

Revenue Concept

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Concepts of Revenue

- **Revenue:** is the amount received by an organisation from the sale of a given quantity of a commodity in the market.
- **Total Revenue (TR):** Sum of all sale receipts or income of a firm.

TR=P×Q where P stands for Price of the product & Q stands for Quantity

- **Average Revenue (AR):** Per unit revenue received from the sale of a commodity. **AR=TR/Q=PQ/Q=P**
- **Marginal Revenue (MR):** Change in TR which results from the sale of one more or one less unit of output.
 $\Delta TR / \Delta Q$ or $MR = TR_n - TR_{n-1}$

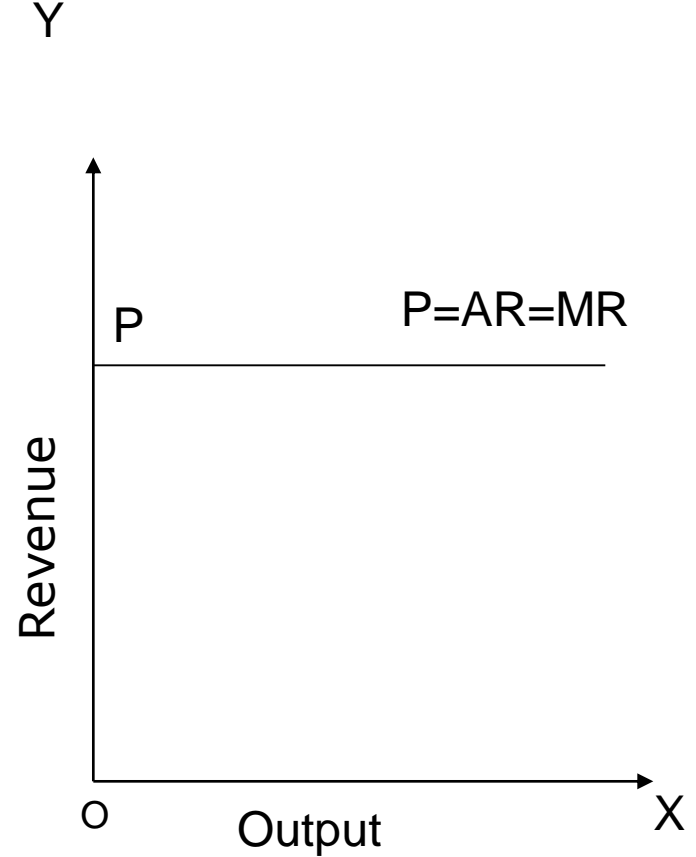
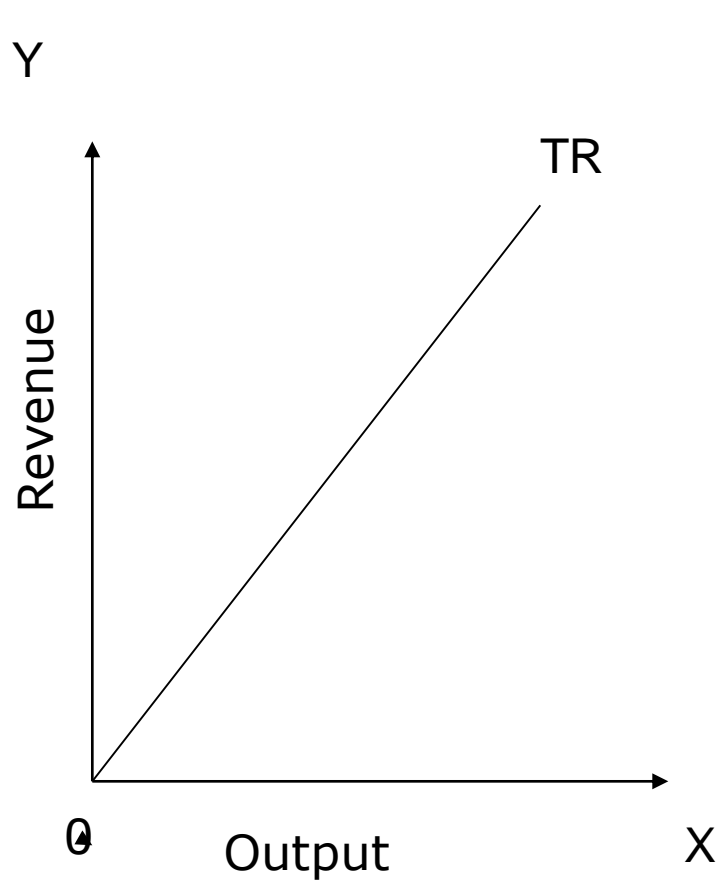
Relationship : TR, AR and MR under *Perfect Competition*

- **Perfect Competition** is a market situation where single price prevails and it has no tendency to change.
- Since under Perfect Competition, price of commodity remains constant. Therefore AR curve of firm is parallel to X axis.
- When AR is parallel to X axis, $MR = AR$.
Meaning that MR is also parallel to X axis.

**Table: TR, AR, MR under *Perfect Competition*:
When Price Remains Constant**

Units of Commodity	Total Revenue= P.Q	Price= Average Revenue	Marginal Revenue
1	5	5	5
2	10	5	5
3	15	5	5
4	20	5	5
5	25	5	5

TR, AR and MR curves under *Perfect Competition*: *When Price Remains Constant*



Relationship between TR and MR
(When Price remains Constant)

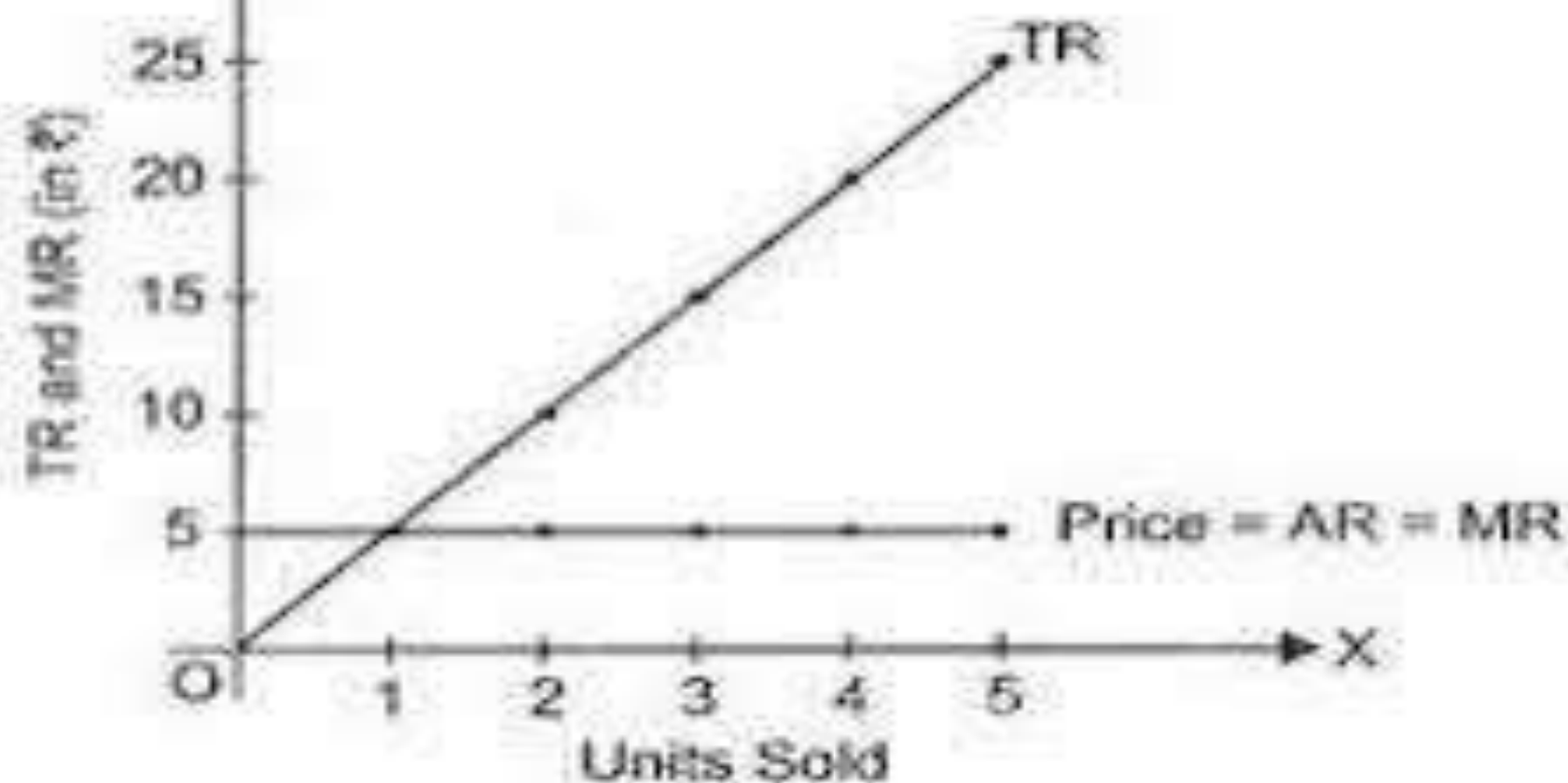


Fig. 7.2

Relationship : TR, AR and MR under

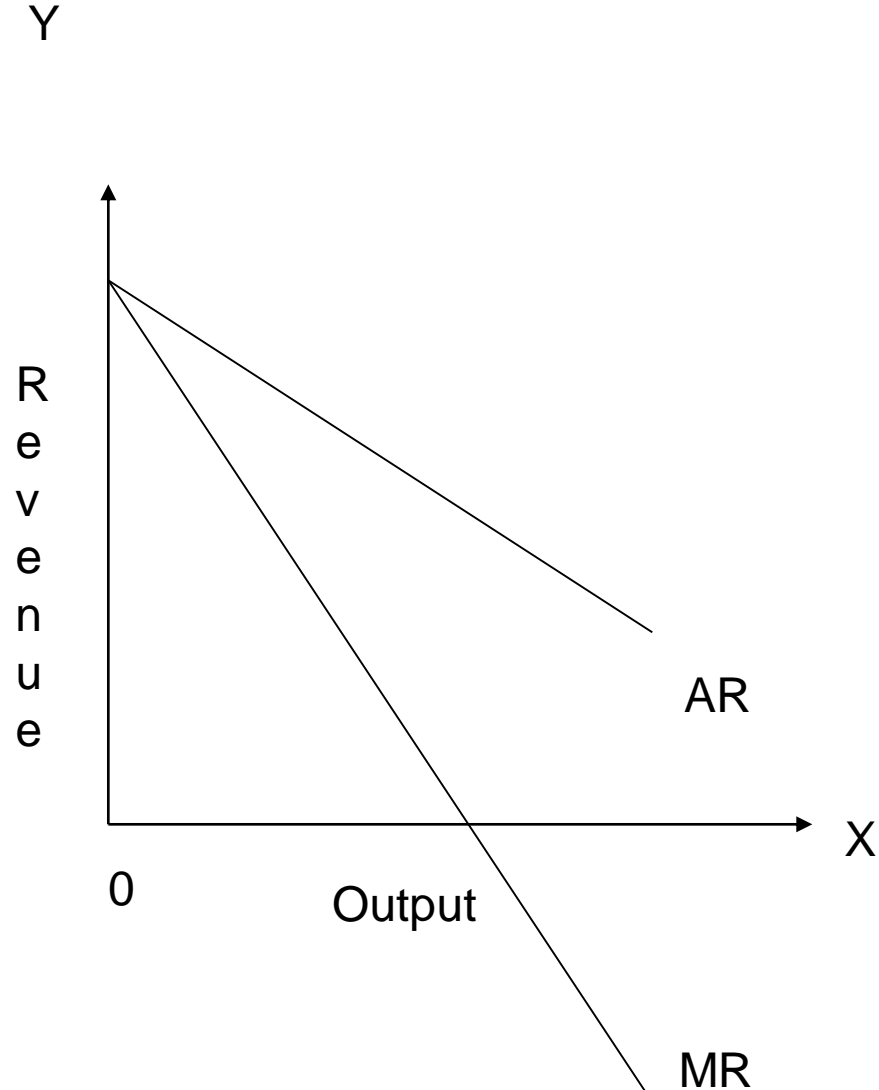
Imperfect Competition:

When Price falls with a rise in Output

- Imperfect competition (Monopoly, etc.) is a market situation where the firm is price maker and it knows that it must reduce price if it wants to sell more.
- In markets like imperfect markets, the price tends to fluctuate and adjust according to the market forces of demand and supply. A firm can increase its volume of sales only by decreasing the price, so the AR falls with an increase in sales.
- The revenue from every additional unit; i.e., MR will be less than AR. As a result, both AR and MR curves slope downwards from left to right. Therefore, AR curve of the firm is downward sloping. This leads to downward slope of MR curve also.
- But the slope of MR curve is double the slope of AR curve.

Units Sold	AR (₹)	TR (₹)	MR (₹)
1	10	10	10
2	8	16	6
3	6	18	2
4	4.5	18	0
5	2	10	-8

AR and MR curves under *Monopoly*



AR and MR curves under *Monopoly*

P	Q	TR=P.Q	AR= TR/Q	MR=TR1-TR1-1
50	1	50	50	(50-0)=50
45	2	90	45	(90-50)=40
40	3	120	40	(120-90)=30
35	4	140	35	(140-120)=20
30	5	150	30	(150-140)=10
25	6	150	25	(150-150)=0
20	7	140	20	(140-150)=-10
15	8	120	15	(120-140)=-20
10	9	90	10	(90-120)=-30

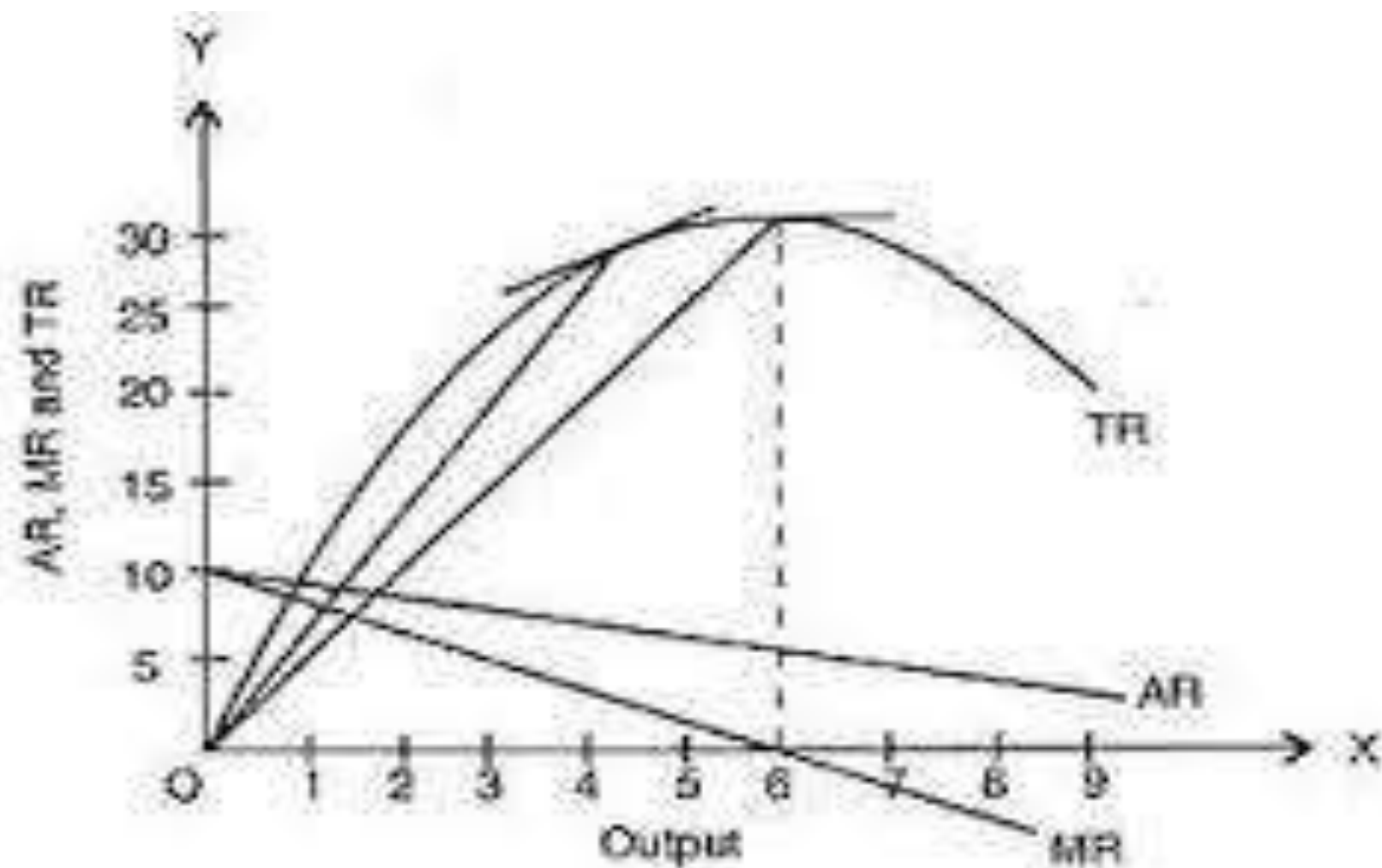


Fig. 12.1 : Relationship among TR, AR and MR

AR and MR under *Imperfect Competition*:

Following results emerge

1. Both AR and MR are derived from TR
2. AR and MR are both downward sloping.
3. Slope of MR is double the slope of AR
4. AR is always positive but same is not true about MR as MR may be positive, zero or even negative
5. Both AR and MR fall with an increase in output. However, MR falls at a rate more than the rate of fall in AR, making the MR curve steeper than the AR curve. MR curve can be zero and negative, while AR remains positive.
6. It must be noted that MR can fall to zero and can even become negative. However, AR can be neither be zero nor negative as TR is always positive.

Equilibrium Concepts

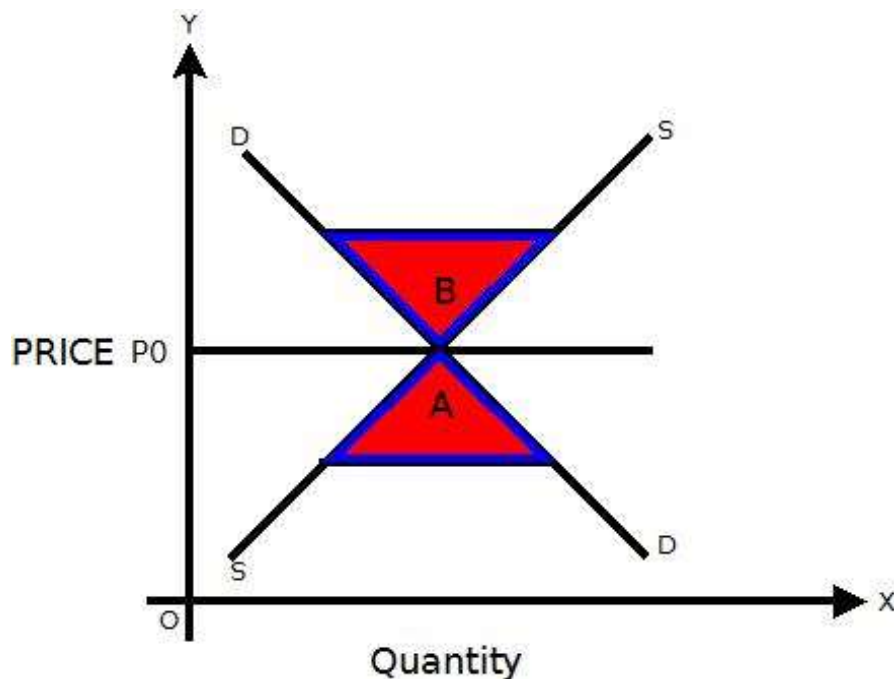
By

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Concepts of Equilibrium

- The word equilibrium is derived from the Latin word “**aequilibrium**” which means equal balance. Its use in economics is imported from physics.
- In physics it means a state of even balance in which opposing forces or tendencies neutralize each other.
- **Prof. Stigler** defines equilibrium in his sense in these words:" equilibrium is a position from which there is no net tendency to move, we say net tendency to emphasize the fact that it is not necessarily a state at sudden inertia but may instead represent the cancellation of power forces.
- In economics, equilibrium implies a position of rest characterized by absence of change.

- **Market equilibrium:** for example, refers to a condition where a market price is established through competition such that the amount of goods or services sought by buyers is equal to the amount of goods or services produced by sellers.
- It is the point at which quantity demanded and quantities supplied are equal. This price is often called the “**equilibrium price**” or “**Market Clearing Price**” and will tend not to change unless demand or supply change.



Price of market balance:

P - price

Q - quantity of good

S - supply

D - demand

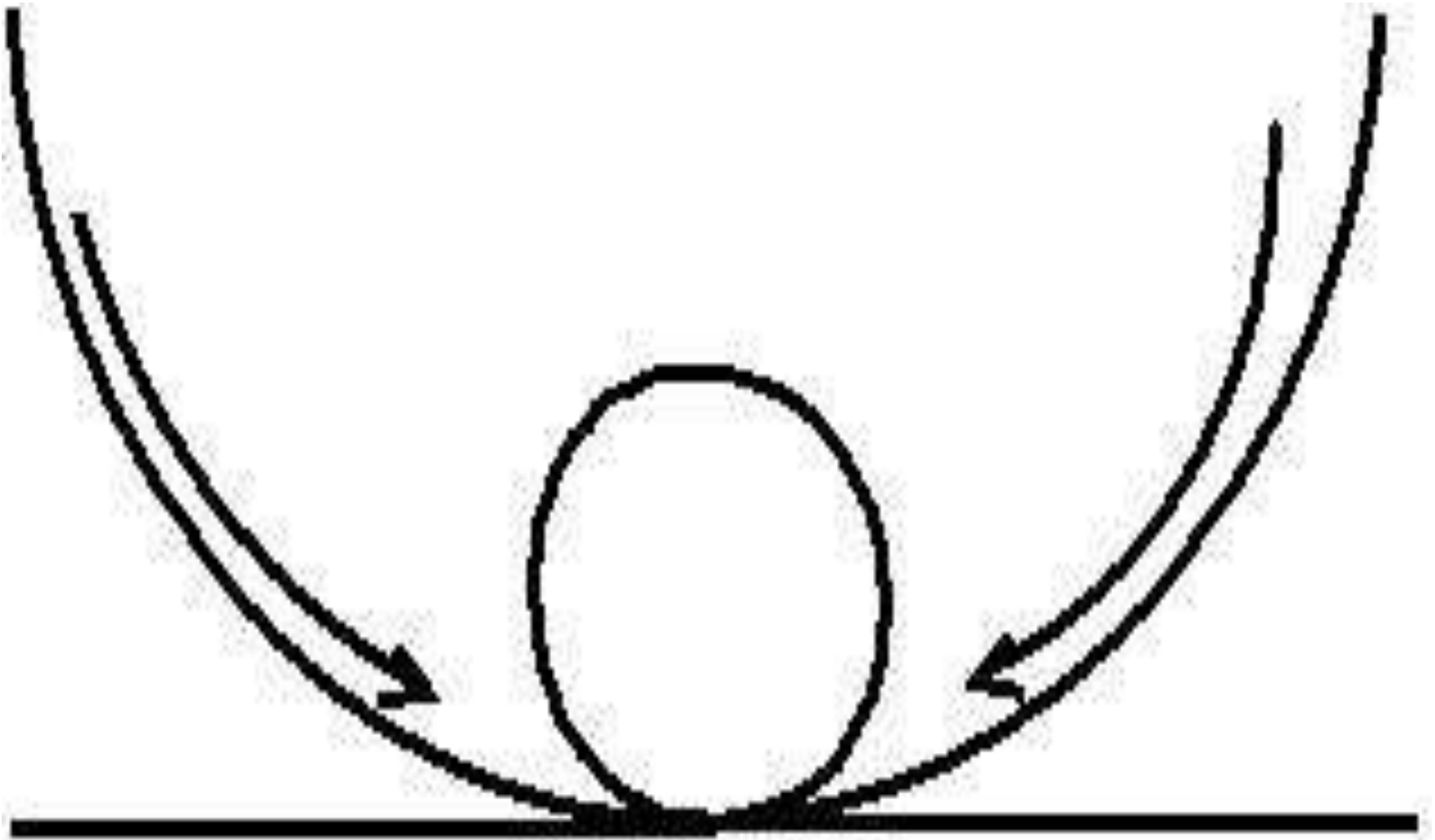
P0 - price of market balance

A - surplus of demand - when $P < P0$

B - surplus of supply - when $P > P0$

(1) Stable Equilibrium

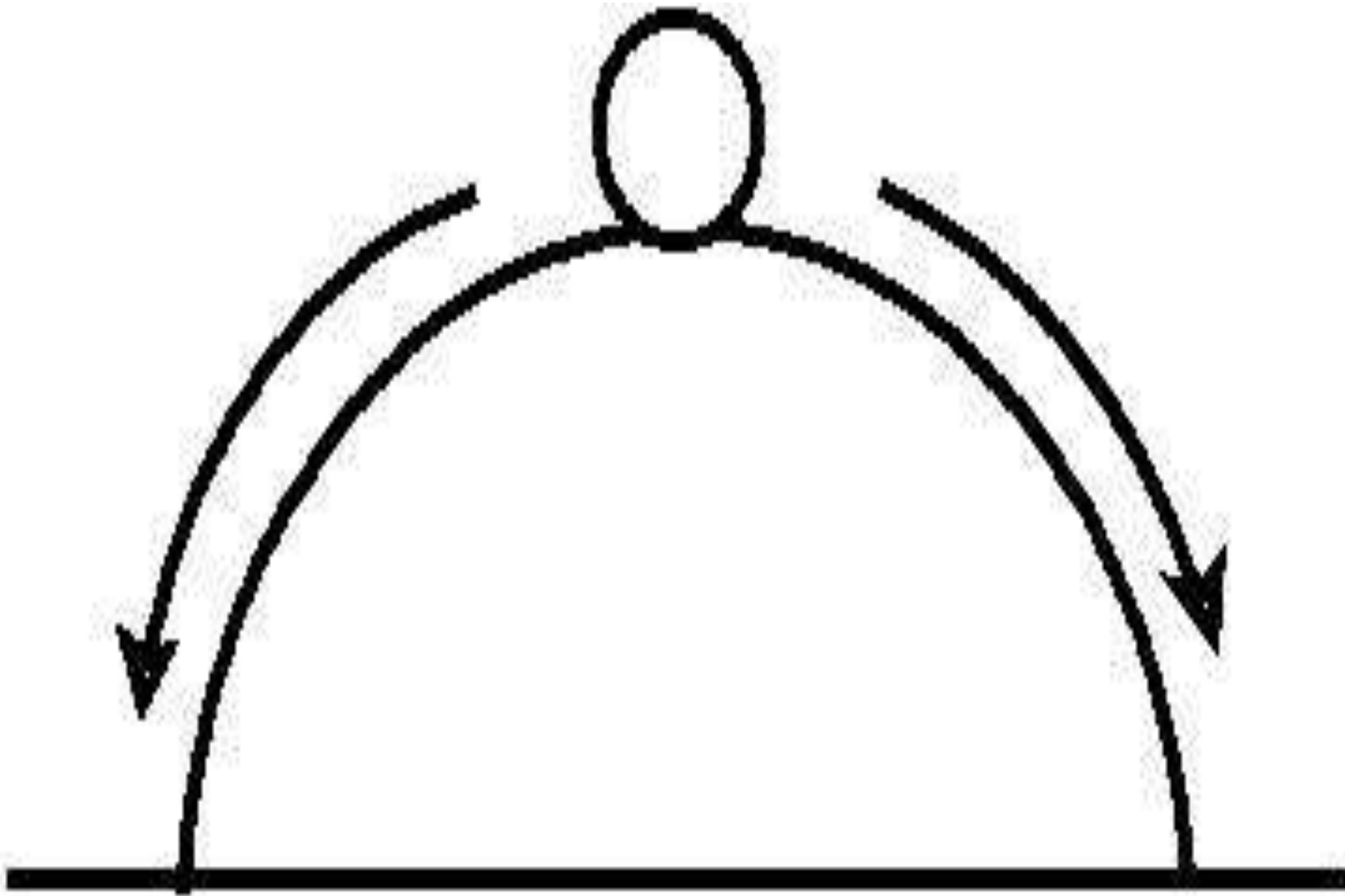
- Equilibrium is said to be stable *when the economy is disturbed on which it depends and again resume to its original position that is the disturbance in the equilibrium is self adjusting so that the original equilibrium is restored.*
- This stable equilibrium can be seen with the diagram. In words of Marshall “When the demand price is equal to the supply price, the amount produced has no tendency either to be increased or to be diminished, it is an equilibrium. Such equilibrium is stable: that is, the price, if displaced a little from it, will tend to return, as a pendulum oscillates about its lowest point.
- Another famous simile is that of a bowl and a bowl given by Schumpeter. A bowl that rest in a bowl is in stable equilibrium because if disturbed it will eventually come to the rest in its initial position after moving back and forth.



[Stable Equilibrium](#)

(2) Unstable Equilibrium

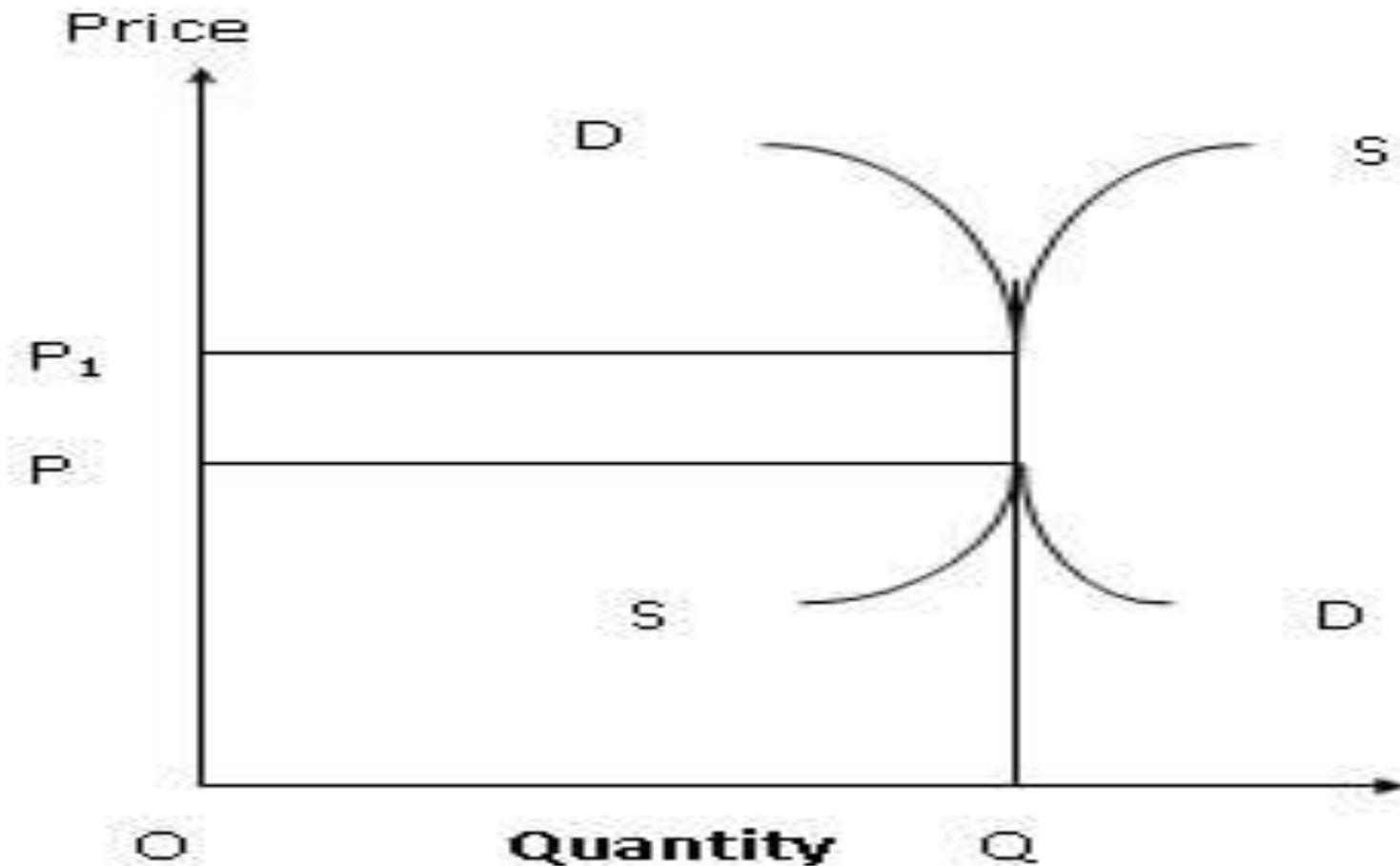
- In case of unstable equilibrium the disturbance in the economy will lead or exaggerate the further disturbances will never to its original position.
- In Pigou's words, "If the small disturbance calls out further disturbing forces which act in a cumulative manner to drive the system from its initial position," it is in unstable equilibrium.
- "As an egg if balanced on one of its ends would at the smallest shake fall down, and lie length ways, "as pointed out by Marshall. If the bowl is inverted and the ball is perched on its top, it will be in unstable equilibrium. For once the ball is pushed; it falls off the top of the bowl to the ground and does not return to its



Unstable Equilibrium

(3) Neutral Equilibrium

- *Neutral equilibrium is when the disturbing forces neither bring it back to the original position nor do they drive it further away from it. It rests where it has been moved.*
- When an initial equilibrium position is disturbed, the forces of disturbance bring it to the new position of equilibrium where the system has come to rest.
- A ball on the billiard table if disturbed will come to rest at the new position to which it has moved.
- According to Prof. Pigou, “An egg lying on its side is in neutral equilibrium.” The static neutral equilibrium condition is illustrated in figure.



Neutral Equilibrium

In fig E is the initial equilibrium point where OQ quantity is demanded and supplied at OP price. With the rise in the price to OP₁, E₁ becomes the new equilibrium point but the quantity demanded and supplied remains the same, i.e. OQ. Thus, the price range PP₁ (=EE₁) represents neutral equilibrium.

4) Partial Equilibrium

- Partial equilibrium analysis is the analysis of an equilibrium position for a sector of the economy or for one or several partial groups of the economic unit corresponding to a particular set of data.
- Partial or particular equilibrium analysis, also known as micro economic analysis, is the study of the equilibrium position of an individual, a firm, an industry or a group of industries viewed in isolation. In other words, this method *considers the changes in one or two variables keeping all others constant, i.e., ceteris paribus* (others remaining the same).
- The ceteris paribus is the crux of partial equilibrium analysis.

Assumptions :

- Commodity price is given and constant for the consumers.
- Consumer's taste and preferences, habits, incomes are also considered to be constant.
- Prices of prolific resources of a commodity and that of other related goods (substitute or complimentary) are known as well as constant.
- Industry is easily availed with factors of production at a known and constant price compliant with the methods of production in use.
- Prices of the products that the factor of production helps in producing and the price and quantity of other factors are known and constant.
- There is perfect mobility of factors of production between occupation and places.

(a) Consumer's Equilibrium: With the application of partial equilibrium analysis, consumer's equilibrium is indicated when he is getting maximum aggregate satisfaction from a given expenditure and in a given set of conditions relating to price and supply of the commodity.

The conditions are: 1) the marginal utility of each good is equal to its price (P), i.e... And (2) the consumer must spend his entire income (Y) on the purchase of goods, i.e... It is assumed that his tastes, preferences, money income and the prices of the goods he wants to buy are given and constant.

(b) Producer's Equilibrium: A producer is in equilibrium when he is able to maximise his aggregate net profit in the economic conditions in which he is working.

(c) Firm's Equilibrium: A firm is said to be in long-run equilibrium when it has attained the optimum size when is ideal from the viewpoint of profit and utilization of resources at its disposal.

(c) Industry's Equilibrium: Equilibrium of an industry shows that there is no incentive for new firms to enter it or for the existing firms to leave it. This will happen when the marginal firm in the industry is making only normal profit, neither more nor less. In all these cases; those who have incentive to change it have no opportunity and those who have the opportunity have no incentive.

Partial Equilibrium



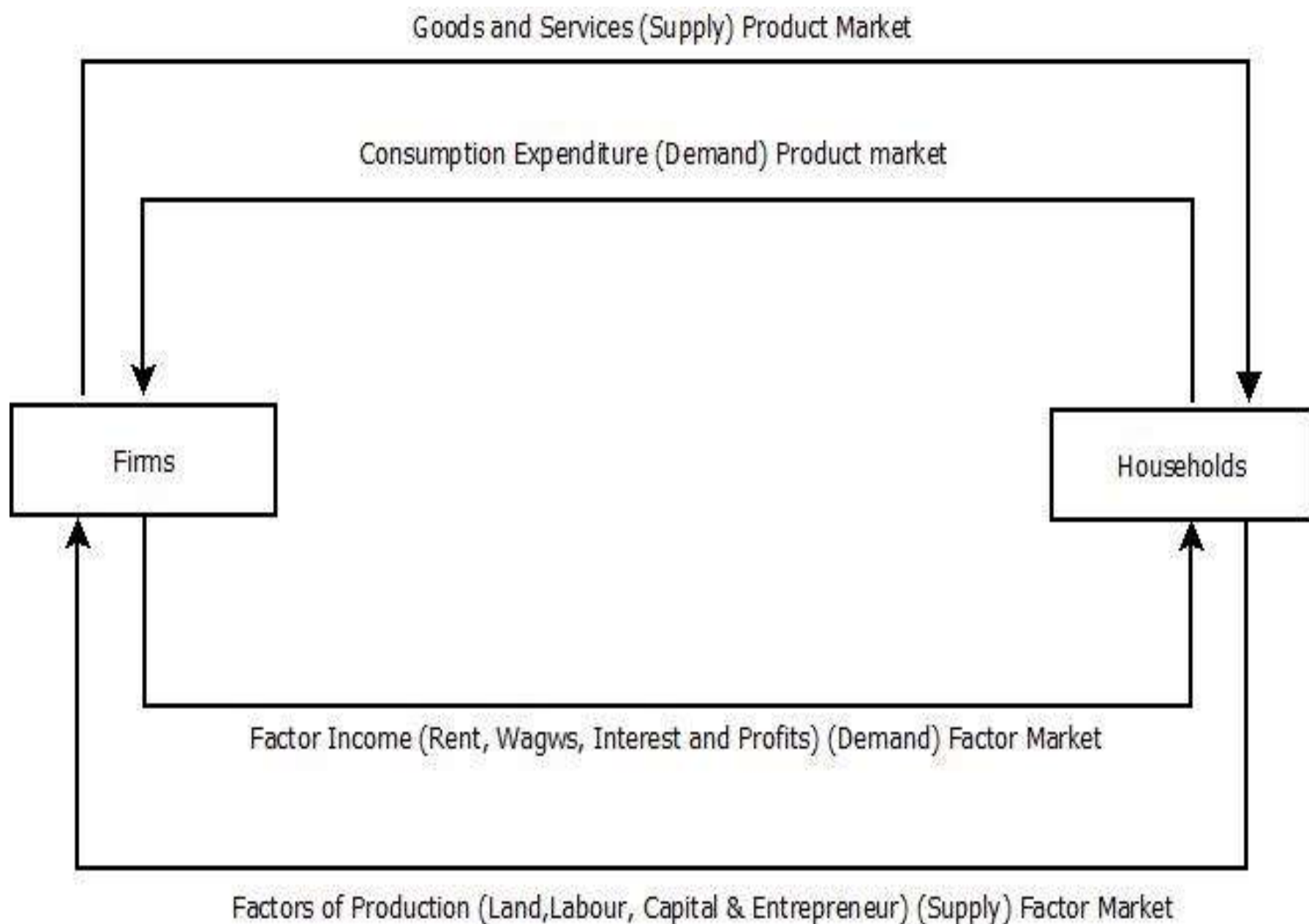
5) General Equilibrium

- **Leon Walras (1834-1910)**, a Neoclassical economist, in his book 'Elements of Pure Economics', created his theoretical and mathematical model of General Equilibrium as a means of integrating both the effects of demand and supply side forces in the whole economy.
- General equilibrium theory is a branch of theoretical microeconomics. The partial equilibrium analysis studies the relationship between only selected few variables, keeping others unchanged. Whereas the general equilibrium analysis enables us to study the behaviour of economic variables taking full account of the interaction between those variables and the rest of the economy.
- In partial equilibrium analysis, the determination of the price of a good is simplified by just looking at the price of one good, and assuming that the prices of all other goods remain constant. Thus **the economy is in general equilibrium when commodity prices make each demand equal to its supply and factor prices make the demand for each factor equal to its supply so that all product markets and factor markets are simultaneously in equilibrium.**

Such a general equilibrium is characterized by two conditions in which the set of prices in all product and factor markets is such that

- 1) All consumers maximize their satisfactions and all producers maximize their profits and
- 2) All markets are cleared which means that the total amount demanded equals the total amount supplied at a positive price in both the product and factor markets.

To explain it, we begin with a simple hypothetical economy where there are only two sectors, the household and the business. The economic activity takes the form of flow of goods and services between these two sectors and monetary flow between them. These two flows, called real and monetary are shown in figure.



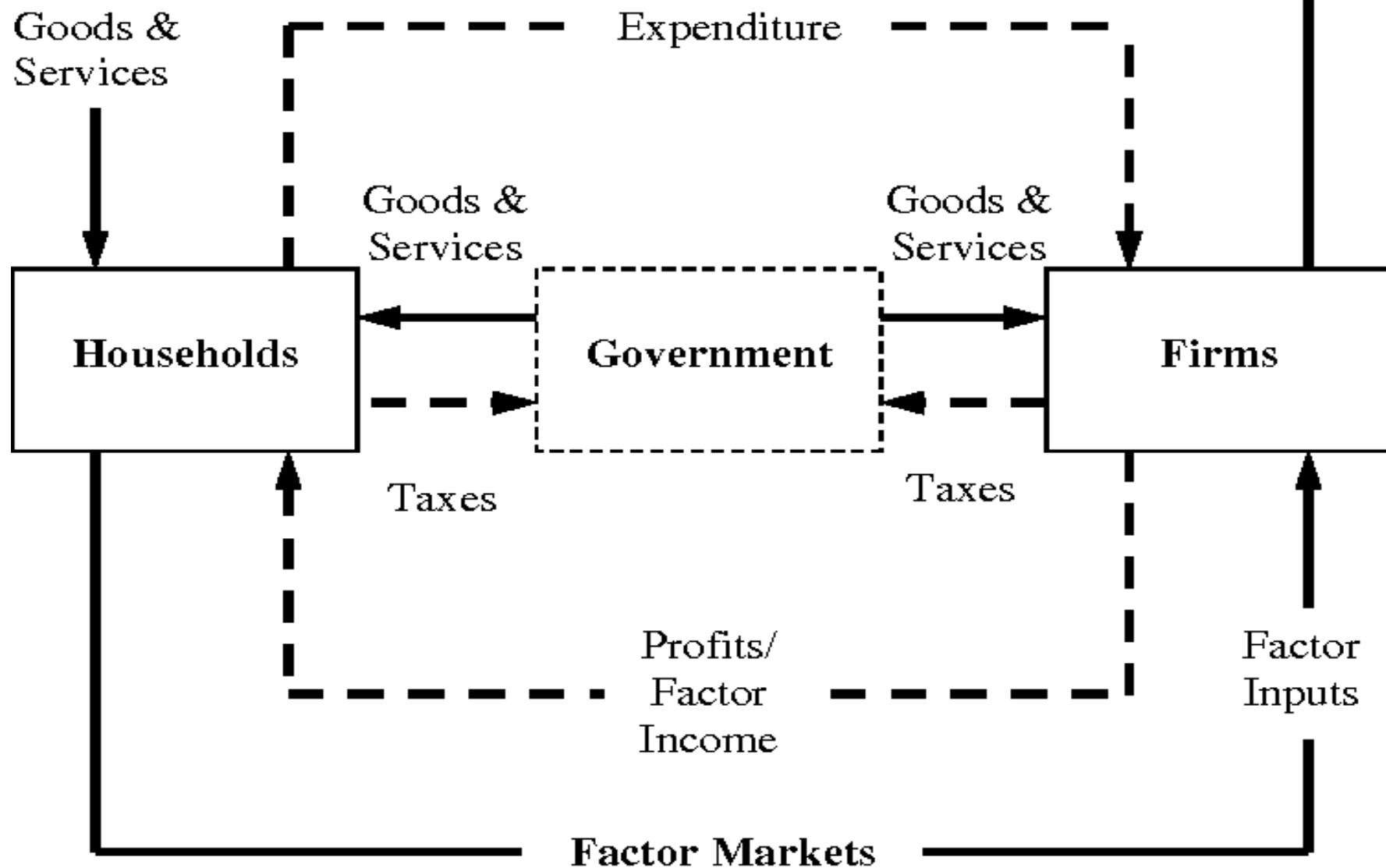
Where the product market is shown in the upper portion and the factor market in the lower portion. In the product market, consumers (Household) purchase goods and services from producers (Firms) while in the factor market, consumers receive income from the former for providing Factor services.

The producers, in turn, make payments to consumers for the services rendered i.e. wage payments for labour services, interest for capital supplied, etc. thus payments go around in a circular manner from producers to consumers and from consumers to producers, as shown by arrows in the inner portion of the figure.

There are also flows of goods and services in the opposite direction to the money payments flows. Goods flow from the business sector to the household sector in the product market, and services flow from the household sector to the business sector in the factor market, as shown in the outer portion of the figure.

These two flows are linked by product prices and factor prices. The economy is in general equilibrium when a set of prices is allowed at which the magnitude of income flow from producers to consumers is equal to the magnitude of the money expenditure from consumers to producers.

Product Markets



Market Equilibrium; Total (TC and TR) Approach

<https://www.toppr.com/guides/business-economics-cs/analysis-of-market/equilibrium-of-the-firm/>

- *A firm is in equilibrium when it has no desire to change (increase or decrease) its output levels. At the equilibrium point, the firm earns maximum profits, i.e*

$$\text{Profit } (\pi) = \text{Total Revenue} - \text{Total Cost} = \text{TR} - \text{TC}$$

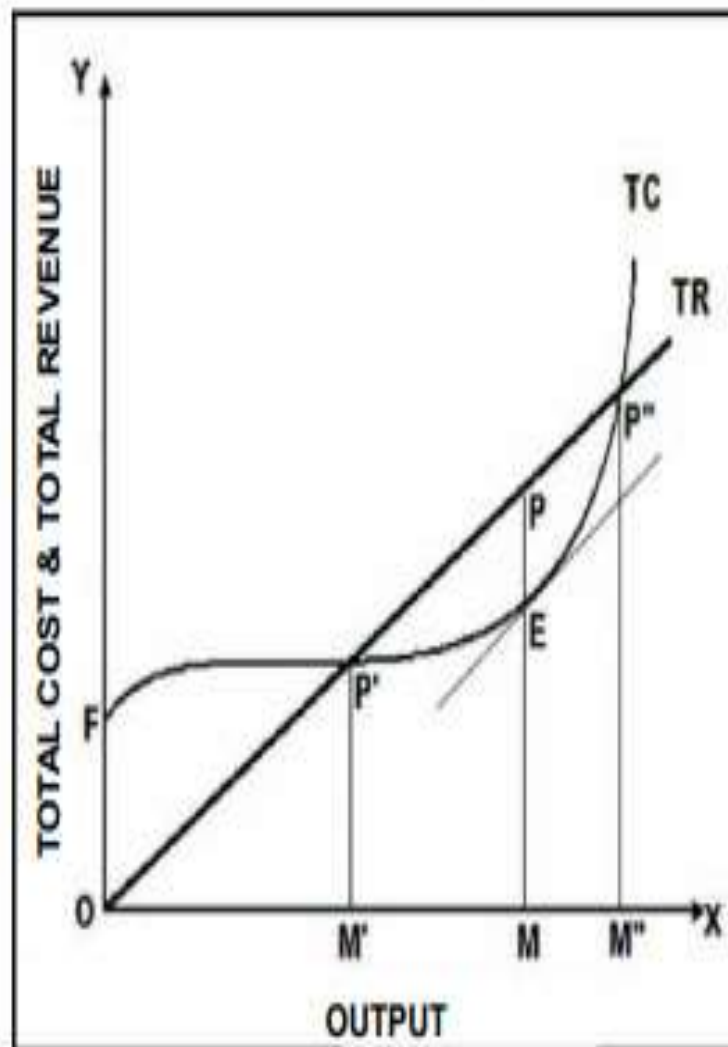
- According to this approach, the producer's equilibrium has two conditions:

1st Condition: *The difference between TR and TC is maximum*

2nd Condition: *The marginal cost becomes higher than the marginal revenue if one more unit is produced.* In other words, even if one more unit of output is produced, then the profit falls.

- **TC is the Total Cost Curve and TR is the Total Revenue Curve.** Also, P is the equilibrium point where the distance between TR and TC is maximum.
- Further, you can see that before the point P' and after the point P'', $\text{TC} > \text{TR}$.
- Therefore, the producer must produce between P'P'' or M'M''.

Equilibrium of a Firm using TR and TC Curve



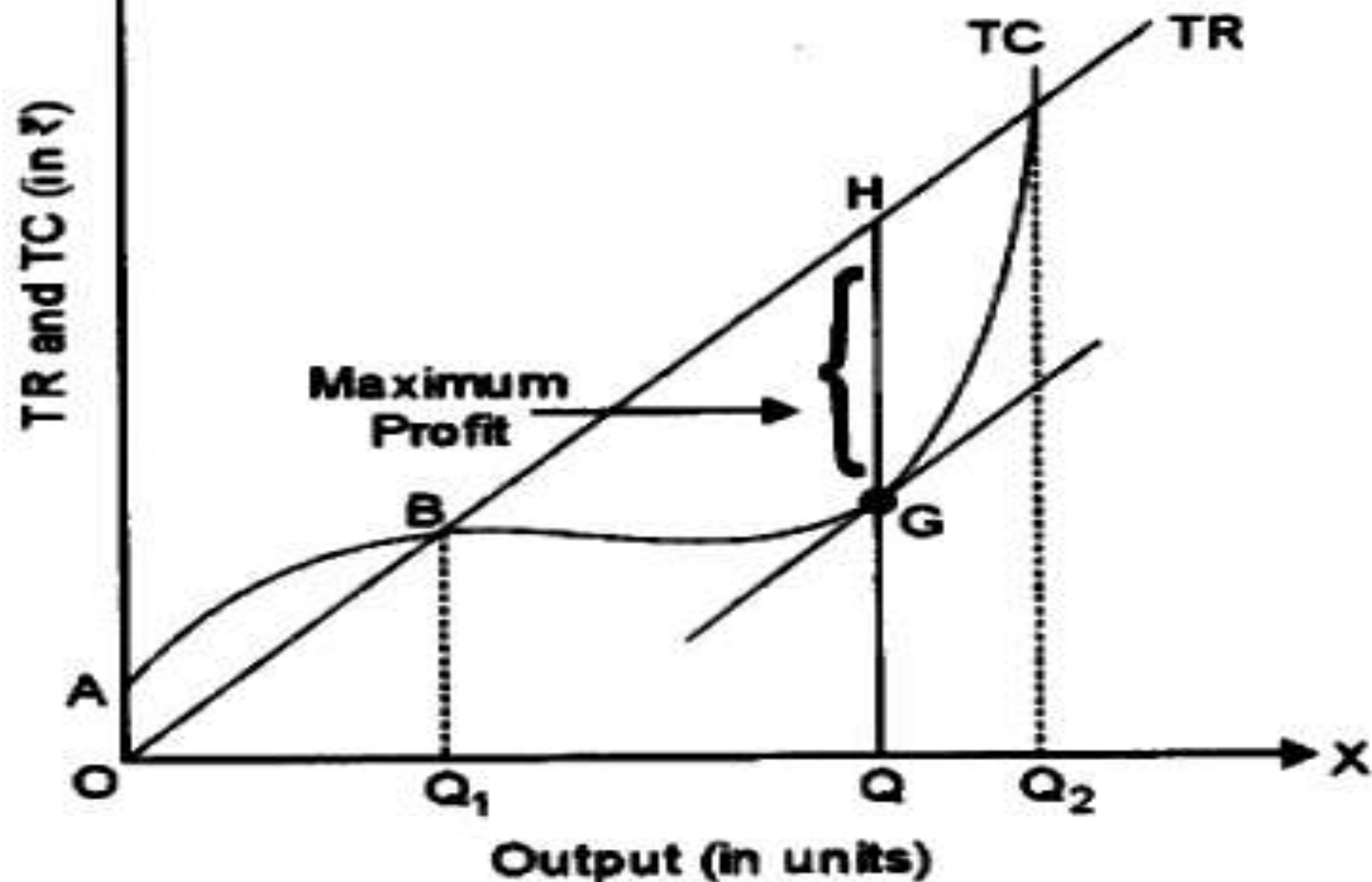
In the figure above, the X-axis shows the levels of output and Y-axis shows total costs and total revenues.

TC is the Total Cost Curve and TR is the Total Revenue Curve. Also, P is the equilibrium point where the distance between TR and TC is maximum.

Further, you can see that before the point P' and after the point P'', $TC > TR$. Therefore, the producer must produce between P'P'' or M'M''.

At the point P, a tangent drawn to TC is parallel to TR. In other words, at point P, the slope of TC is equal to the slope of TR. This equality is not achieved at any other point.

**Producer's Equilibrium (TR-TC)
(When Price remains Constant)**



Market Equilibrium; Marginal (MC and MR)

Approach

- The MR-MC approach is derived from the TR-TC approach. The two conditions of equilibrium under the MR-MC approach are:

1st Condition: $MR = MC$

2nd Condition: MC cuts the MR curve from below.

- 1) $MR = MC$:** If one additional unit of the output is produced, then MR is the gain and MC is the cost to the producer. As long as MR is greater than MC , it is profitable to produce more. Therefore, the firm has not achieved an equilibrium level of output where the profit is maximum. This is because the firm can increase its profits by producing more.
- On the other hand, if MR is less than MC , then the benefit is less than cost. Therefore, the producer is not in equilibrium either. He can reduce the production to add to his profits. *When $MC = MR$, the benefit is equal to cost, the producer is in equilibrium provided that MC becomes greater than MR beyond this level of output.*
- Therefore, for producer's equilibrium $MC = MR$ is a necessary condition but not sufficient.

2) MC cuts the MR curve from below

- Understand [Equilibrium in Monopoly](#) here in detail.
- While $MC = MR$ is necessary for equilibrium but it is not sufficient. *This is because the producer might face more than one $MC = MR$ outputs. Out of these, only that output beyond which MC becomes greater than MR is the equilibrium output.*
- This is because if MC is greater than MR , then producing beyond $MR = MC$ will reduce the profits. Also, when it is no longer possible to add profits, the maximum profit level is reached.
- On the other hand, if MC is less than MR beyond the $MC = MR$ output, then the producer can add profits by producing more. Therefore, for the producer's equilibrium, it is important that $MC = MR$. Also, MC should be greater than MR if more output is produced.

Firm's Equilibrium when price (AR) is constant:

<https://www.economicdiscussion.net/producers-equilibrium/producers-equilibrium-mr-mc-approach-perfect-competition-and-diagrams/31080>

Let us understand the significance/rationale of these conditions with reference to Table 1.

Table 1. MR, MC and Producer's Equilibrium

Q (Units of Output)	MR (₹)	MC (₹)
1	12	15
2	12	12
3	12	10
4	12	9
5	12	8
6	12	7
7	12	8
8	12	9
9	12	10
10	12	12
11	12	15

In Table 1, $MR = MC$ in two situations – (i) when 2 units of output are produced, and (ii) when 10 units of output are produced. However, while in situation 1 (when output = 2 units) MC is falling, in situation 2 (when output = 10 units) MC is rising. A producer will strike his equilibrium only when MC is rising.

Implying that the equilibrium will be struck when 10 units of output are produced, not when 2 units of output are produced.

Reason is simple. Given the price, falling MC only increases the difference between TR and TVC (recall, $\Sigma MC = TVC$, and $\Sigma MR = TR$). So that $TR - TVC$ tends to rise, or that profits tend to rise in a situation of falling MC.

Accordingly, it would be an irrational decision for a producer to strike his equilibrium in a situation of falling MC. It is only when MC is rising that a producer would strike his equilibrium. Thus, equilibrium will be struck when $MR = MC = 12$, and MC is rising.

The producer will maximize profits when 10 units of output are produced. Let us illustrate this point further with reference to Table 1.

Table 1 offers us two different situations when $MR = MC$, as under:

Situation 1: When output = 2 (and $MR = MC$, and MC is falling)

$$\begin{aligned} TR &= \Sigma MR \\ &= 12 + 12 = 24 \end{aligned}$$

$$\begin{aligned} TVC &= \Sigma MC \\ &= 15 + 12 = 27 \end{aligned}$$

$$\begin{aligned} \pi &= TR - TVC \quad (\text{Here, } \pi \text{ refers to gross profit.}) \\ &= 24 - 27 = -3 \end{aligned}$$

Situation 2: When output = 10 (and $MR = MC$, and MC is rising)

$$\begin{aligned} TR &= \Sigma MR \\ &= 12 + 12 + 12 + 12 + 12 + 12 + 12 + 12 + 12 + 12 \\ &= 120 \end{aligned}$$

$$\begin{aligned} TVC &= \Sigma MC \\ &= 15 + 12 + 10 + 9 + 8 + 7 + 8 + 9 + 10 + 12 \\ &= 100 \end{aligned}$$

$$\begin{aligned} \pi &= TR - TVC \quad (\text{Here, } \pi \text{ refers to gross profit.}) \\ &= 120 - 100 \\ &= 20 \end{aligned}$$

We find that the difference between TR and TVC tends to rise, as output is increased from 2 to 10.

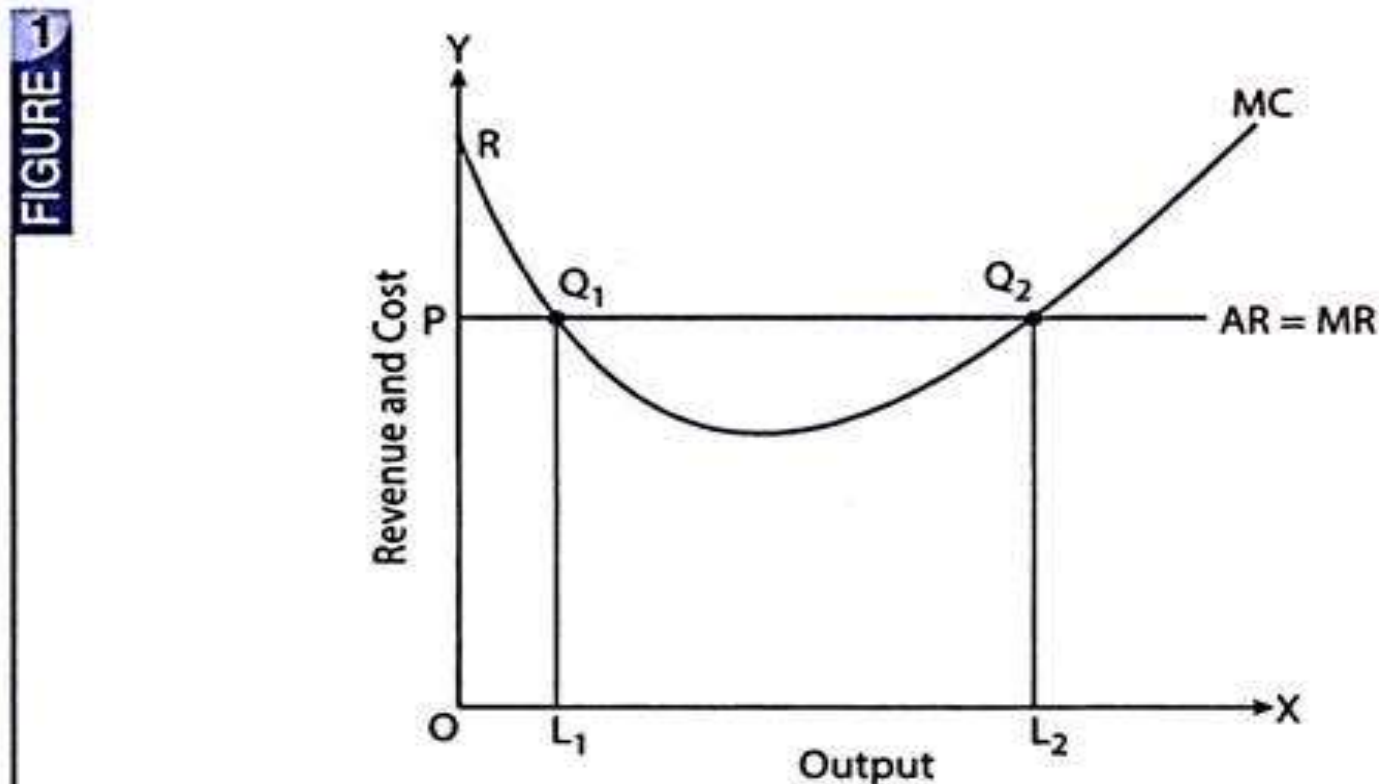
In fact, it is only when output = 10 units that the profit (π) is maximum. If output is increased beyond 10 units, π will reduce.

Thus, if 11 units of output are produced, $\Sigma MR = 132$, while $\Sigma MC = 115$, so that $\pi = TR - TVC = 132 - 115 = 17$ (which is less than 20 when output = 10).

It is only when $MR = MC$, and when MC is rising that a producer will reach the point of equilibrium, where profit is maximized.

Diagrammatic Illustration:

- Fig. 1 illustrates producer's equilibrium in terms of MR and MC approach:



Note: Fig. 1 is drawn on the assumption that AR is constant for a firm and is equal to OP . It is as in a situation of perfect competition. Constant AR implies constant MR. Accordingly, $AR = MR$, and both are indicated by a horizontal straight line, parallel to X-axis.

In Fig. 1, AR is assumed to be constant as under perfect competition. Constant AR implies constant MR. Thus, both AR and MR are indicated by a horizontal straight line parallel to X-axis. MC curve is shown to be U-shaped, as usual.

MR is equal to MC in two situations – (i) at point Q_1 when output = OL_1 , and (ii) at point Q_2 when output = OL_2 .

In situation 1, MC is falling but in situation 2, MC is rising. Equilibrium of the producer will be struck at point Q_2 when – (i) $MR = MC$, and (ii) MC is rising.

It is at point Q_2 that the profit ($= TR - TVC$) is maximized, not at point Q_1 .

In fact, Q_2 is a situation of profit while Q_1 is a situation of loss. This is how we can prove it.

We know,

TR = Area under MR corresponding to a given level of output.

This is equal to OL_1Q_1P in situation 1.

Likewise, TVC = Area under MC corresponding to a given level of output.

This is equal to OL_1Q_1R in situation 1.

Evidently, $\text{area } OL_1Q_1R > \text{area } OL_1Q_1P$.

It is situation of loss to the firm. In such a situation, it would not be wise for the producer to undertake production of the commodity.

Corresponding to situation 2, when MC is rising, at point Q_2 , we find that:

$$TR = OL_2Q_2P, \text{ and}$$

$$TVC = OL_2Q_2R$$

Evidently, $TR > TVC$

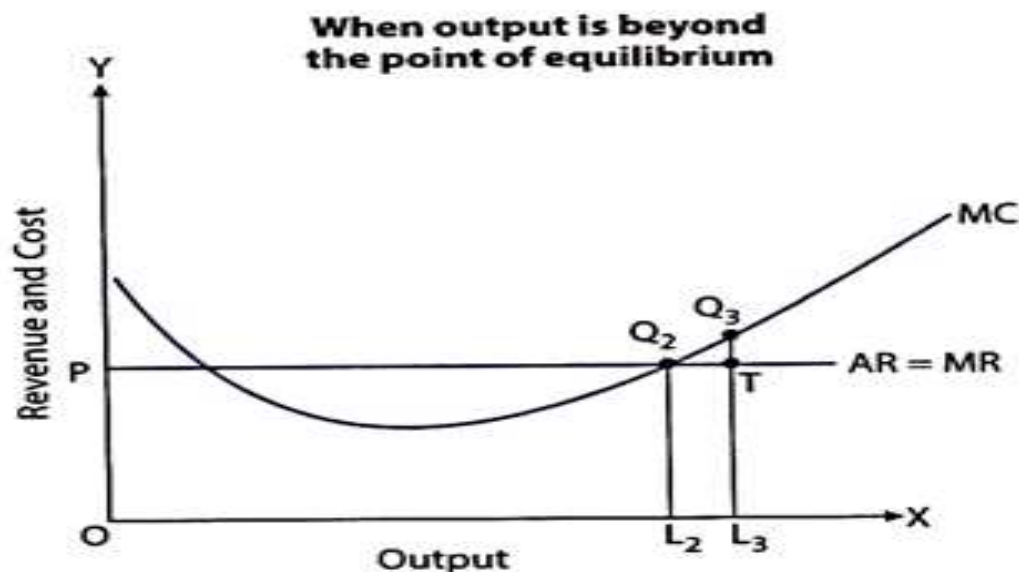
This indicates the existence of profit. Accordingly, the producer will strike his equilibrium only in situation 2 when (i) $MR = MC$, and (ii) MC is rising.

With reference to Fig. 1, producer's equilibrium is struck at point Q_2 when output = OL_2 . It is here only that the two conditions of equilibrium are satisfied – (i) $MR = MC$, and (ii) MC is rising.

What happens when a unit more or a unit less is produced than OL_2 units of output?

Answer is that in both the situations π will be less compared to the situation when OL_2 units of output are produced. Figs. 2 and 3 illustrate this situation.

In case OL_3 units of output are produced (as in Fig. 2):



Area $L_2L_3TQ_2$ (additional revenue)
 $<$ Area $L_2L_3Q_3Q_2$ (additional cost)

Addition to TR = Area $L_2L_3TQ_2$

Addition to TVC = Area $L_2L_3Q_3Q_2$

Addition to TVC is greater than addition to TR. Additional TVC exceeds additional TR by the area Q_2TQ_3 . So that $TR - TVC$ will tend to shrink.

In case OL_1 units of output are produced (as in Fig. 3):

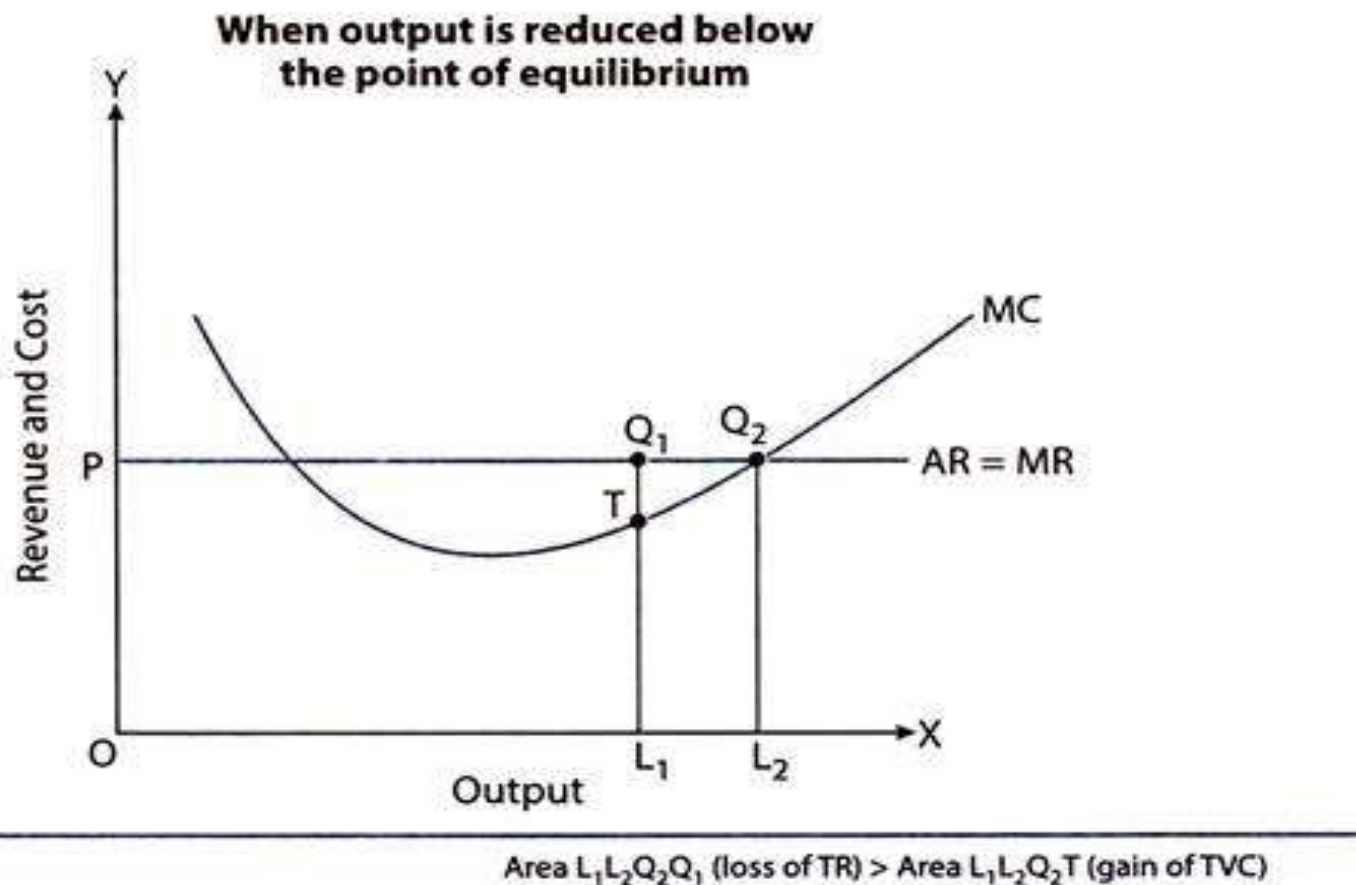
TR reduces by the area $L_1L_2Q_2Q_1$

TVC reduces by the area $L_1L_2Q_2T$

Thus, reduction in TVC is less than the reduction in TR. Or, the loss of TR is greater than the gain of TVC.

Accordingly, $TR - TVC$ will tend to shrink.

FIGURE 3



Thus, any departure from the state of equilibrium (when $MR = MC$, and MC is rising) would only mean that the difference between TR and TVC will tend to shrink, or that the profits will not be maximised.

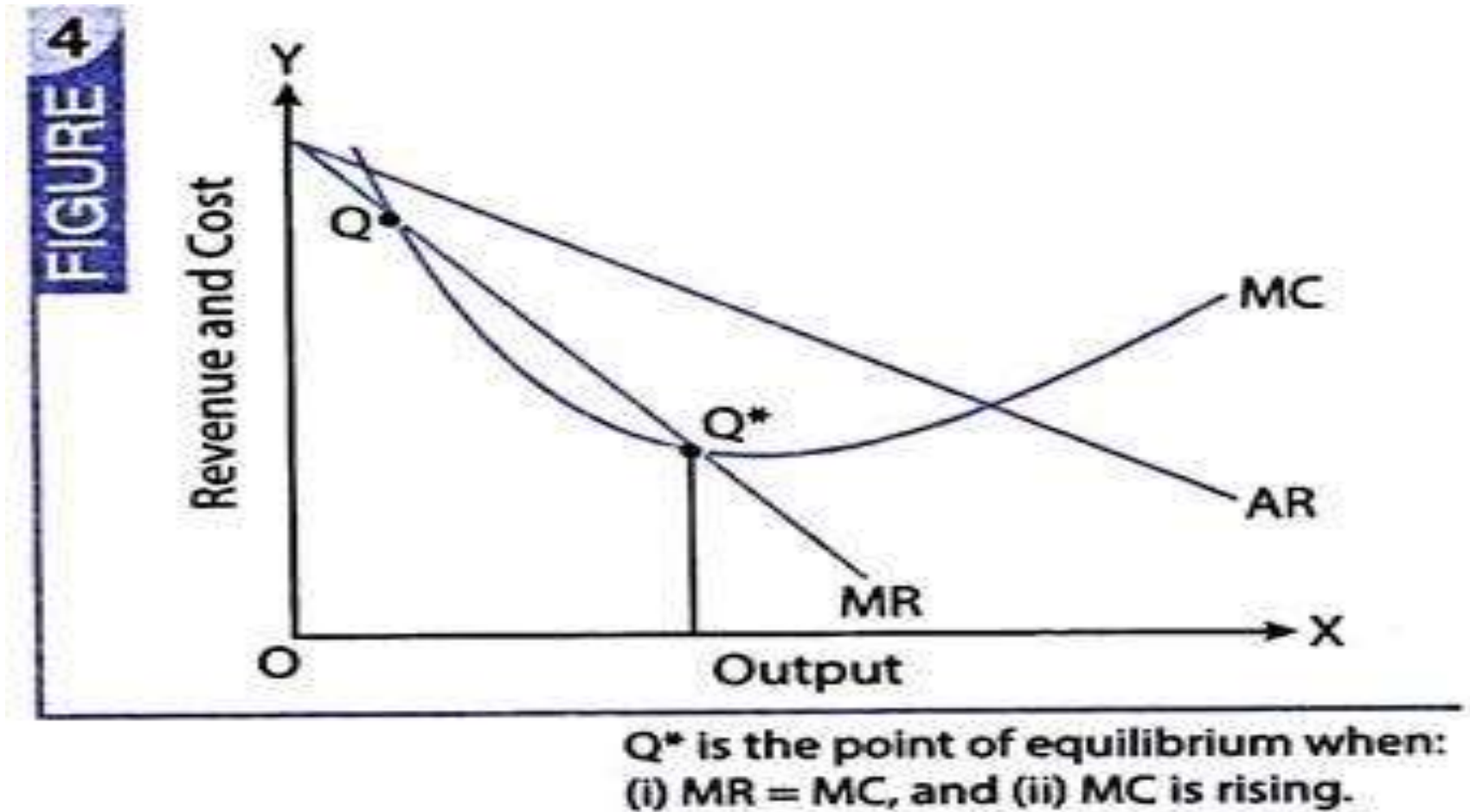
Do All Firms always Maximise their Profit?

- ‘No’ is the answer. Profit maximisation is only a goal. A firm may or may not achieve it. After all there are firms which close down, owing to losses. However, a notable point in this context is that a firm may suffer losses, and yet continue to stay in the market; it does not suspend its production activity. Yes, this happens in the short period.
- Because in the short period, a firm is confronted with 2 sets of costs – (i) fixed cost, and (ii) variable cost. Fixed cost is incurred even when output is zero. A firm has to bear the loss of fixed cost even when production is stopped. Accordingly, a firm may decide to continue production so long as variable costs are covered. Thus, production may continue as long as $TR \geq TVC$, even when a producer is in losses (as he is not covering his fixed costs).
- Of course, in the long period, when all costs are variable costs, a firm will undertake production only when all costs are covered. Otherwise, it will quit the industry.

Firm's Equilibrium when price (AR) is not constant:

- When price is not constant, a firm can generally sell more of a commodity by lowering its price. Implying that AR curve slopes downward. In such a situation, MR curve also slopes downward and at a rate faster than AR.
- **Even, in such situations, equilibrium of a firm is struck when two conditions are satisfied:**
- (i) $MR = MC$, and (ii) MC is rising.
- **This is illustrated through Fig. 4:**

Fig. 4:



Both at points Q and Q* $MR = MC$. But at point Q, MC is falling. It is only at point Q* that (i) $MR = MC$, and (ii) MC is rising. Accordingly, a firm will strike its equilibrium only at point Q*.

Solved Question on Equilibrium of the Firm

Q1. What are the two approaches to the producer's equilibrium?

- Answer: The two approaches to the producer's equilibrium are:
- Total Revenue – Total Cost (TR-TC) Approach – which has two conditions:
 - The difference between TR and TC is maximum
 - Even if one more unit of output is produced, then the profit falls. In other words, the marginal cost becomes higher than the marginal revenue if one more unit is produced.
- Marginal Revenue – Marginal Cost (MR-MC) Approach – which has two conditions:
 - $MR = MC$
 - MC cuts the MR curve from below

Thank You
All

Dr. Suvendu Barik