the concentrated industry may be dominant enough to restrict the growth of the other firms and to stop the entry of new ones because of the various barriers to entry at their disposal. There is, thus, very little prospective for the growth of the firms in a concentrated industry and so for the over­all growth of the industry itself. There are some empirical studies where the inverse relationship between initial market, concentration and, subse­quent market growth has been verified.

The second view about the concentration and growth of the firm and hence of the market, is a positive one. In order to maximize the long-term profit, firms may like to grow over time even under market concentration. They may prefer to create excess capacity to meet the future growing demand and to discourage new entry in the market. They may have some short-term sacrifice of profit in order to stimulate long-term benefits. So, we find a case for the positive relationship between initial market concen­tration and growth of the firms. The firms with market power may be finding themselves at ease regarding finances and other requirements of growth.

***D. Concentration and Technological Change***

Now let us look into, whether concentrated industries are the most research oriented and technically progressive. It is true that the few firms who enjoy monopoly power in a concentrated industry will be large enough. They will be having stability, financial resources and ability to initiate the processes of R&D and gain the benefits from them. Dasgupta and Stiglitz, clearly showed the situation when market concentration and innovative activities are positively corre­lated. There is no conclusive empirical evidence to prove such proposi­tion. In fact studies conducted by Williamson have shown quite opposite results. Doubts about this have also been expressed by Blair. It may not be the concentration but the other attributes of market structure like size of firm, product differentiation possibilities etc., which may be having collinearity with concentration and thus causing a spurious positive corre­lation between concentration and technological change.

**3.5. The Determinants of Concentration**

To what extent differences in entry conditions across industries explain differences in concentration across them. Different studies have tested different variables as the determinants of the long-run level of concentration.

The two studies by Martin suggest that minimum efficient scale is a significant factor determining market concentration. According to this study an increase of 10 percentage points in minimum efficient scale would, on average, result in an increase of 3 percentage points in the four-firm seller concentration ratio. This is because it controls for differences across industries in the average number of plants per firm. It is to be expected that the concentration of sales will be larger, for any level of minimum efficient scale, the more plants the average firm operates. The concentration of an industry with two plants on average per firm is higher than that industry with the average number of plants per firm is one. The absolute capital requirements will have their greatest effect on entry conditions when the minimum efficient scale is large.

Moeller and Rogers found a fairly large and significant effect of all advertising on concentration. They were able to split advertising expenses into two components, one for television and the other for other media. The significant impact of advertising on concentration is seen to be entirely due to television advertising. This implies that a small entrant competing with national firms has to advertise nationally in order to market its product effectively.

A recent studies by Besides makes a careful attempt to distinguish precompetitive and anticompetitive effects of advertising. According to Besides, advertising will discourage entry because its cost is sunk. The larger the advertising campaign necessary for entry, the greater the sunk investment is risked by a decision to enter. In this sense, advertising will discourage entry.

Advertising can also alter the probability that entry will be successful. The structure conduct performance school believes that entry is less likely to be successful in industries where advertising is important. According to this analysis, advertising encourages brand loyalty, increases minimum efficient scale and reduces the odds of successful entry.

Product differentiation can also discourage entry. This will occur if the effects of sales efforts endure overtime, if there are economics of scale in advertising and if the expense of advertising is a sunk cost.

The combination of impacted information and opportunism, under the uncertainty that characterizes real-world capital markets, means that established firms will enjoy an absolute cost advantage over potential entrants. Market concentration thus reflects a combination of technical factors and factors (such as cost fixity and product differentiation) that are under the control of established firms.