

## **Managerial Economics**

### **(Sessions 21-30)**

1. Profit Maximization
2. Perfect Competition
3. Monopoly and Price Discrimination
4. Monopolistic Competition
5. Oligopoly
6. Concentration of Economic power
7. Game Theory

### **PROFIT MAXIMIZATION**

Firms run their business to make profit and more often than not, are in the pursuit to maximize their profit. Profit is the total revenue less total cost. Both total costs and total revenue are a function of quantity produced and sold.  $\text{Profit} = \text{Total Revenue (TR)} - \text{Total Costs (TC)}$

#### **I. Economic Profit versus Accounting Profit**

Economic profit: The difference between the total revenue received by the firm from its sales and the total opportunity costs of all the resources used by the firm (explicit costs + implicit costs).

$\text{Economic Profit} = \text{Total Revenue} - \text{Explicit Costs} - \text{Implicit Costs}$

Accounting profit: The total revenue minus explicit costs, paid for and recorded in the books of accounts.

$\text{Accounting Profit} = \text{Total Revenue} - \text{Explicit Costs}$

#### **II. Types of Profits**

1. Normal profit - is defined as the least possible level of profit that will keep a firm afloat in business. The firm ends up covering all costs including both, implicit and explicit costs. Hence when  $\text{Profit} = \text{Zero}$ , in Economics, it is referred to as Normal Profit.
2. Economic Loss - is defined profit being less than normal profit where Total Revenue is less than Economic Costs.
3. Supernormal (economic) Profit - is any profit achieved in excess of normal profit - also known as supernormal profit.

#### **III. Revenue**

Total Revenue - TR: is the product of price and quantity.

Average Revenue - AR: total revenue divided by the quantity sold.

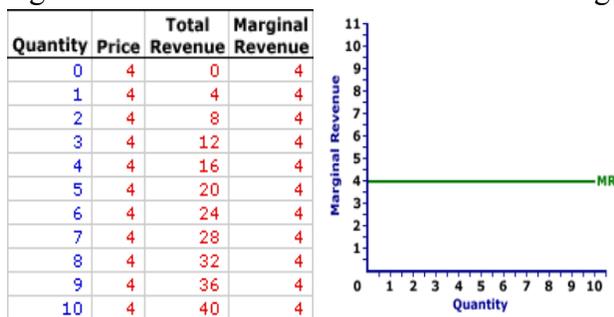
Marginal revenue - MR: the change in total revenue due to change in quantity.

Average revenue is the same as price. But marginal revenue is equal to price only under perfect competition where firms can increase total revenue only by increasing quantity as a single firm does not have the ability to change the price.

### Marginal Revenue for a Competitive firm

Under a competitive market structure, the output of any individual firm has no effect on the market price of the product. Therefore, a competitive firm is a price taker. Hence the demand curve faced by a competitive firm is a horizontal line. The firm can sell any amount at the same price. Thus, the marginal revenue remains the same and is equal to price which is the same as the average revenue. Under perfect competition the  $AR = MR = Price$ .

Figure 1 TR & MR and Market and Firm Marginal Revenue under Perfect Competition

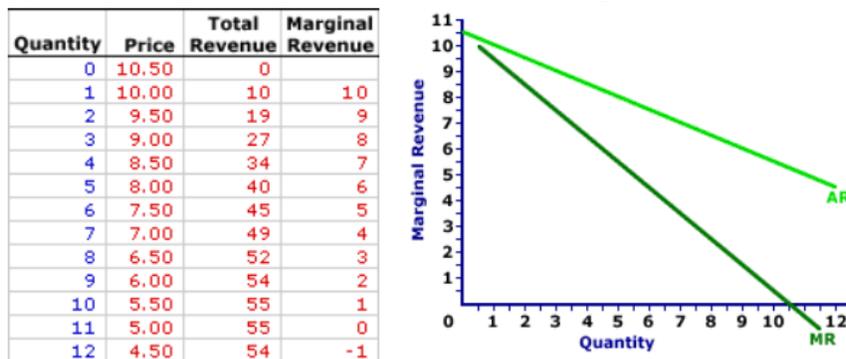


Source: Marginal Revenue, Perfect Competition.

### Marginal Revenue under Imperfect Markets

For firms under the imperfect market structures, viz. monopoly, oligopoly, or monopolistically competitive firm, the marginal revenue curve is negatively sloped. As these firms face a negatively sloped demand curve, the price received is not fixed and varies with quantity in accordance with the Law of Demand.

Figure 2. TR & MR and Market and Firm Marginal Revenue and Demand Curve



Source: Marginal Revenue, Imperfect Markets

### IV. Profit Maximization using TR – TC approach

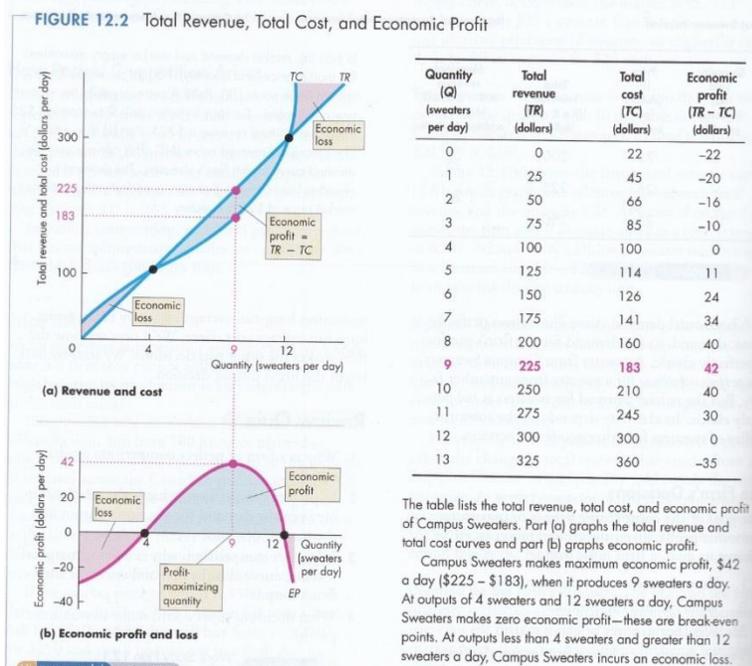
Profit is the difference between total revenue and total cost. As both total costs and total revenue depend on quantity, determining the firm's profit maximizing output level means studying its

revenue and costs at all levels of output. This is the first method of arriving at profit maximizing quantity. Hence, total revenue and total cost at all levels of output are examined.

As shown in Figure 3, profit is the difference between total revenue and total cost at various levels of quantity. The table shows that the firm suffers economic loss at levels of quantity from 0 to 3 units. At the fourth unit, the firm is making Normal Profit, where  $TR = TC$ . Between units 5 to 11, the firm is enjoying supernormal profits and at units 12, the firm reverts to normal profits which converts to economic loss from units 13 onwards. The firm suffers from economic loss at low levels because revenue is not enough to cover fixed and variable expenses. As the output levels increase there comes a point when the difference between total revenue and total costs is maximized. Output level beyond this point will reduce profit as cost keeps on increasing at a faster rate.

The profit / loss (fig. b) at various levels of output shows that the firm is making maximum profit at 9 units of output which is termed as profit maximizing quantity.

Figure 3: TR, TC and Economic Profit & Economic Profit and Loss



Source: [5.0 Competition](#)

## V. Profit Maximization using MR -MC approach

We can also arrive at profit maximizing quantity using the MR – MC output rule.

Profit maximization in the short-run

How much should a firm produce over the short-run, when its plant size is fixed, to maximize profit?

Output rule: In order to maximize profit in the short-run, a firm should produce at the level at which marginal revenue = marginal cost.

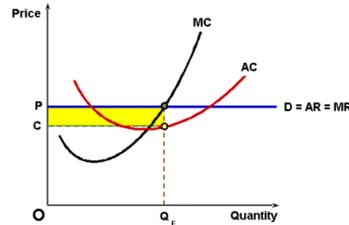
### V.1: Profit Maximization in Perfect Competition

In Fig. 4, the Hari Dairy Farm exists in Perfect Competition, as MR is constant at all levels of quantity. In this example, profit is maximized if the farm produces 4 or 5 litres of milk (see the fourth column).

The firm will continue to produce as long as  $MR \geq MC$ , till 5 litres of milk. Hari Dairy Farm will not produce at a level of quantity below 5 litres, as by producing more, the profit is increasing. At quantity levels below 5 litres,  $MR > MC$ . So as long as  $MR > MC$ , continue to produce, as profit is increasing. In case the 6 litres are produced and sold, profit will decline from 7 to 6 as  $MR < MC$ . Hence the moment,  $MR < MC$ , profit begins to fall. This will make the producer decrease production back to 5 litres of milk. This shows that profit is maximum at that level of output where  $MR = MC$ .

Figures 4&5: Profit Maximization: The Hari Dairy Farm

Quantity	Total Revenue	Total Cost	Profit	Marginal Revenue	Marginal Cost	Change in Profit
0	Rs. 0	Rs. 3	Rs. -3	----	----	----
1	6	5	1	Rs. 6	Rs. 2	Rs.4
2	12	8	4	6	3	3
3	18	12	6	6	4	2
4	24	17	7	6	5	1
5	30	23	7	6	6	0
6	36	30	6	6	7	-1
7	42	38	4	6	8	-2
8	48	47	1	6	9	-3



Source: Profit Maximization

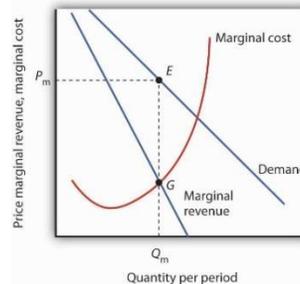
The same has been illustrated in the diagram (fig. 5), where the upward sloping MC cuts the horizontal MR, which gives us the profit maximizing output  $Q_E$ , in this example 5 litres. This output will be sold at market-determined price of Rs.6 per litre making maximum profit of Rs.7.

V.2: Profit Maximization in Imperfect Markets

In imperfect markets, a firm's price is determined by the demand curve which shows us the willingness to pay of consumers. As per the law of demand, all other things remaining constant, quantity demanded varies inversely with price making the demand curve downward sloping. The profit-maximizing quantity of output occurs where marginal revenue is equal to marginal cost. While the  $MR = MC$  rule of profit-maximization applies to all firms all market structures, there is one important difference.

Figures.6&7: Profit Maximization: Imperfect Markets

Output	Price	TR	TC	MR	MC	Profit
0	40	0	40000			-40000
1000	35	35000	42000	35	2	-7000
2000	32.5	65000	43500	30	1.5	21500
3000	28	84000	45500	19	2	38500
4000	25	100000	48500	16	3	51500
5000	21.5	107500	52500	7.5	4	55000
6000	18.92	113520	57500	6.02	5	56020
7000	17	119000	63750	5.48	6.25	55250
8000	15.35	122800	73750	3.8	10	49050
9000	14	126000	86250	3.2	12.5	39750



Source: Monopoly Model

In the above table,  $MR > MC$  till output level of 6000 units and profit is gradually increasing till this output. Reaching a maximum of Rs 56020 at 6000 units. It can be inferred that somewhere between output levels of 6000 – 7000 units, MR will equal to MC. As can be seen in table, at 7000 units of output,  $MR < MC$  and profit has started to decline from its highest levels. Hence, it is clear the profit is maximized where  $MR = MC$ . The firm will produce and sell 6000 units of output and profit is Rs. 56020.

\*\*\*\*\*

## MARKET STRUCTURES

There are four basic types of market structures.

- Perfect Competition.
- Monopolistic Competition. ...
- Oligopoly. ...
- Pure Monopoly.

The classification of the markets is done on the basis of

- a) Number of sellers
- b) Nature of the product
- c) Control over price by the seller
- d) Non – price competition
- e) Restrictions on entry and exit of firms

Type of Market	Number of Firms	Nature of Product	Freedom of entry	Control Over Price	Non – Price Competition	Demand Curve
Perfect Competition	Many	Homogeneous and Identical	Free	none	Zero	Horizontal
Monopoly	one	unique	Blocked	maximum	Not Applicable	Downward sloping and Steep
Monopolistic Competition	Many	Slightly differentiated	Free	Within a range	Very High	Downward sloping but relatively elastic
Oligopoly	Few	May be identical or differentiated	Restricted	Significant	Very High for differentiated	Downward sloping, inelastic and depends upon reactions of rivals

The sellers in each of the market has the objective of profit maximization and chooses the price and quantity accordingly. However, the decision of the optimum price and quantity may differ in the long run as compared to the short run as only in the long run will it be possible for firms to enter and exit the market.

Hence, each of the markets will be assessed independently and the short run and long run profit maximization will be elaborated in the following sections.

---

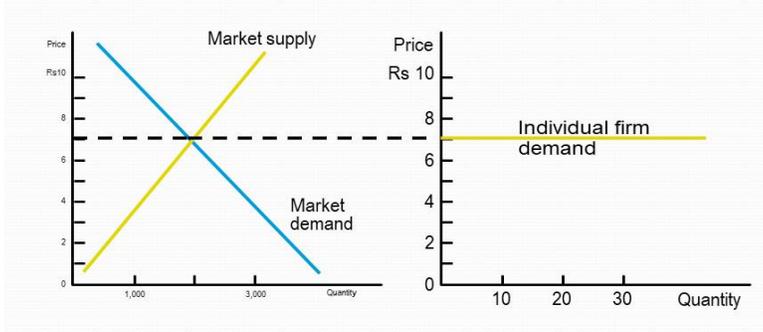
### PERFECT COMPETITION

**Perfectly competitive Market Structure is : An *industry structure with a***

- Large Number of buyers and Sellers,
- Homogenous products,
- Free Entry and Free Exit,
- Perfect Information,
- Free Mobility of factors of production,

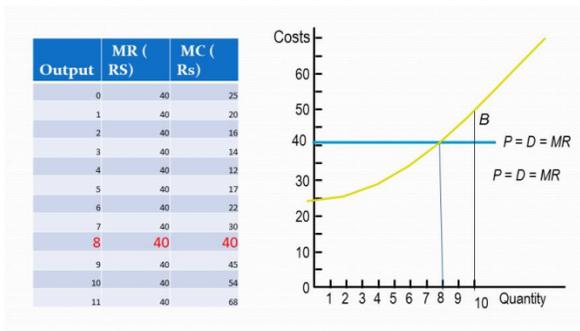
- No transport costs.

**Demand Curve under Perfect Competition:** Firm faces perfectly elastic demand curve. Perfectly competitive firm maximizes profit by produce the quantity of output that equates marginal revenue and marginal cost. The marginal cost curve is thus the perfectly competitive firm's supply curve.



**Fig 2: Profit Maximizing Condition under Perfect Competition**

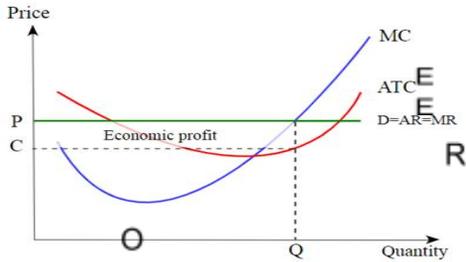
1)  $MR = MC$ , 2)  $MC$  curve is rising



**Short Run and Long Run Equilibrium under Perfect Competition (under the assumption of identical cost):** In short run a perfectly competitive firm can make super normal profits, normal profits and even losses . A firm can make losses as long as it is able to cover its variable costs. If a firm makes supernormal profit then:  $AR > AC$ , the  $AC$  curve is below the  $MR / AR$  curve. If a firm makes losses then,  $AC > AR$  curve , the  $AC$  curve lies above the  $MR/AR$  curve If a firm at shut down point then  $MC = AVC$  at its lowest point and A firm earns normal profit when  $AC = AR = MR = MC$

**Fig 3: Super normal Profit under Perfect Competition**

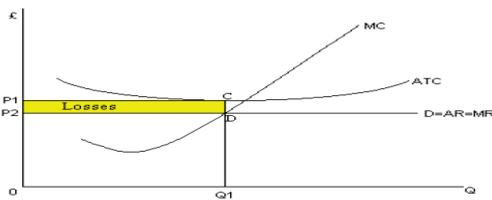
Short Run of Perfectly competitive firms



[:https://upload.wikimedia.org/wikipedia/commons/5/55/Perfect\\_competition\\_in\\_the\\_short\\_run\\_%28simple%29.svg](https://upload.wikimedia.org/wikipedia/commons/5/55/Perfect_competition_in_the_short_run_%28simple%29.svg)

In the diagram above equilibrium output =  $OQ$ ,  $AR = OP = MR$ .  $MC$  intersects  $MR$  at point  $E$ . The firm is making supernormal profit given by rectangle  $PCER$ , since Average cost ( $OC$ ) is less than  $AR$  ( $OP$ ) by  $PC$ .  $P_c$  is super normal profit per unit and  $PCER$  is supernormal profits for output  $OP$

**Fig 4: Losses Profit Under Perfect Competition**

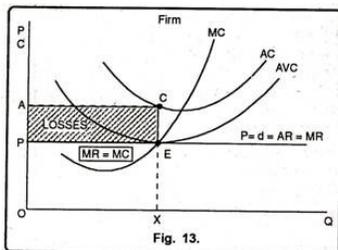


[http://www.economicsguide.me/?page\\_id=1162](http://www.economicsguide.me/?page_id=1162)

In Figure 4, equilibrium at  $D$  where  $MR$  intersects  $MC$  from below. However, the firm making Total losses are given by triangle  $PIP_2CD$ .

**Shut Down Point:** Under short run, a firm can continue in business, despite making losses so long as it is covering variable costs. Hence so long as  $AC$  is greater than  $P$ , but  $P$  is higher than (average variable cost)  $AVC$ , in short price per unit of output is covering variable cost, the firm continues to remain in business in short run. It sells  $OX$  output at point  $E$ , where  $MR = MC$ . Hence at a point when  $P = \text{Min Average variable cost}$ , is called shut down point. In figure 5, although firm is making losses since ( $OA$ ) the average cost is greater than Price ( $OP$ ), the firm will continue since  $\text{Price} = \text{min AVC}$  ( $OP$ ),  $EX$  point  $E$  is called the shutdown price, since any price below  $OP/EX$  will not be able to cover even the minimum variable costs.

**Fig5: Shut down Point Under Perfect Competition**



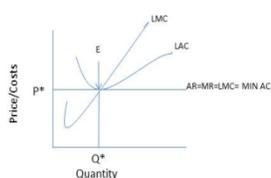
Source: <https://www.economicdiscussion.net/perfect-competition/practical-applications-of-perfect-competition-with-diagram/7202>

Normal Profit : The firms in short run can make normal profits too. Where  $P = MR = MC = \text{Min AC}$ .

### Long Run Equilibrium of Firms making under Perfect competition

In long run after all adjustments have taken place, all firms will earn normal profits. If there are more firms making supernormal profit, in the industry, It will incentivize more firms to join in. This shall increase the supply and reduce the price taking away excess profits. If firms are making losses they will leave the industry and reduce supply, price will rise and the gap between AC and Price will narrow down. After all adjustments have taken place, All firms will make normal profits

### Fig8: Firm making Normal Profit in Long Run



Equilibrium output ( $Q^*$ ) is produced at the minimum point of AC curve (E).  $P^*$  = lowest possible point of AC ensure Production Efficiency / technical Efficiency.  $P^* = MC$  ensures allocative efficiency

## MONOPOLY

A firm is said to be a monopoly if it is the sole seller or producer of a product which has no close substitutes. A monopoly exists because there are barriers to entry and other firms cannot enter the market and compete with the monopolist.

### Features of a monopoly:

1. There is a single producer or seller of the product.
2. Product sold by the monopolist has no close substitutes. Thus, cross elasticity of demand between the product of the monopolist and any other producer is very small.
3. There are strong barriers to entry into the industry. There is no difference between the monopolist and the industry as one firm constitutes the whole industry. The monopolist faces the demand curve of all the consumers in the industry. Hence the market demand curve facing a monopolist is downward sloping.

### Reasons for barriers to entry / causes for the existence of a monopoly

1. Control over Essential Raw Material:
2. Patents or Copyrights:
3. Government created monopolies: Monopoly is created when the government grants exclusive legal rights to produce a good or service in a particular area or region to a specific
4. Economies of scale or Natural monopolies: A natural monopoly is created when a single firm can supply a good or service to the entire market at a lower cost than what two or

more firms can supply. The firm enjoys economies of scale over the given range of output. eg. Indian Railways

### Nature of Demand and Marginal Revenue Curves in case of Monopoly

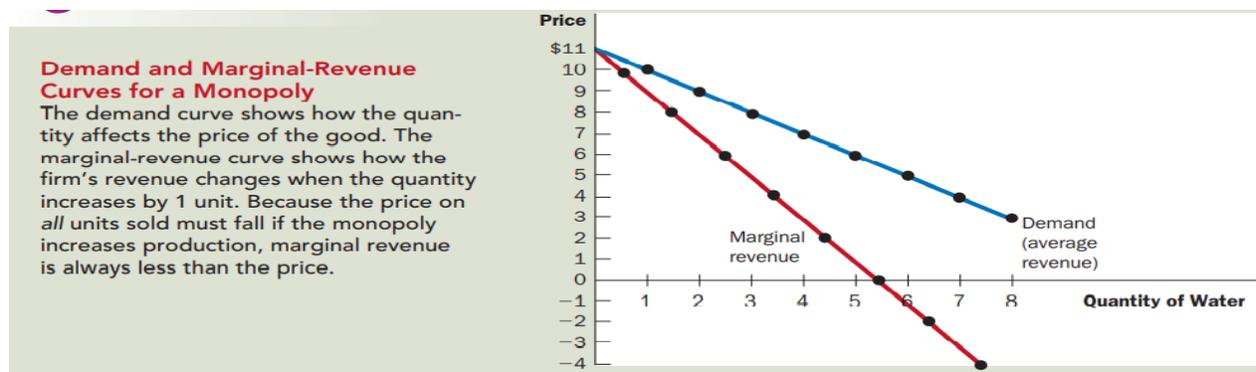
In case of a monopoly, there is no difference between the firm and the industry, hence the firm faces the downward sloping market demand curve. He can sell more by reducing the price of his product. If he wants to increase his price, his output will reduce.

A Monopolist's Marginal Revenue is always less than the price of its product

Consider the following table. It shows data for a firm which is the sole seller of water in a town.

Qty of water (gallons) Q	Price (\$) p	Total revenue P x Q = TR	Average revenue TR/Q = AR	Marginal Revenue $\frac{\Delta TR}{\Delta Q} = MR$
0	11	0	-----	-----
1	10	10	10	10
2	9	18	9	8
3	8	24	8	6
4	7	28	7	4
5	6	30	6	2
6	5	30	5	0
7	4	28	4	-2
8	3	24	3	-4

As can be seen from the table, marginal revenue is less than the price of the monopolist. This is because, if the monopolist wants to sell more then he has to reduce the price due to which he will charge less from all the customers



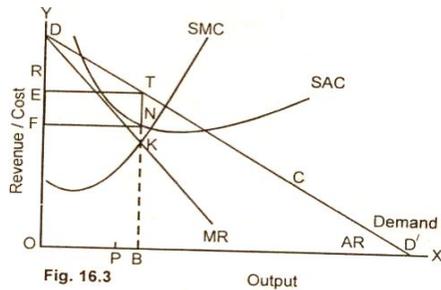
### Price – Output Decision in the short run

A monopolist aims at profit maximisation. The equilibrium condition for profit maximisation:

1.  $MR = MC$
2.  $MC$  is rising

In the short run, a monopolist can earn supernormal profits, normal profits and can even incur losses.

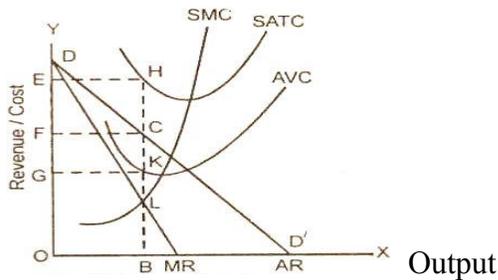
### Supernormal Profits



At the point of equilibrium K,  $MR = SMC$ , equilibrium quantity = OB, Equilibrium price =  $OE = TB$ . At the quantity OB, average cost =  $OF = NB$ , Total revenue = price x qty =  $OE \times OB = OETB$ , Total cost =  $SAC \times qty = OF \times OB = OFNB$

Economic profit = total revenue – total cost =  $OETB - OFNB = FETN = \text{Supernormal profit}$

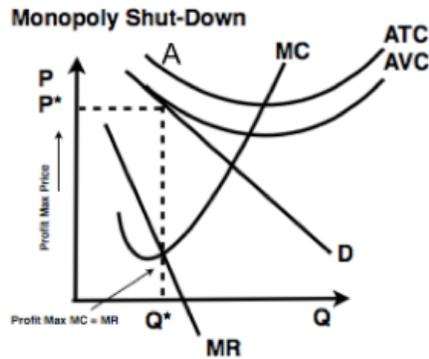
### Economic Loss



At the equilibrium K, MR intersects SMC,  $MR = SMC$ , Equilibrium qty = OB, equilibrium price =  $OF = CB$ , average cost =  $OE = HB$ , Total revenue =  $OF \times OB = OFCB$ , Total cost =  $OE \times OB = OEHB$ , Economic profit =  $OFCB - OEHB = -FEHC$ , Thus, economic loss = FEHC

### Shut-Down Point

When price = AVC, it gives the shut down point for a monopolist because if price falls below this then the firm will not be able to recover its variable costs and hence, it would shut down to avoid losses.



Point A indicates the shut down point ie. If price falls below  $P^*$ , the monopolist will shut down.

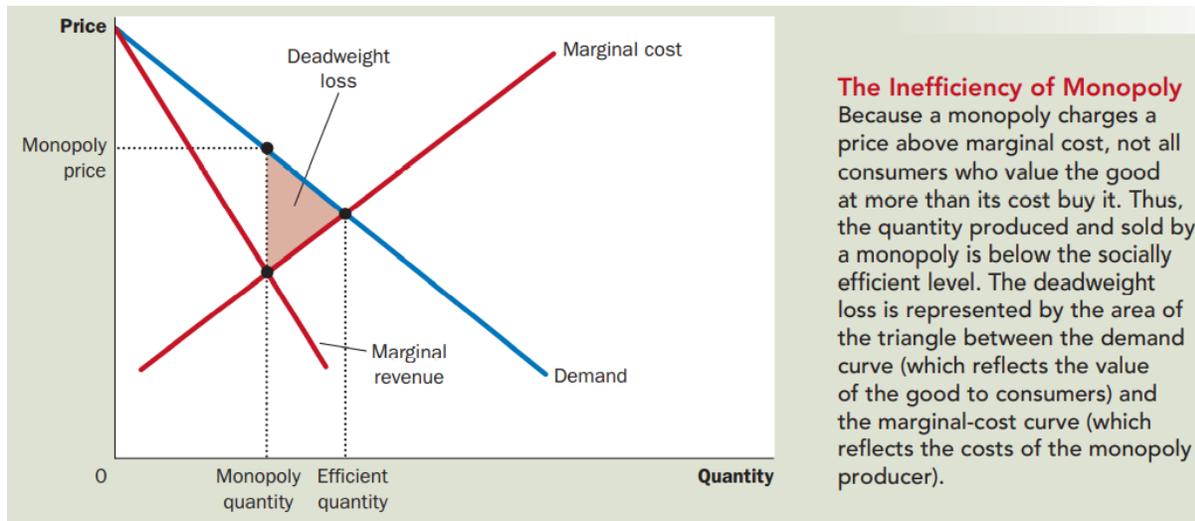
Equilibrium condition for a monopolist in the long run:

$$MR = LMC = SMC$$

$SAC = LAC, P \geq LAC$ . These conditions imply that in the long run the monopolist should be able to earn at least normal profits to stay in business.

**A monopolist always produces in the elastic part of the demand curve-** because as price will reduce total revenue will increase, but when demand becomes inelastic, a fall in the price will reduce the revenue.

### Deadweight Loss in a monopoly



### REFERENCES

Robert%20Pindyck,%208%20th%20edn%20Daniel%20Rubinfeld-Microecon[14693].pdf

[N.\_Gregory\_Mankiw]\_Principles\_of\_Microeconomics,(BookZZ.org).pdf

<https://econowaugh.blogspot.com/2014/11/monopoly-4-break-even-shut-down.html>

<https://www.economicdiscussion.net/monopoly/constructing-a-supply-curve-under-monopoly/17069>

[http://www.economicsconcepts.com/short\\_run\\_equilibrium\\_price\\_and\\_output\\_under\\_monopoly.htm](http://www.economicsconcepts.com/short_run_equilibrium_price_and_output_under_monopoly.htm)

### **PRICE DISCRIMINATION**

Price discrimination is a situation which occurs when identical goods and services are sold at different prices by the same producer.

Degrees of Price Discrimination:

1<sup>st</sup> Degree: This is the purest form of price discrimination. Here the firm separates the market into each individual consumer and charges them the price they are willing and able to pay. So he leaves zero consumer surplus for them

2<sup>nd</sup> Degree: Here, the monopolist divides his total output into different 'blocks' or quantities where each block is sold at a different price. E.g electricity supply by state electricity boards in the pre- liberalisation phase.

3<sup>rd</sup> Degree: Here the monopolist divides his total market into 2 or more sub-markets based on the elasticity of demand of the buyers and charges a different price in each sub market. Consumers cannot purchase the good at the lower price in the elastic sub-market, and then re-sell it to other consumers in the inelastic sub-market, at a higher price.

## MONOPOLISTIC COMPETITION

Monopolistic Competition is a market structure which derives its name from both Perfect Competition and Monopoly.

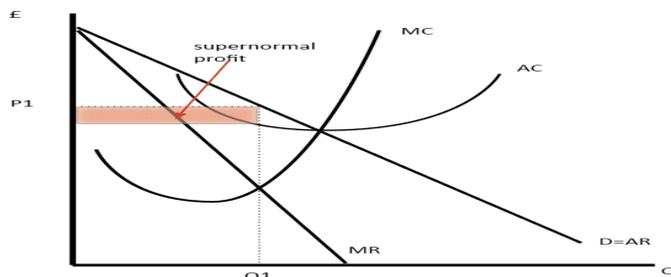
The main features of this market are

- Large number of sellers
- Product differentiation –the products sold are very similar but not identical. Differentiation may be in the physical features of the product, sales location, and intangible features of the product such as after sales servicing, as well as the consumers' perceptions of the product.
- Free entry and exit of buyers and sellers
- Non - Price Competition- since the products are differentiated between the sellers, each seller tries to influence the buyer by making him aware of the features of the product. Thus **advertising** is a key feature of this market.
- Control over price within a range – since each seller's product is different, every seller has a limited monopoly power. He is able to change prices within a small range without the fear of losing the customer.
- Examples of a monopolistically competitive market are branded FMCG products, restaurants, spas, grocery shops, and even services which have their own USP.

Based on the above features, each representative firm within a product group has a **downward sloping demand curve** (average revenue curve) which is **relatively elastic**. The monopolistic competitor can raise his price without losing all the buyers or he can lower the price and gain more buyers. As usual a downward sloping demand curve will have a downward sloping Marginal Revenue curve below it.

Of all the features under Monopolistic Competition, free entry and exit is a long term feature  
**Short Run Equilibrium**

The sellers under Monopolistic Competition faces a downward sloping demand curve as the sellers have some control over price. This curve flatter than that of a monopolist as there are many close substitutes. To maximize profits, the seller will have to equate Marginal Revenue (MR) to Marginal Cost (MC) to find the optimum quantity and price.



Source: <https://www.economicshelp.org/blog/311/markets/monopolistic-competition/>

In the above diagram, **Q1** is the profit maximizing output and we go up to the demand curve to get the profit maximizing price **P1**. The shaded area is the amount of **profit**. This profit is the economic or super normal profit.

The following schedule displays the profit maximizing price and quantity in the short run.

Quantity	Price	Total Revenue	Marginal Revenue	Total Cost	Marginal Cost	Average Cost
10	\$23	\$230	–	\$340	–	\$34
20	\$20	\$400	\$17	\$400	\$6	\$20
30	\$18	\$540	\$14	\$480	\$8	\$16
40	\$16	\$640	\$10	\$580	\$10	\$14.50
50	\$14	\$700	\$6	\$700	\$12	\$14
60	\$12	\$720	\$2	\$840	\$14	\$14
70	\$10	\$700	–\$2	\$1,020	\$18	\$14.57
80	\$8	\$640	–\$6	\$1,280	\$26	\$16

Source: <https://opentextbc.ca/principlesofeconomics/chapter/10-1-monopolistic-competition/>

In this example, MR and MC intersect at a quantity of 40, which is the profit-maximizing level of output for the firm. The profit maximizing price is \$16.

A firm under Monopolistic Competition can have both profit and loss in the short run. As in Monopoly, this market also shows **price higher than marginal cost**. This combination of price and quantity however exists only in the short run and cannot be continued into the long run. In the long run, the feature of free entry and exit comes into play. If firm has a profit in the short run, it is a signal for new firms to enter the business and if there is a loss, it is a signal for some existing firms to leave the business. The process of entry and exit will stop when the firm is making neither a profit nor loss and is left with only normal profit.

***Short run economic profit leads to the entry of firms in the long run.***

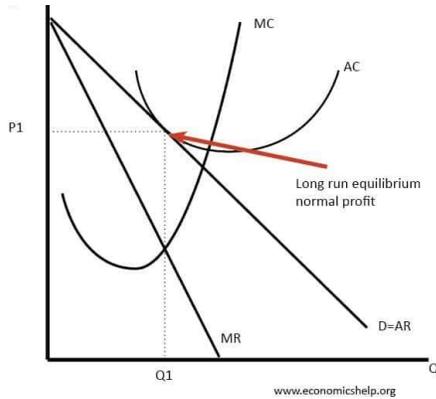
- The demand curve shifts leftward as every representative firm has a smaller share of the market.
- At the same time, the demand curve becomes flatter as more substitutes are available which cause elasticity to increase.
- The entry of firms will stop when there is neither a loss nor a profit i.e. zero economic profit.
- This will mean that the demand curve just touches the average cost curve. (P=Long Run Average Cost)

***Short-run economic losses encourage firms to exit the market.***

- Decrease in the number of products offered, Increased demand faced by the remaining firms.
- The demand curves of the existing firms shift to the right. The curve becomes steeper as elasticity falls due to lesser substitutes being available.
- As a firm's demand curve shifts to the right, its marginal revenue curve will shift to the right, too. This shift in marginal revenue will change the profit-maximizing quantity that the firm will choose, since marginal revenue will then equal marginal cost at a higher quantity
- The firms will stop exiting when profits return to only levels of normal profit.

**Equilibrium in the Long Run**

At equilibrium, there is neither a profit nor loss and the economic profits are zero. This will imply that there is no further entry or exit into the market. This means the long run average cost curve is just tangent to the demand curve

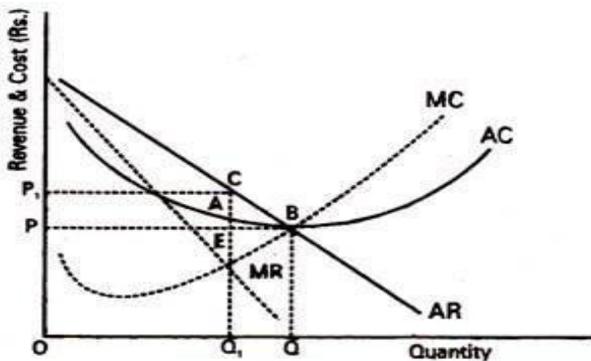


c

<https://www.economicshelp.org/wp-content/uploads/2008/02/monopolistic-competition-lr.jpg>

### Comparison with Perfect Competition and Monopoly

- Like Perfect Competition, this market has many sellers due to free entry and exit which drives economic profits to zero in the long run. However, in the short run it can make profits or losses. Like Monopoly, each seller equates marginal cost to marginal revenue but price is higher than marginal cost since the demand curve is downward sloping line.
- Monopolistic Competition has a smaller output sold at a higher price as compared to Perfect Competition. The following diagram shows the comparison.



**Fig. 11.9. Price higher under Monopoly than under Perfect Competition**

Source:

[https://cdn.economicdiscussion.net/wp-content/uploads/2015/10/clip\\_image019\\_thumb2.jpg](https://cdn.economicdiscussion.net/wp-content/uploads/2015/10/clip_image019_thumb2.jpg)

The profit maximizing price and quantity under perfect competition is  $Q$  where the demand curve is tangent to the average cost curve and the price is  $P$ . Under Monopolistic Competition, by

equating MR and MC, the profit maximizing quantity will be  $Q_1$  and the corresponding price will be  $P_1$ . It is clear that the quantity is higher and price is lower for Perfect competition

### **Main Disadvantages of this Market Structure:**

#### **Excess Capacity**

Due to free entry and exit in the long run, the economic profits become equal to zero. Since the market displays equilibrium at the point where the demand curve is tangent to the cost curve, the equilibrium will always be on the falling portion of the cost curve, implying that there is excess capacity and the firms could lower their average costs by increasing production. This results in an inefficient use of resources in this market structure. Hence monopolistic competition does not display **productive efficiency**.

**No Allocative Efficiency:** In a monopolistically competitive market, the rule for maximizing profit is to equate MR to MC. And since price is greater than Marginal Revenue, we can say that in this market,  $P > MC$ . If  $P > MC$ , it implies that resources are not allocated efficiently. Thus we can say that the monopolistically competitive market does not display **allocative efficiency**.

**High Cost of Advertising :** There is also an excess amount of money spent on advertising expenditure in this market. In order to attract the customer each seller tries to advertise the features of their product. These advertising costs are called selling costs. It is said that in absence of these selling costs, the average cost curve for the firm would be lower and the price of the product could have been reduced.

**Spurious Product Differentiation:** There is a possibility of spurious product differentiation possible where the customers may be duped into thinking that they are buying a different product although they may be buying the same product albeit in different packaging

Despite these disadvantages, this market has an important role as it provides the customer a wide variety of choices in their product purchased which is not available in any other market structure.

## **OLIGOPOLY**

An **Oligopoly** market is where few dominant sellers capture the market selling either homogeneous or differentiated products.

### **Characteristics**

1. **Few Firms:** Hence there is severe competition amongst the players in the industry
2. **Interdependence:** Each seller considers the actions and reactions of their rival firms while taking decisions on price and/or output
3. **Barriers to Entry:** One of the most significant reasons oligopoly exists is the prevalence of entry barriers that tend to deter new firms entering the market. Few of the significant reasons for entry barriers are as follows:
  - a. **Economies of Scale:** Large firms often have a competitive advantage because their fixed cost of operation (e.g., research and development, promotional cost etc) can be spread out over a greater sales volume reducing the per unit cost. Large initial set up cost makes it uneconomical for large number of small firms sharing the market.

- b. **Control over specialized inputs:** An exclusive ownership of a key resource of production, e.g., technology, raw materials, puts an incumbent firm in an advantageous position and acts as entry deterrents for potential entrants. Exp: an airline controlling access to an airport.
- c. **Exclusive patents and licenses:** Government regulations and patents create entry barriers in the market. E.g. Pharmaceutical manufacturers rely heavily on patents, due to high investments in research and development for formulating new drugs.
- d. **Advertising:** In oligopoly there is a constant effort by the firms to gain greater market share and maximize sales. In view of this firms incur a considerable amount of expenses on advertisements and various sales promotions.
- e. **Group Behaviour:** The interdependence amongst the firms in oligopoly sometimes results in firms preferring to form a group that will protect the interest of all the firms in that group and maximize the joint profit, instead of taking price and output decisions independently. This is called a cartel
- f. **Strategy:** Firms act strategically trying to anticipate the probable response of their rivals to any given change in their business decisions.

The various strategies adopted by the firms in an Oligopoly market can be classified under two broad categories – Collusive and Non-Collusive.

### **Collusive Oligopoly**

In oligopoly firms can never be sure as to how their competitors will react to any business strategy. In order to overcome this uncertainty firms may collaborate with each other. Such collusion tends to maximize their joint profits and the collaboration operates like a monopolist.

**Price-leadership:** In this form implicit collusion one firm sets the price and others follow it. There is a dominant firm and there are followers in this market structure.

There are various forms of price leadership depending upon the comparative advantage of one firm over others in the group:

**Price leadership of a low cost firm:** Firms have unequal costs and the firm with the lowest cost sets the price. Remember the price leader will set the price that maximizes its profit i.e. where its Marginal Cost curve is equal to its Marginal Revenue.

**Price leadership of a dominant firm:** One of the firms has a large dominant firm having significant market share and it sets the price.

**Barometric price leader:** Often it is neither the low-cost firm nor the dominant firm that becomes the price leader for the market but the firm with the most experience. A firm which has been in the business for a long time and knows market trends and understands the market dynamics. It sets the price which the follower firms take.

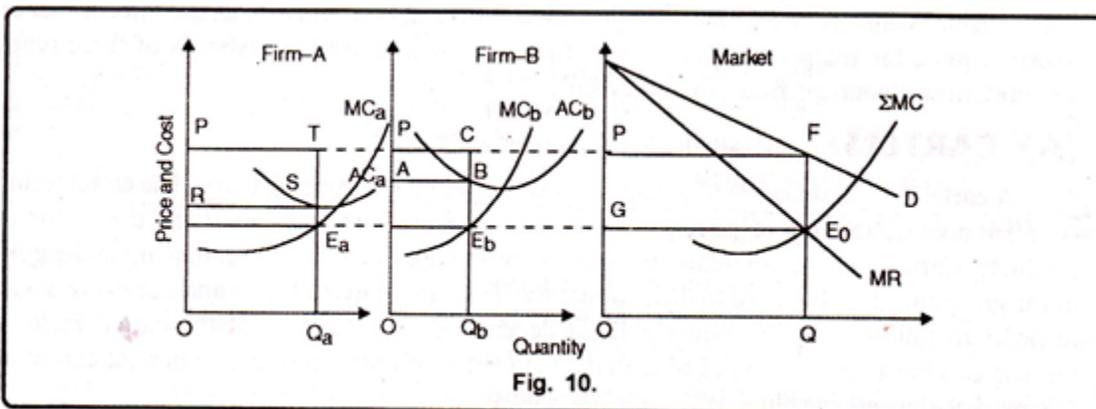
**Cartel:** A small number of rival firms collude rather than compete, to maximize their joint interest. Usually this involves setting agreed output quotas for each member of the cartel in order to maintain the agreed price. This way cartels act like a single monopolist charging a high price and producing lower output. OPEC, Cement

Most of the times cartels become difficult to sustain because individual members may have the incentive to cheat the agreement and secretly undercut the cartel price and try to increase their individual sales and gain market share.

**Implicit or Tacit Collusion:** This is formed when the firms do not declare a cartel but informally agree to charge the same price and compete on non price aspects of the business. Tacit collusions take place because open collusive agreements are illegal in most countries. The most common practice of tacit collusion is:

Often groupism comes to the rescue of an oligopoly market where all the firms in the market come together as a group and set a price at which their profit is maximized and each firm's territory in the market is clearly marked so that there is no competition in that particular market segment. The best example and possibly the only example of a successful cartel is the Organisation of the Petroleum Export Countries (OPEC), consisting of 13 of the world's oil producing and exporting nations with headquarters in Vienna, Austria. The OPEC sets the world oil price and since it has very few competitors (the USA, Russia) the price set by OPEC becomes the de-facto oil price for the world.

### Price Determination in a Collusive Oligopoly



Source: [www.economicdiscussion.net](http://www.economicdiscussion.net)

In the above figure the graph on extreme right is the industry demand (AR) and MR curve. Assuming that the industry is made up of two firms, the other two graphs show the profit maximizing equilibrium of the two firms. We can understand the figure like this: the industry's equilibrium (at E0 in the extreme right graph) gives us the industry's equilibrium price OP which both the firms have to take. But since the cost structure of each of the firms is different, their profits are different as can be seen in the figure. Firm A's profitability is PTRS which is smaller than the profitability of Firm B (shaded rectangle PCBA). Firm A supplies OQa of the total market supply and Firm B supplies OQb of the total supply. Total market supply is  $OQ = OQa + OQb$ .

### Non-Collusive Oligopoly

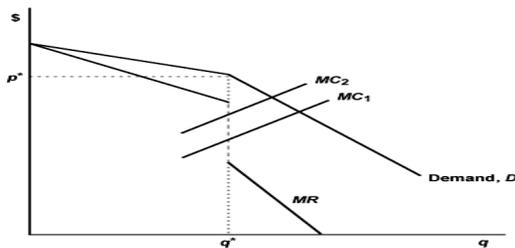
In this form of oligopoly firms, while being conscious about its rivals responses, adopt business strategies without any collusion.

## Paul Sweezy's Model on Kinked Demand Curve in an Oligopoly

Every firm reacts to any price change by any other firm in the market. While a competitor firm will react to every price decline by reducing its price further it will not match price rise with an equivalent price rise. In such a case it was Paul Sweezy's contention that the market demand curve is not a straight line but has a kink. The kink shows the equilibrium price and the part of the demand curve above the kink is relatively elastic and below the kink is relatively inelastic. Let's take an example of a duopoly market with two players: A and B. If firm A decides to increase the price and firm B doesn't increase theirs then demand for firm A's product will decline much more than it would have in the absence of competition because B's product is a close substitute making demand for A's product relatively elastic when it increases the price but the demand will be inelastic when it reduces the price because B will also reduce their price and new customers will enter the market with this reduced price increasing the number of customers for both A and B so A will not see much decline in demand for its product.

### The Kinked Demand Curve

In the diagram, the part of the demand curve above  $OP$  is relatively elastic and below is relatively inelastic. Consequently, the Marginal Revenue curve for the demand Curve has a discontinuous portion shown in the fig. below.



[https://wps.pearsoned.co.uk/ema\\_ge\\_carltonper\\_modernio\\_4/249/63926/16365177.cw/content/index.html](https://wps.pearsoned.co.uk/ema_ge_carltonper_modernio_4/249/63926/16365177.cw/content/index.html)

If firms face a kinked demand curve, the price,  $p^*$ , is profit maximizing for both marginal cost curve  $MC1$  and  $MC2$  that cuts the vertical section of the marginal revenue curve  $MR$ . The kinked demand theory of oligopoly behavior explains why prices are likely to remain “sticky” for small changes in costs. If costs increase significantly and marginal costs intersect Marginal Revenue above the discontinuous part, prices will have to change. A basic flaw of this model is however that this theory is silent on how the initial price set.

## General Comparison of the Four Markets

	Perfect Competition	Monopoly	Monopolistic Competition	Oligopoly
--	---------------------	----------	--------------------------	-----------

<b>Meaning</b>	Perfect competition is a situation in which there are large number of buyers and sellers buying and selling homogenous products at a single uniform price.	Monopoly means a market in which a single seller controls the entire supply of a commodity which has no close substitute.	Monopolistic competition refers to market situation in which there are large number of buyers and sellers buying and selling identical but differentiated products.	Oligopoly means a market in which there are very few sellers buying and selling homogenous or identical products.
<b>Type of Products Sold</b>	Homogenous	Unique	Identical but differentiated	Homogenous or heterogenous
<b>Entry and Exit of Firms</b>	There is free entry and exit of firms.	Neither entry nor exit of firm is allowed.	Few barriers to entry and exit of firms.	Few barriers to entry and exit of firms.
<b>Price</b>	Price is decided by industry with the help of demand and supply forces.	Monopolist is the price maker.	Producers have some control over the prices.	Price is decided using market sharing by quota agreement, dominant firm price leadership or barometric price leadership.
<b>Nature of the Demand Curve</b>	Demand curve is horizontal i.e. it is parallel to X axis.	Demand curve is inelastic. It slopes downwards from left to right but the curve is steeper.	Demand curve is elastic. It slopes downwards from left to right but the curve is flatter.	Demand curve is indeterminate.
<b>Selling Cost</b>	The firms do not incur selling cost as all products are homogenous.	Selling costs are not so important as there is no competition.	Selling cost plays an important role.	Selling cost plays an important role.
<b>Profit Making Possibility</b>	In the short run, the firm can earn super normal profit. But in the long run the firm will earn normal profit.	The monopolist can earn super normal profit in the short as well as long run.	In the short run, the firm can earn super normal profit. But in the long run the firm will earn normal profit.	There is potential for moderate profit. It depends upon the pricing strategy followed by firms.
<b>Product Differentiation</b>	Product differentiation is not followed as	Product differentiation is not required.	Product differentiation is followed using	Product differentiation is followed using

	the products are homogenous.		price and non price factors.	price and non price factors.
<b>Existence of Market</b>	Perfect competition is a myth.	Monopoly exists.	Monopolistic competition exists.	Oligopoly exists.
<b>Example</b>	Local agricultural market	Indian railways	Beauty soaps	Domestic airlines

*Reference: Glossary of Statistical Terms, OECD.*

### **Market Concentration**

Market concentration indicates the relative importance of different firms in an economy with reference to provision of goods and services. In other words, it indicates the dominance of different firms in an economy with respect to provision of goods and services.

Market concentration is mainly calculated with help of market concentration ratio.

Market concentration ratio measures the combined market share of top 'n' firms in an industry in terms of sales, employment, imports, exports, etc. It refers to the extent to which few firms can control the market.

Generally, 'n' is considered to be a value which is less than 5. In some cases, it is considered to be less than 10. For e.g. if the value of 'n' is assumed to be 3 while calculating market concentration ratio in terms of sales, it means that we will calculate the total sales made by top 3 firms in an industry.

Higher the value of market concentration ratio, greater is the control of top few firms in an industry. In other words, market is highly concentrated if the top 'n' firms have a major share of market in terms of sales, employment, etc.

This ratio can help us to even determine the type of market structure associated with a product. Generally, in case of oligopoly or monopolistic competition, this ratio is very high. It is the highest in case of monopoly and lowest in case of perfect competition.

The concepts like Four Firm Concentration Ratio (CR4), Herfindahl Hirschman Index and Lerner Index can be used to measure market concentration.

### **Four Firm Concentration Ratio**

Four firm concentration ratio indicates the market share of top four firms in an industry. This measure is mainly used to predict whether the market is an oligopolistic market or not.

The following steps are followed to calculate four firm concentration ratio:

- 1) Calculate the market share of top four firms.
- 2) Add up the market share of top four firms.

The value of four firm concentration ratio may vary from 0 (0%) to 1 (100%). If the value is 0, it indicates that the market represents perfect competition. If the value is 1, it indicates that the market represents monopoly.

The concentration levels can be summarized as follows:

Concentration Level	Value of Four Firm Concentration Ratio		Type of market structure
	Absolute Terms	Percentage	
Low	0-0.5	0% - 50%	Market represents monopolistic competition if the value is near to 0 or 0%. Market represents the beginning of oligopoly if the value is near to 0.5 or 50%.
Medium	0.5 – 0.8	50% - 80%	Very much oligopoly
High	0.8 – 1.0	80% - 100%	Market represents oligopoly. But if the value tends to move towards 1, it indicates the beginning of monopoly.

### **Herfindahl Hirschman Index (HHI)**

HHI is named after economists Orris C. Herfindahl and Albert O. Hirschman. It measures the competitiveness between the different firms in a market. It is generally used to find out the change in the level of competitive in case of pre and post merger transactions.

HHI is calculated by summing up the squares of market shares of different firms.

The formula to calculate HHI is as follows:

$$HHI = S_1^2 + S_2^2 + S_3^2 + \dots + S_n^2$$

S refers to market share (without decimals), n refers to number of firms

The value of HHI can be between 0 and 10,000.

It would be almost 0 if 0% market share is handled by top firms ( $0 \times 0 = 0$ ). It can be observed in case of perfect competition.

It would be 10,000 if 100% market share is handled by a single firm ( $100 \times 100 = 10,000$ ). It can be observed in case of monopoly.

**Lerner Index – Measurement of Monopoly Power** Lerner index was introduced by Abba Lerner in 1934. This index helps us to find out the monopoly power with the help of price and marginal cost. The formula used to calculate Lerner Index is as follows:

$$L = \frac{P - MC}{P}$$

L refers to Lerner Index, P refers to price and MC refers to marginal cost.

The value of this index can be between 0 and 1.

Generally to find out equilibrium output, we have to use the condition  $MC = MR$ .

Under perfect competition in the long run,  $Price = MR$ . So the value of Lerner Index under perfect competition would be equal to zero which indicates that there is no monopoly power. It also indicates optimum utilization of resources.

An oligopolist or monopolist will definitely decide the price which is greater than marginal cost. So in case of monopolist or oligopolist,  $P > MC$ . In case of monopoly, the value of Lerner Index tends to be 1.

The price decided by the seller depends upon the elasticity of demand for the product.

In case of monopoly, the demand for the product is inelastic. So as a result, the seller can increase the price to a large extent and earn good amount of profit. In this case, the value of  $P$  will increase which will increase the value of Lerner Index. This indicates that since monopoly power is high, there can be misallocation of resources under monopoly.

We can say that there is an inverse relation between Lerner Index and elasticity of demand.

## **GAME THEORY & PRISONER'S DILEMMA**

In an oligopoly market, and the actions of one player impacts the business and profits of the others. Since Oligopoly firms are so interdependent it is useful for them to cooperate with each other but such cooperation is difficult to achieve because though it maximizes the collective interest it is not in the self-interest of the firm. This conflict between self-interest and collective interest is shown using the Prisoner's Dilemma. The Prisoner's Dilemma is a story of two captured prisoners Bonnie and Clyde who are being interrogating in two separate cells such that the two are unable to speak to each other. In such a situation there are four possible outcomes. The below pay-off matrix provides an insight into what could be the outcome of the sentence in each of the four scenarios:

		Bonnie's Decision	
		Confess	Remain Silent
Clyde's Decision	Confess	Bonnie gets 8 years Clyde gets 8 years	Bonnie gets 20 years Clyde goes free
	Remain Silent	Bonnie goes free Clyde gets 20 years	Bonnie gets 1 year Clyde gets 1 year

Source: Southwestern Thomson Learning

1. Both Confess: The law goes easy on both Bonnie and Clyde due to the confession and they both get 8 years each in prison which adds up to 16 years for both of them put together.
2. Both remain silent : Charges are partially proved and they both get 1 year each in prison which adds up to 2 years for both of them put together.

3. Bonny confesses and Clyde remains silent: If Bonny strikes a deal with the cops and confesses he goes free but comes down heavily on Clyde with 20 years in prison since he remained silent which adds up to 20 years for both of them put together.
4. Clyde confesses and Bonny remains silent: If Clyde strikes a deal with the cops and confesses he goes free but comes down heavily on Bonny with 20 years in prison since he remained silent which adds up to 20 years for both of them put together.

Let's analyze the situation from the perspective of both the prisoners:

Scenario 1: Bonny would think that if he remains silent and Clyde confesses he would get a 20-year prison sentence but if he too confesses he gets 8 years sentence which is better.

Scenario 2: If Clyde remains silent and he too remains silent, he would get 1 year in prison but if he confesses he could go free which is a better outcome for him and he should confess.

Either ways it's in Bonny's self-interest to confess and hence becomes his dominant strategy. A dominant strategy is a strategy that is best for the player irrespective of the one chosen by the other. Clyde would also analyze both the scenarios in a similar fashion and conclude that either ways it's in Clyde's self-interest to confess and hence becomes his dominant strategy irrespective of the strategy chosen by Bonny. If both of them follow their respective Dominant Strategies they both end up confessing and getting an 8 years sentence each. This outcome if called as the Nash Equilibrium which implies settling for a sub-optimum outcome where an optimum outcome was available, in this case they had a mutually beneficial outcome of 2 years between the two of them but in their pursuit of self-interest they landed up with 16 years between the two of them which was the sub-optimum outcome. Hence cooperation though desirable is difficult to maintain.

Now let's apply the Prisoner's Dilemma to business as the same human instinct of pursuing self-interest is applicable to business as well. Assuming there are only two oil producing countries in the world Iran and Iraq, both have an option of producing a low output and enjoy high prices. Let's construct a pay-off matrix and understand each of the four possible outcomes

		Iraq's Decision	
		High Production	Low Production
Iran's Decision	High Production	Iraq gets \$40 billion Iran gets \$40 billion	Iraq gets \$30 billion Iran gets \$60 billion
	Low Production	Iraq gets \$60 billion Iran gets \$30 billion	Iraq gets \$50 billion Iran gets \$50 billion

Source: Southwestern Thomson Learning

1. Both Iran and Iraq decide on High Production: If both Iran and Iraq go in for high production it results into a glut in the market resulting into low prices and low revenues of \$40 bn each, together adding up to \$80 bn.
2. Both Iran and Iraq decide on Low Production: If both Iran and Iraq go in for low production it results into a shortage resulting into high prices and high revenues of \$50 bn each.

3. Iran decides on High Production but Iraq decides on Low Production: If Iraq produces a low output but Iran produces a high output resulting in moderate output and prices in the market with Iraq making a revenue of \$30 bn but Iran makes a cool revenue of \$60 bn.
4. Iraq decides on High Production but Iran decides on Low Production: Similarly, if Iran produces a low output but Iraq produces a high output resulting in moderate output and prices in the market with Iran making a revenue of \$30 bn but Iraq makes \$60 bn.

Let's analyze the two scenarios from the perspective of both the countries:

Scenario 1: Iraq would think that if it produces a low output and Iran produces a high output it would land up with revenues of only \$30 bn but if he too produces a high output it would earn \$40 bn which is better than earning \$30 bn and, in that light, should have a high production.

Scenario 2: If Iraq has a low production and so does Iran, it would earn \$50 bn but if it produces a high output it could earn \$60 bn which is a better outcome for Iraq.

Either ways it's in Iraq's self-interest to produce a high output and hence becomes his dominant strategy as irrespective of the Iran's strategy it's in the self-interest of Iraq to have a high output.

Iran would also analyze Scenario 1 and 2 in a similar way as Iraq and conclude that either ways it's in Iran's self-interest to produce a high output and hence becomes its dominant strategy as irrespective of the Iraq's strategy it's in the self-interest of Iran to have a high output. If both the countries follow their respective Dominant Strategies they both end up producing a high output and getting a revenue of \$40 bn each. This outcome would be the Nash Equilibrium as both countries have settled for a sub-optimum outcome where an optimum outcome was available, in this case they had an optimum outcome of earning \$100 bn between the two of them but in their pursuit of self-interest they made only \$80 bn between the two of them which was the sub-optimum outcome. Hence cooperation though desirable is difficult to maintain.

---