

Managerial Economics

Notes for 11-20 sessions

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Topic	Total No of Sessions Covered
Production Analysis	1
Analysis of Costs	6
Perfect Competition	3

Production analysis: Basic concepts, The Production Function, Total, Average, and Marginal product, The Law of Diminishing Returns, returns to scale, Short run and Long run, Technological change, The Law of diminishing marginal product, Least cost factor combination for a given output, Expansion path

Total Number of Sessions Allotted : 2

Total Number of Sessions Covered : 1

Concept of Production

Production can be defined as the process of converting the inputs into outputs. Inputs include land, labour and capital, whereas output includes finished goods and services. Organizations engage in production for earning maximum profit, which is the difference between the cost and revenue. Therefore, their production decisions depend on the cost and revenue. The main aim of production is to produce maximum output with given inputs.

Factors of Production

1) Land: Land is utilized to produce income called rent. Land is available in fixed quantity; thus, does not have a supply price. This implies that the change in price of land does not affect its supply. The return for land is called rent. 2) Labour: Labour includes unskilled, semi-skilled and highly skilled labours. The supply of labour is affected by the change in its prices. It increases with an increase in wages. The return for labour is called wages and salary. 3) Capital: Capital is the wealth created by human beings. It is one of the important factors of production of any kind of goods and services, as production cannot take place without the involvement of capital. 4) Enterprise: An enterprise is an organisation that undertakes commercial purposes or business ventures and focuses on providing goods and services.

Production function

Production function can be defined as a technological relationship between the physical inputs and physical output of the organization. Production function is based on the following assumptions:

1) Production function is related to a specific time period. 2) The state of technology is fixed during this period of time. 3) The factors of production are divisible into the most viable units.

4) There are only two factors of production, labour and capital. 5) Inelastic supply of factors in the short-run period.

Law of Diminishing Returns (Law of Variable Proportions)

The law of diminishing returns is an important concept of the economic theory. This law examines the production function with one variable keeping the other factors constant. It explains that when more and more units of a variable input are employed at a given quantity of fixed inputs, the total output may initially increase at an increasing rate and then at a constant rate, and then it will eventually increase at diminishing rates. The main assumptions made under the law of diminishing returns are as follows: 1) The state of technology is given and changed. 2) The prices of the inputs are given. 3) Labour is the variable input and capital is the constant input.

Production in the Long Run

Long run is the period in which the supply of labour and capital is elastic. It implies that labour and capital are variable inputs. The long run production function can be expressed as:

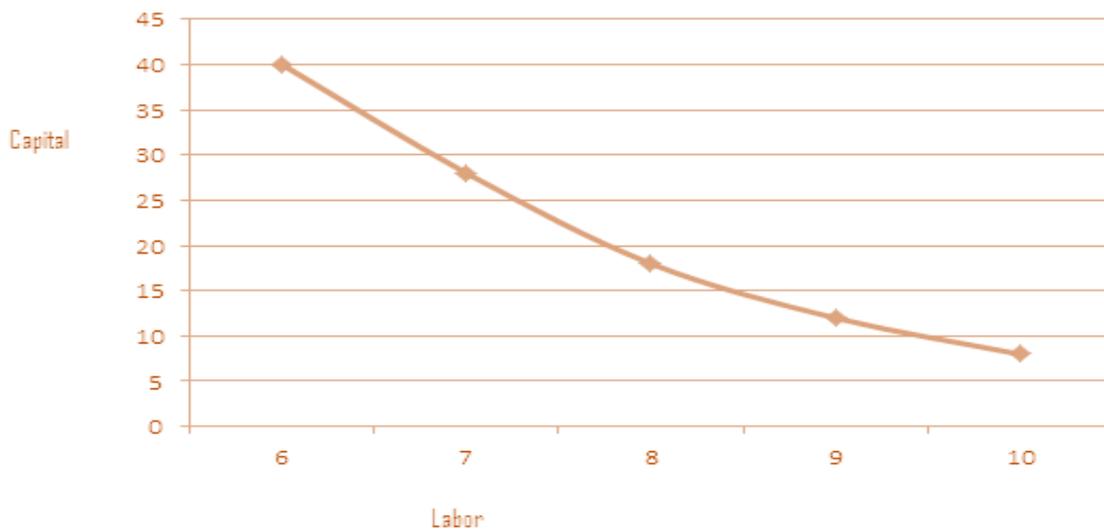
$$q = f(L, K)$$

where L= labour, which is variable K=capital, which is variable

In the long run, inputs-output relations are studied by the laws of returns to scale. These are long-run laws of production. The laws of returns to scale functional can be explained with the help of the isoquant curve.

Isoquant Curves

A technical relation that shows how inputs are converted into output is depicted by an isoquant curve. It shows the optimum combinations of factor inputs with the help of prices of factor inputs and their quantities that are used to produce the same output.



Properties of Isoquant

Isoquant curves slope downwards: It implies that the slope of the isoquant curve is negative. This is because when capital (K) is increased, the quantity of labour (L) is reduced or vice versa, to keep the same level of output.

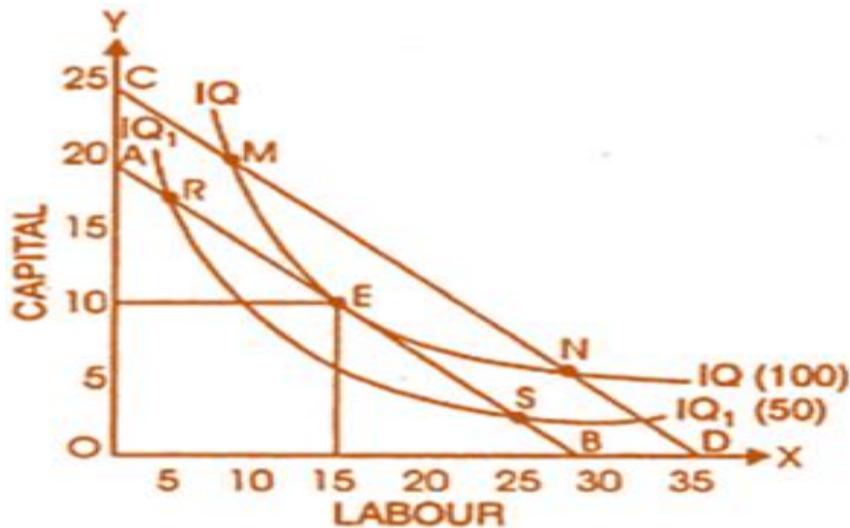
Isoquant curves are convex to origin: It implies that factor inputs are not perfect substitutes. This property shows the substitution of inputs and diminishing marginal rate of technical substitution of isoquant. The marginal significance of one input (capital) in terms of another input (labour) diminishes along with the isoquant curve.

Isoquant curves cannot intersect each other: An isoquant implies the different levels of combination producing different levels of inputs. If the isoquants intersect each other, it would imply that a single input combination can produce two levels of output, which is not possible. The law of production would fail to be applicable.

The higher the isoquant the higher the output: It implies that the higher isoquant represents higher output. The upper curve of the isoquant produces more output than the curve beneath. This is because the larger combination of input results in a larger output as compared to the curve that is beneath it.

Producer's Equilibrium

Producer's equilibrium implies a situation in which a producer maximises his/her profits. Thus, he /she chooses the quantity of inputs and output with the main aim of achieving the maximum profits. Least cost combination is that combination at which the output derived from a given level of inputs is maximum or at which the total cost of producing a given output is minimum.



Returns to Scale

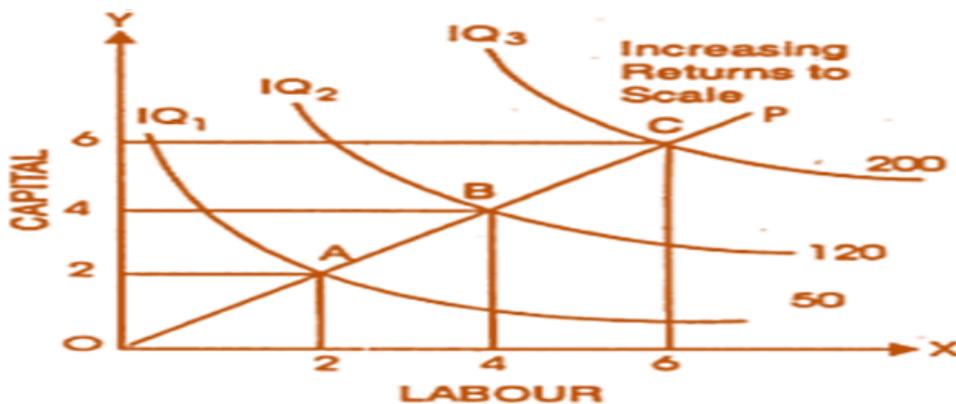
Returns to scale implies the behaviour of output when all the factor inputs are changed in the same proportion given the same technology.

The assumptions of returns to scale are as follows: 1) The firm is using only two factors of production that are capital and labour. 2) Labor and capital are combined in one fixed proportion. 3) Prices of factors do not change. 4) State of technology is fixed.

There are three aspects of the laws of returns: 1) Increasing returns to scale 2) Constant returns to scale 3) Diminishing returns to scale

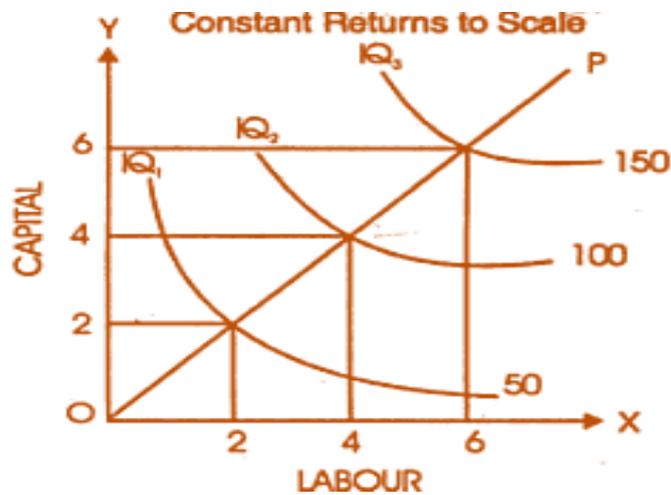
Increasing Returns to Scale

It is a situation in which output increase by a greater proportion than increase in factor inputs. For example, to produce a particular product, if the quantity of inputs is doubled and the increase in output is more than double, it is said to be an increasing return to scale.



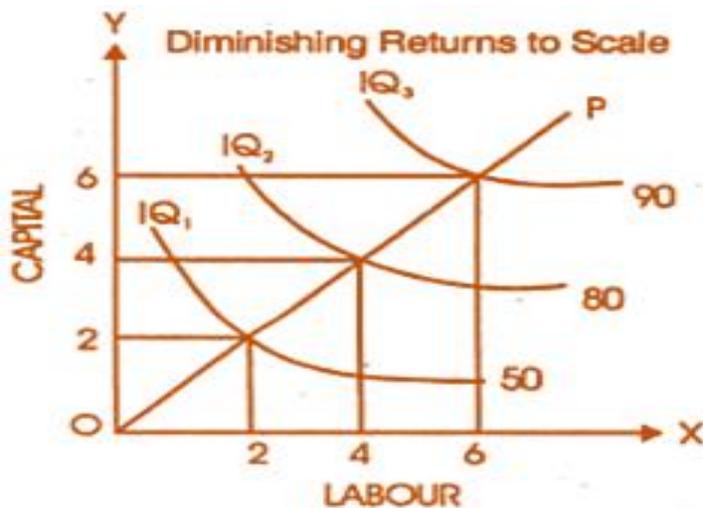
Constant Returns to Scale

A constant return to scale implies the situation in which an increase in output is equal to the increase in factor inputs. For example, in the case of constant returns to scale, when the inputs are doubled, the output is also doubled.



Diminishing Returns to Scale

Diminishing returns to scale refers to a situation in which output increases in lesser proportion than increase in factor inputs. For example, when capital and labour are doubled, but the output generated is less than double, the returns to scale would be termed as diminishing returns to scale.



Different Types of Costs

Opportunity Costs

An organization has limited resources, such as land, labour, capital, etc., which can be put to alternative uses having different returns. Organizations tend to utilize their limited resources for the most productive alternative and forgo the income expected from the second-best use of these resources. Therefore, opportunity cost may be defined as the return from the second-best use of the firm's limited resources, which it forgoes in order to benefit from the best use of these resources.

Let us assume that an organization has a capital resource of ₹ 1,00,000 and two alternative courses to choose from. It can either purchase a printing machine or photo copier, both having a productive life span of 12 years. The printing machine would yield an income of ₹ 30,000 per annum while the photo copier would yield an income of ₹ 20,000 per annum. An organization that aims to maximize its profit would use the available amount to purchase the printing machine and forgo the income expected from the photo copier. Therefore, the opportunity cost in this case is the income forgone by the organization, i.e., ₹ 20,000 per annum.

Business Costs

Business costs include all the expenditures incurred to carry out a business. The concept of business cost is similar to the explicit costs. Business costs comprise all the payments and contractual obligations made by a business, added to the book cost of depreciation of plant and equipment. These costs are used to calculate the profit or loss made by a business, filing for income tax returns and other legal procedures.

Full Costs

The full costs include the business costs, opportunity costs, and normal profit. Full costs of an organization include cost of materials, labour and both variable and fixed manufacturing overheads that are required to produce a commodity.

Fixed Costs

Fixed costs refer to the costs borne by a firm that do not change with changes in the output level. Even if the firm does not produce anything, its fixed costs would still remain the same. For example, depreciation, administrative costs, rent of land and buildings, taxes, etc. are fixed costs of a firm that remain unchanged even though the firm's output changes. However, if the time period under consideration is long enough to make alterations in the firm's capacity, the fixed costs may also vary.

Variable Costs

Variable costs refer to the costs that are directly dependent on the output level of the firm. In other words, variable costs vary with the changes in the volume or level of output. For example, if an organization increases its level of output, it would require more raw materials. Cost of raw material is a variable cost for the firm. Other examples of variable costs are labour expenses, maintenance costs of fixed assets, routine maintenance expenditure, etc. However, the change in variable costs with changes in output level may not necessarily be in the same proportion. The proportionality between the variable costs and output depends upon the utilization of fixed assets during the production process. The sum of fixed costs and variable costs of a firm constitutes its total cost of production. This can be expressed as follows: Total Costs of a firm (TC) = Fixed costs (FC) + Variable costs (VC)

Short Run Costs of Production

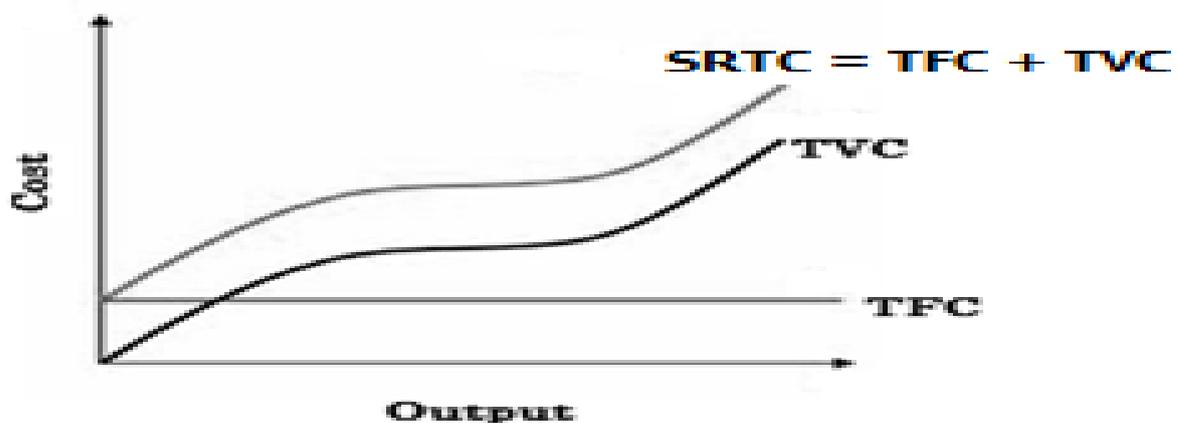
Short-run Total Cost

The Short-Run Total Cost (SRTC) of an organization consists of two main elements:

Total Fixed Cost (TFC): These costs do not change with the change in output. TFC remains constant even when the output is zero. TFC is represented by a straight line horizontal to the x-axis (output).

Total Variable Cost (TVC): These costs are directly proportional to the output of a firm. This implies that when the output increases, TVC also increases and when the output decreases, TVC decreases as well.

$$\text{SRTC} = \text{TFC} + \text{TVC}$$

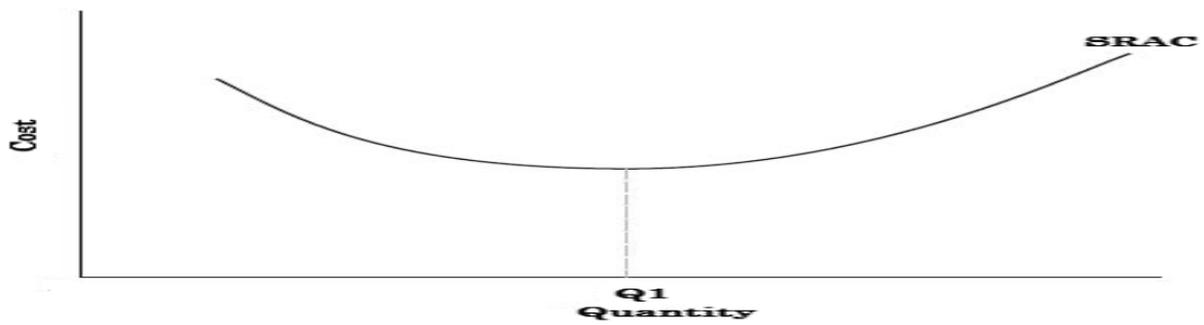


Short Run Average Cost

The short run average cost curve of a firm refers to per unit cost of output at different levels of production.

$$\text{SRAC} = \text{SRTC}/Q = (\text{TFC} + \text{TVC})/Q = \text{TFC}/Q + \text{TVC}/Q = \text{AFC} + \text{AVC}$$

$$\text{SRAC} = \text{AFC} + \text{AVC}$$



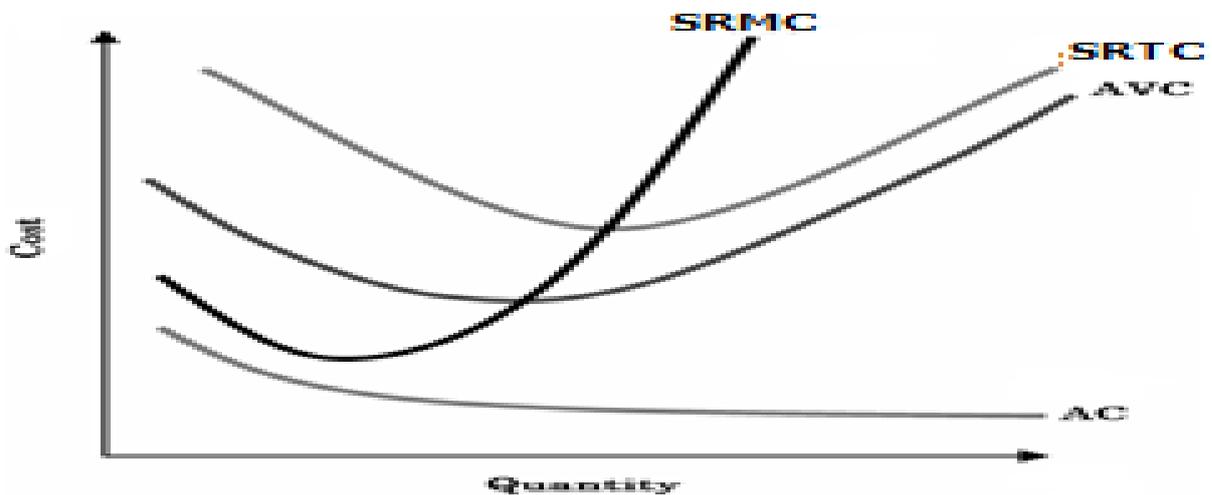
Shape of Short Run Average Cost Curve

SRAC of a firm is U-shaped. It declines in the beginning, reaches to a minimum and starts to rise. In the beginning, the fixed costs remain the same while only the variable costs, such as cost of raw material, labour, etc. changes. Later, when the fixed costs get distributed over the output, the average cost begins to fall. When a firm utilizes its capacities to the full, the average cost reaches to a minimum. It is at this point that the firm operates at its optimum capacity.

Short Run Marginal Cost

It measures change in short run total cost due to change in output.

$$SRMC = d(SRTC) / dQ$$

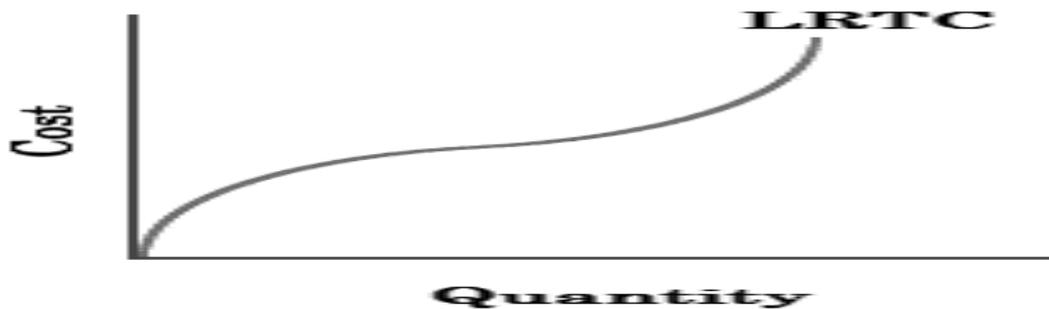


The short run marginal cost and the short run average variable cost curves are U shaped because increasing rate of returns in the beginning followed by diminishing returns. Short run marginal cost curve intersects Short Run Average Cost curves and Average Variable Cost at their lowest points.

Long Run Costs of Production

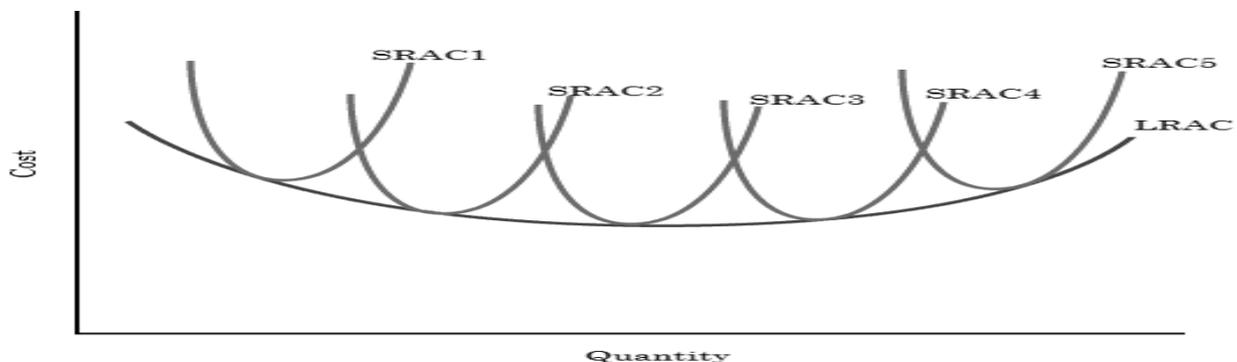
Long-run Total Cost

Long-run total cost (LRTC) refers to the total cost incurred by an organization for the production of a given level of output when all factors of production are variable. It is the per unit cost incurred by a firm when it expands the scale of its operations not just by hiring more workers, but also by building a larger factory or setting up a new plant. The shape of the long-run total cost curve is S-shaped, much similar to a short-run total cost curve.



Long-run Average Cost

Long-run average cost (LRAC) refers to per unit cost incurred by a firm in the production of a desired level of output when all the inputs are variable. The LRAC of a firm can be obtained from its individual short-run average cost curves. Each SRAC curve represents the firm's short-run cost of production when different amounts of capital are used. The shape of the LRAC curve is similar to the SRAC curve.



Shape of Long Run Average Cost Curve

The shape of the LRAC curve is similar to the SRAC curve although the U-shape of the LRAC is not due to increasing, and later diminishing marginal. The negative slope of the LRAC curve depicts economies of scale and increasing returns to scale. On the other hand, the positive slope of the LRAC curve represents diseconomies of scale or decreasing returns to scale.

Economies of Scale

Economies of scale result in cost saving for a firm as the same level of inputs yield a higher level of output. There are two types of economies of scale:

Internal economies of scale: These refer to the economies that a firm achieves due to the growth of the firm itself.

External economies of scale: These refer to the economies in production that a firm achieves due to the growth of the overall industry in which the firm operates.



Bulk-buying economies: As a firm grows in size, it requires larger quantities of production inputs, such as raw materials. With increase in the order size, the firm attains bargaining power over the suppliers. It is able to purchase inputs at a discount, which results in lower average cost of production.

Technical economies: As a firm increases its scale of production, it may use advanced machinery or better techniques for the production purposes. For example, the firm may use mass production techniques, which provide a more efficient form of production. Similarly, a bigger firm may invest in research and development to increase the efficiency of production.

Financial economies: Often small businesses are perceived as being riskier than larger businesses that develop a credible track record. Therefore, while the smaller firms find it hard to obtain finance at reasonable interest rates, larger firms easily find potential lenders to raise money at lower interest rates. This capital is further used to expand the production scale resulting in low average total costs.

Marketing economies: The marketing function of a firm incurs a certain cost, such as costs involved in advertising and promotion, hiring sales agents, etc. Many of these costs are fixed and as the firm expands its capacity, it is able to spread the marketing costs over a wider range of products. This results in low-average total costs.

Managerial economies: As a firm grows, managerial activities become more specialized. For example, a larger firm can further divide its management into smaller departments that specialize in specific areas of business. Specialist managers are likely to be more efficient as they possess a high level of expertise, experience and qualifications. This reduces the managerial costs in proportion to the scale of production in the firm. Therefore, economies of scale can be achieved with efficient management.

Diseconomies of Scale

Diseconomies of scale refer to the disadvantages that arise due to the expansion of a firm's capacity leading to a rise in the average cost of production. These can be categorized into:

Internal diseconomies: These refer to the diseconomies that a firm incurs due to the growth of the firm itself.

Managerial inefficiency

When a firm expands its production capacity, control and planning also need to be increased. This requires the administration to be more efficient. Often due to the challenge of managing a bigger firm, managerial responsibilities are delegated to the lower level personnel. As these personnel may lack the required experience to undertake the challenge, it may result in low output at higher cost.

Labour inefficiency: When a firm expands its production capacity, work areas may become more crowded leaving little space for each worker to work efficiently. Moreover, over-specialisation and division of labour in a bigger firm create over-dependence on workers. In such situations, labour absenteeism, lethargy, discontinuation of services, etc., become common, which increase the long-run average cost of production.

Several factors that give rise to external diseconomies of scale are as follows:

The concentration of firms within an industry increases the demand for raw materials. This leads to an increase in the prices of raw materials consequently increasing the cost of production in the industry. The concentration of firms within an industry increases the demand for skilled labour. This leads to an increase in the wages of the skilled workers consequently increasing the cost of production in the industry. The concentration of firms within an industry may lead to problems of waste disposal. Firms are bound to employ expensive waste disposal or recycling methods, which increases the long run cost of production. The concentration of firms within an industry may lead to excessive need for advertising and promotion, consequently increasing the cost of production in the industry.

Economies of Scope

Economies of scope refer to the decrease in the average total cost of a firm due to the production of a wider variety of goods or services. Economies of scope can be attained by sharing or joint utilization of inputs leading to reductions in unit costs. Economies of scope allow organizations to generate operational efficiencies in production. There are several ways through which an organization can attain economies of scope.

Flexibility in manufacturing: The use of flexible manufacturing systems results in economies of scope as it allows low-cost swapping of one product line with another. If a manufacturer can produce multiple products using the same equipment and maintains flexibility in manufacturing as per the market demand, the manufacturer can attain economies of scope.

Sharing of resources: If a firm expands its existing capacities or resources or areas of expertise for greater competitiveness, it reduces the average cost. These businesses could share the operational skills, manufacturing know-how, plant facilities, equipment or other existing assets. This leads to the attainment of economies of scope.

Mergers and acquisitions: Mergers may be undertaken to enhance or expand a manufacturer's product portfolio, increase plant size and combine costs. For example, several

pharmaceutical organizations have consolidated their research and development expenses for bringing new products to market. This leads to the attainment of economies of scope.

Concept of Revenue

Revenue is the total amount of money received by an organisation in return of the goods sold or services provided during a given time period. Revenue of a firm refers to the amount received by the firm from the sale of a given quantity of a commodity in the market. The concept of revenue consists of three important types of revenues: Total, Average and Marginal revenue.

Total Revenue

Total Revenue (TR) of a firm refers to total receipts from the sale of a given quantity of a commodity. Total revenue is calculated by multiplying the quantity of the commodity sold with the price of the commodity. Symbolically, Total Revenue = Quantity \times Price

Average Revenue

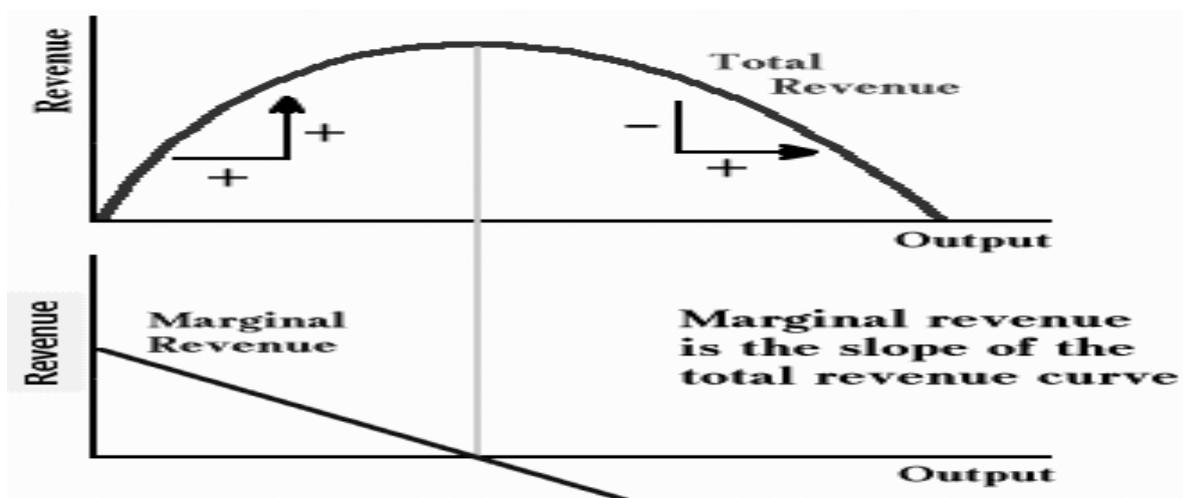
Average revenue is revenue earned per unit of output. Average revenue = Total Revenue / Number of units of sold.

Marginal Revenue

Marginal revenue is revenue earned by selling one additional unit of output. Marginal Revenue = Change in total revenue / Change in number of units

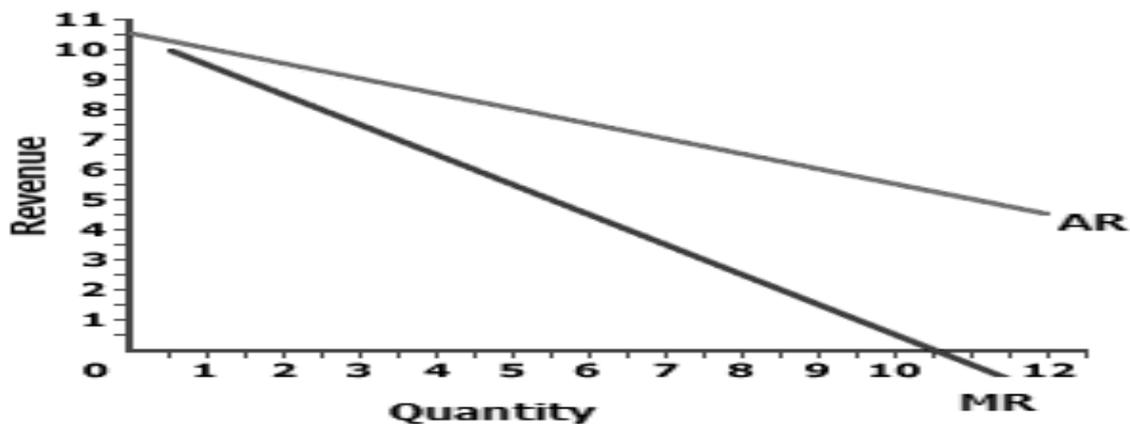
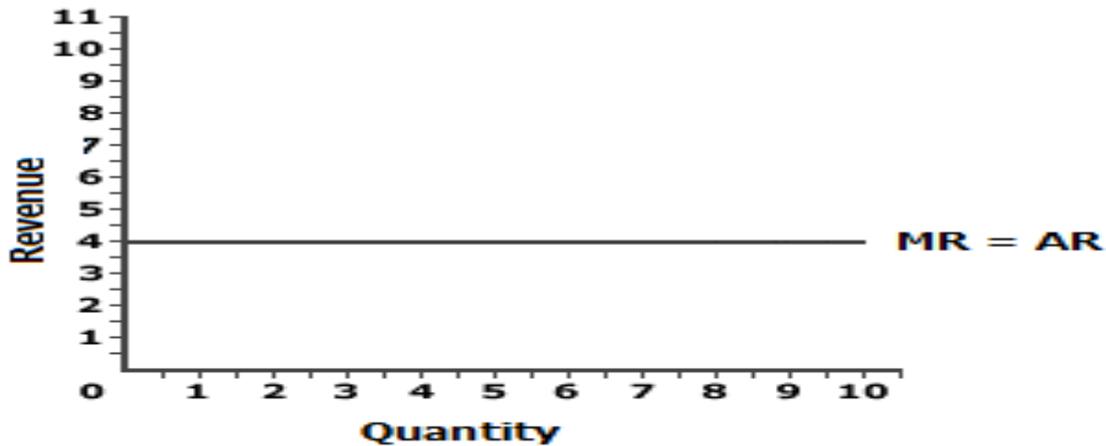
Relationship between Total Revenue and Marginal Revenue

If MR is greater than zero, the sale of additional unit increases the TR. If MR is lesser than zero, the sale of additional unit decreases the TR. If MR is equal to zero, the sale of additional unit results no change in TR. TR is shaped like inverted U. Slope of TR curve = Change in total revenue / change in number of units.



Relationship between Average Revenue and Marginal Revenue

Marginal revenue is less than average revenue: $MR < AR$ occurs for a firm selling an output in a monopoly market, where a single firm sells to several customers. Marginal revenue is equal to average revenue: $MR = AR$ occurs for a firm selling an output in a perfectly competitive market, where there are several sellers and several buyers of a given product.



Perfect Competition: Characteristics of a Perfectly Competitive Market, Supply and Demand in Perfect Competition, Short Run Equilibrium of the Competitive Firm, Long Run Equilibrium of the Competitive Firm, Efficiency of Competitive Markets, Effects of Taxes on Price and Output

Total Number of Sessions Allotted : 3

Total Number of Sessions Covered : 3

Perfect Competition refers to a market situation in which buyers and sellers operate freely and a commodity sells at a uniform constant price.

Features of Perfect Competition:

(a) **Large number of sellers and buyers**

(i) Large number of sellers

The words 'large number' simply states that the number of sellers is large such that no single seller has control over the market. One single seller has no option but to sell what it produces at this market determined price. This position of an individual firm in the total market is referred to as price taker. This is a unique feature of a perfectly competitive market.

(ii) Large number of buyers

The words 'large number' simply states that the number of buyers is large enough, that an individual buyer's share in total market demand is insignificant, the buyers cannot influence the market price on his own by changing his demand. This makes a single buyer also a price taker. To sum up, the feature "large number" indicates ineffectiveness of a single seller or a single buyer in influencing the prevailing market price on its own, rendering him simply a price taker.

(b) **Homogeneous Products**

(i) Product sold in the market are homogeneous, i.e., they are identical in all respects like quality, colour, size, weight, design, etc.

(ii) The products sold by different firms in the market are equal in the eyes of the buyers.

(iii) Since, a buyer cannot distinguish between the products of different firm, he becomes indifferent as to the firms from which he buys.

(iv) The implication of this feature is that since the buyers treat the products as identical they are not ready to pay a different price for the product of any one firm. They will pay the same price for the products of all the firms in the industry. On the other hand, any attempt by a firm to sell its product at a higher price will fail. To sum up, the "homogenous products" feature ensures a uniform price for the products of all the firms in the industry.

(c) **Free entry and exit of firms**

(i) Buyers and sellers are free to enter or leave the market at any time they like. New firms induced by large profits can enter the industry whereas losses make inefficient firms to leave the industry.

(ii) The freedom of entry and exit of firms has an important implication. This ensures that no firm can earn above normal profit in the long run. Each firm earns just the normal profit, i.e., minimum necessary to carry on business.

(iii) Suppose the existing firms are earning above normal profits, i.e. positive economic profits. Attracted by the positive profits, the new firms enter the industry. The industry's output, i.e. market supply, goes up. The prices come down. New firms continue to enter and the prices continue to fall till economic profits are reduced to zero.

(iv) Now suppose the existing firms are incurring losses. The firms start leaving. The industry's output starts falling, prices going up, and all this continues till losses are wiped out. The remaining firms in the industry then once again earn just the normal profits.

(v) Only zero economic profit in the long run is the basic outcome of a perfectly competitive market.

(d) **Perfect Knowledge about the market**

(i) Perfect Knowledge means both buyers and sellers are fully informed about the market.

(ii) The firms have all the knowledge about the product market and the input markets. Buyers also have perfect knowledge about the product market.

(iii) The implication of perfect knowledge about the product market is that any attempt by any firm to charge a price higher than the prevailing uniform price will fail. The buyers will not pay because they have perfect knowledge. A uniform price prevails in the market.

(iv) All firms have an equal access to the technology and the inputs used in the technology.

(v) No firm has any cost advantage. Cost structure of each firm is the same.

(vi) There is uniform price and uniform cost in case of all firms. All the firms earn uniform profits in the long run.

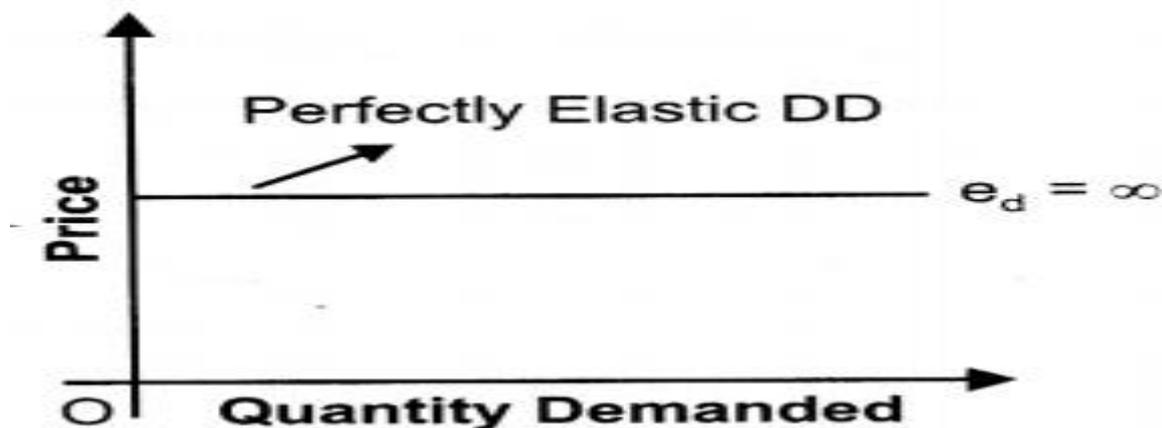
(e) Perfect mobility of factors of production

- (i) There is perfect mobility in the market both for goods and factors of production.
- (ii) There should be no restriction on their movement. Goods can be sold at any place.
- (iii) Similarly, factors of production can freely move from one place to another or from one occupation to another.

(f) Absence of transportation and selling cost.

- (i) In perfect competition, it is assumed that there is no transport cost for consumers who may buy from any firm and also there is no selling cost.
- (ii) This insures existence of a single uniform price of the product.

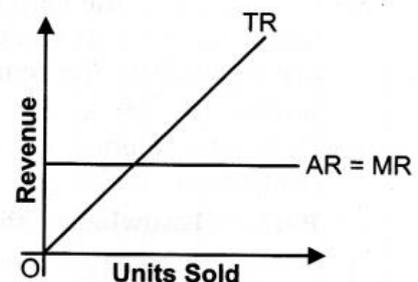
Demand Curve and revenue curves under perfect competition



Price	Demand
5	1
5	2
5	3
5	4
5	5

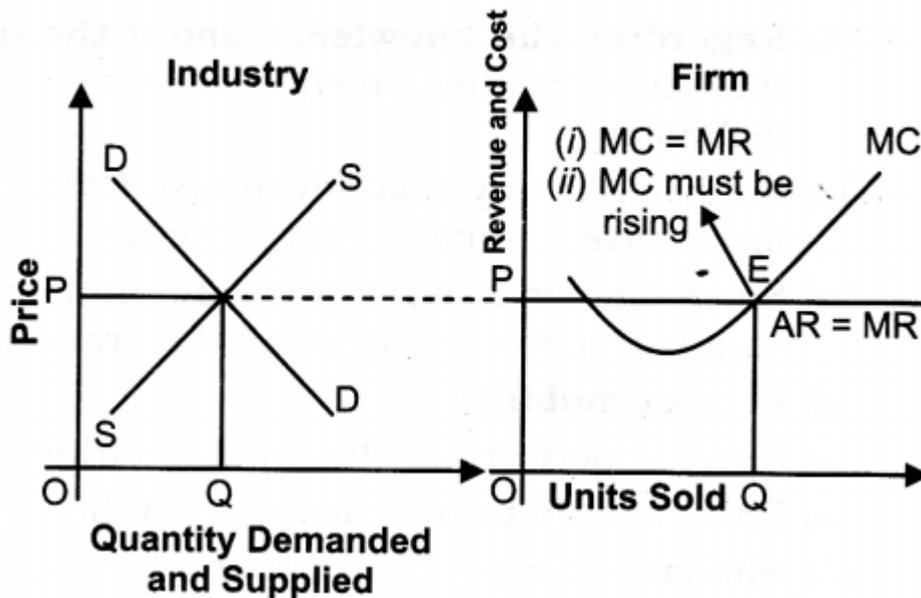
- (a) As we know, in perfect competition homogeneous goods are produced. So, price remains constant, which makes the demand curve perfectly elastic.
- (b) In perfect competition, homogeneous goods are produced, that is why price remains constant, as price = AR, it means AR remains constant. And if, AR remains constant, then AR = MR

Quantity	Price (Average Revenue)	Total Revenue = Price × quantity	Marginal Revenue $= \frac{\Delta TR}{\Delta Q}$
1	10	10	10
2	10	20	10
3	10	30	10
4	10	40	10



In perfect competition, industry is the price maker and firm is the price taker.

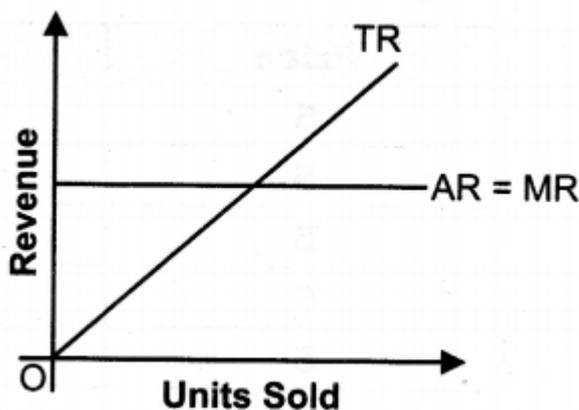
- (a) As we know, in Perfect competition, homogeneous goods are produced. So, industry cannot charge different price from different firms.
- (b) So, industry will give that price to the firm where industry is in equilibrium, i. e., where Demand = Supply. Any movement from that point would be unstable.
- (c) In the above diagram, price, revenue and Cost is measured on vertical axis and units of commodity on horizontal axis. Industry will give OP price to the firm as at that point Demand = supply, i.e., industry is in equilibrium.



The firms will follow the same price and charges same from the consumer.

Relationship between TR, AR and MR under perfect competition

- (a) In the perfect competition, a firm is a price taker.
- (b) It has to sell its product at the same price as given (determined) by the industry. Consequently, price = AR = MR.
- (c) Hence, a firm's AR and MR curve will be a horizontal straight line parallel to X axis.
- (d) Since price remains the same, i.e., MR is constant, therefore, TR increases at the constant rate as increase in the output sold.



- (e) As a result, TR curve facing a competitive firm is positively sloped straight line. Again, because at zero output Total Revenue is zero therefore, TR curve passes through the origin O as shown in the figure.

Equilibrium under perfect competition

In perfect competition, the market is the sum of all of the individual firms. The market is modelled by the standard market diagram (demand and supply) and the firm is modelled by the cost model (standard average and marginal cost curves). The firm as a price taker simply 'takes' and charges the market price (P^* in Figure 1 below). This price represents their average and marginal revenue curve. Onto this we superimpose the marginal and average cost curves and this gives us the equilibrium of the firm.

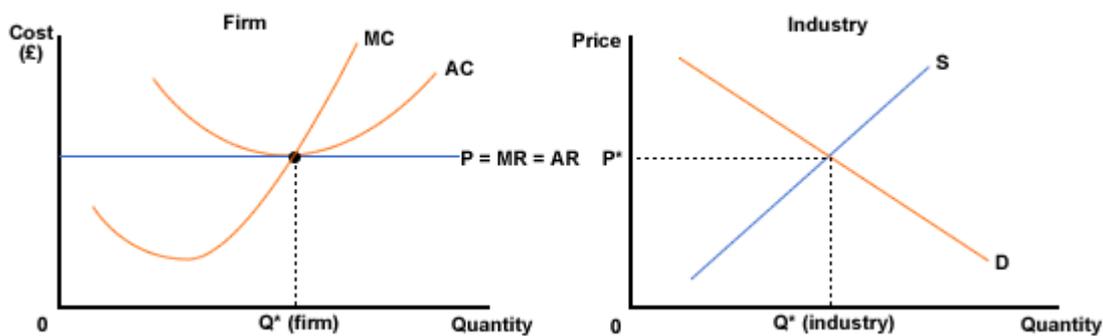
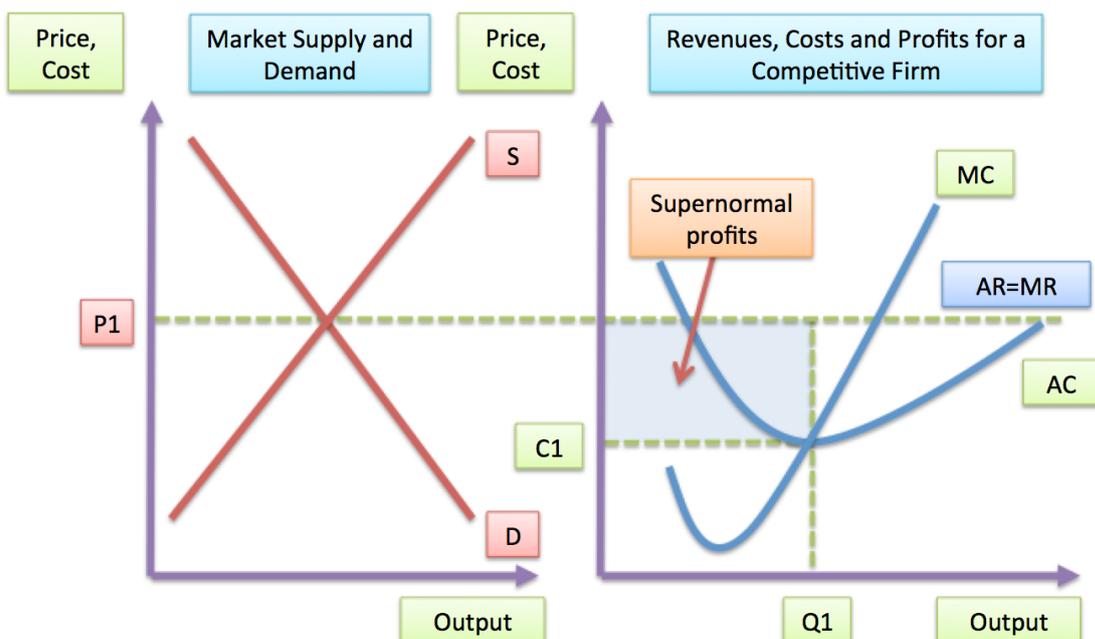


Figure 1 Equilibrium of the firm and industry in perfect competition

Profit Maximisation with Perfect Competition

Supernormal profit is made when price > average cost



For the firm, the **profit maximising output** is at Q_1 where $MC=MR$. This output generates a total revenue ($P_1 \times Q_1$)

Since total revenue exceeds total cost, the firm in our example is making **supernormal (economic) profits**

Adjustment to Long-run Equilibrium in Perfect Competition

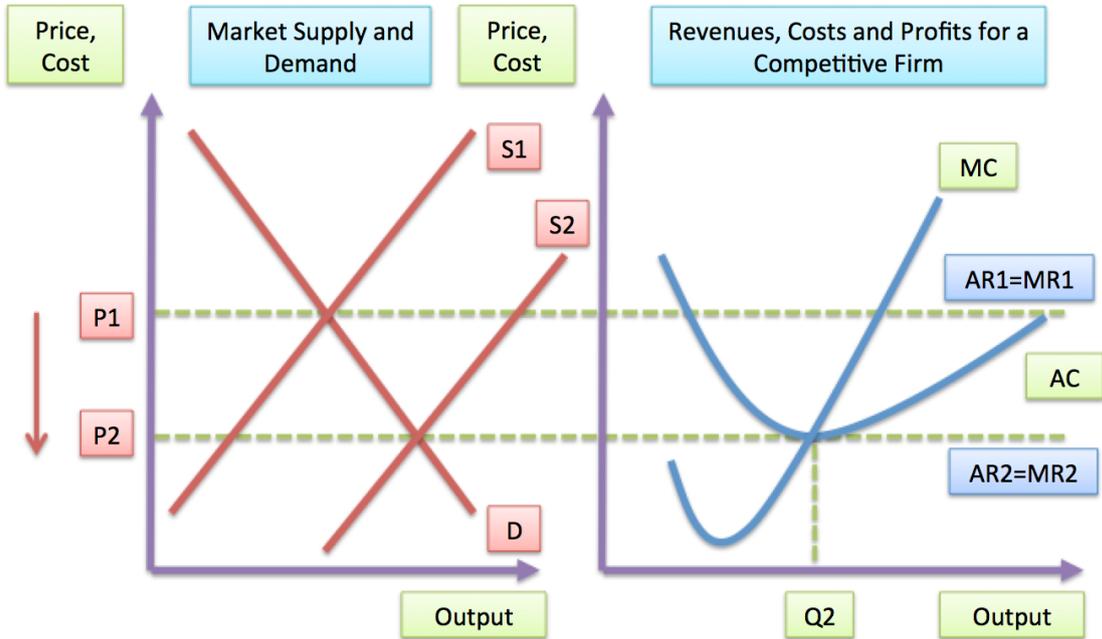
- If most firms are making **abnormal profits** in the short run, this encourages the **entry of new firms** into the industry
- This will cause an outward shift in market supply forcing down the price
- The increase in supply will eventually reduce the price until **price = long run average cost**. At this point, each firm in the industry is making normal profit.
- Other things remaining the same, there is no further incentive for movement of firms in and out of the industry and a long-run equilibrium has been established. This is shown in the next diagram

An increase in market supply

- The effect of increased market supply is to lower the price for each supplier, the price they “take” is now lower and it is this that drives down the level of profit made towards normal profit equilibrium.
- Competition drives down the market price reducing the profitability of each remaining business in the market

Adjusting to the Long Run Equilibrium Price

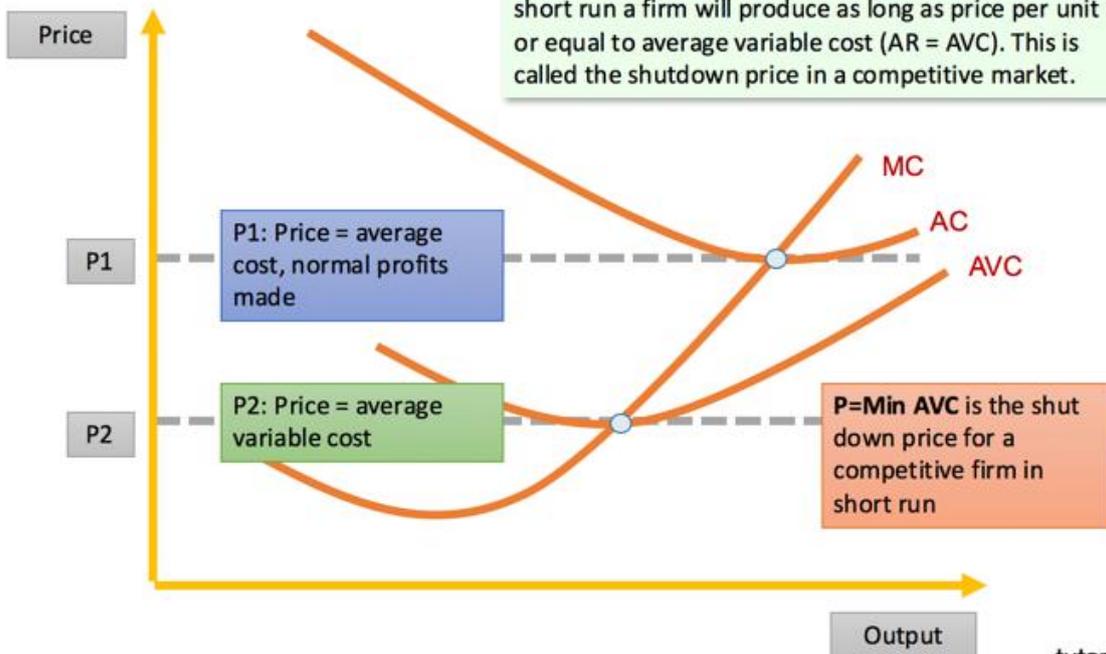
The entry of new firms causes market supply to increase



So in the long run, firms earn just normal profit.

Shut down Price:

A business needs to make **at least normal profit in the long run** to justify remaining in an industry but in the short run a firm will produce as long as price per unit > or equal to average variable cost ($AR = AVC$). This is called the shutdown price in a competitive market.



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