

CHANGES IN MARKET EQUILIBRIUM

Changes in either demand or supply cause changes in market equilibrium. Several forces bringing about changes in demand and supply are constantly working which cause changes in market equilibrium, that is, equilibrium prices and quantities. We have explained above the factors or forces which cause shift in demand and supply curves. The demand may increase or decrease, the supply curve remaining unchanged. This would cause a change in equilibrium price and quantity. Similarly, the increase or decrease in supply, the demand curve remaining constant, would have an impact on equilibrium price and quantity. Both supply and demand for goods may change simultaneously causing a change in market equilibrium. Supply-demand analysis is an important tool of economics with which we can make forecasts about how prices and quantities will change in response to changes in demand and supply. We explain below the impact of changes in demand and supply on equilibrium price and quantity.

Impact of Increase in Demand on Market Equilibrium

Increase in demand affect prices and quantities. Suppose there is increase in income of the working class due to the enhancement of their salaries by the pay commission. As a result of this increase in income, their demand for cloth for shirting will increase causing a shift in the entire demand curve for cloth to the right. This will raise the equilibrium price and quantity of cloth, the supply curve of cloth remaining unchanged as is shown in Fig. 21.3. It is important to understand the chain of causation which leads to the increase in price and quantity as a result of increase in demand. Consider Fig. 21.3, in which D_0D_0 and SS are the initial demand and supply curves of cloth. The increase in income causes a shift in the entire demand curve to the right to the new position D_1D_1 while the supply curve remains constant. It will be observed from Fig. 21.3 that with the shift in demand curve to D_1D_1 at the old price OP_0 excess demand (or shortage) of cloth equal to E_0A has emerged. This excess demand or shortage of the good exerts upward pressure on price. This will result in rise in price to OP_1 where again quantity demanded equals quantity supplied and new market equilibrium is attained and shortage of demand is eliminated. It is worth noting that increase in demand is the most important factor causing inflation, that is, rise in prices and is generally described as *demand-pull* inflation.

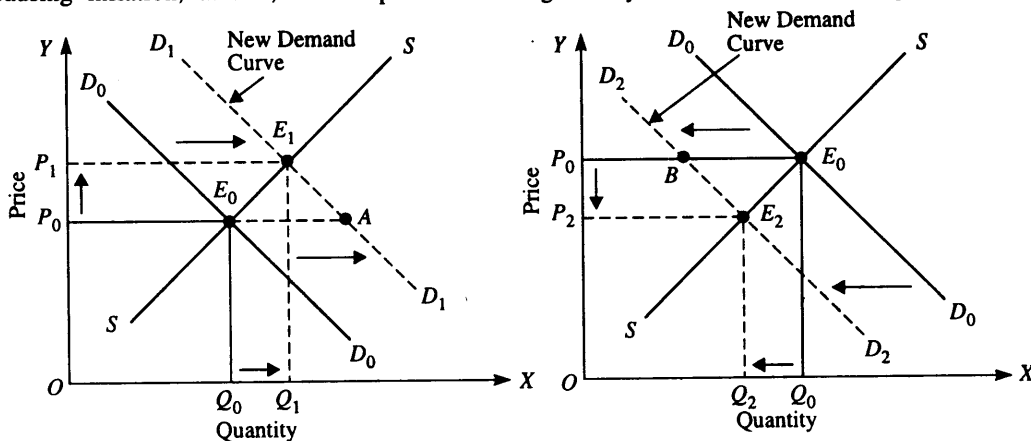


Fig. 21.3. Impact of Increase in Demand on Price and Quantity ($P\uparrow$, $Q\uparrow$)

Fig. 21.4. Impact of Decrease in Demand on Price and Quantity ($P\downarrow$, $Q\downarrow$)

Though the term inflation is used in the context of a *rise in general price level*, but it has roots at the micro level (*i.e.*, in case of individual goods). Apart from increase in income, a favourable change in consumer's preferences for a good, rise in price of its substitutes will also cause an increase in demand for a good.

Impact of Decrease in Demand on Market Equilibrium

Now, take the opposite case of the impact of decrease in demand on market equilibrium,

the supply curve remaining the same. As explained earlier, the decrease in demand causes a shift in the entire demand curve to the left. This is graphically shown in Fig. 21.4, where originally demand curve D_0D_0 intersects the supply curve SS of eggs at point E_0 and determines equilibrium price equal to OP_0 and equilibrium quantity OQ_0 . Now, suppose that doctors advise the people to take less eggs as it contains greater quantity of cholesterol which increases the risk of heart disease. Consequently, demand for eggs decreases causing a shift in the demand curve to the left to the new position D_2D_2 . The new equilibrium between demand and supply is attained at price OP_2 and quantity OQ_2 , which are lower than initial equilibrium price OP_0 and quantity OQ_0 . Thus, *the decrease in demand leads to the fall in both price and quantity*. How does this come about? With the decrease in demand and consequently leftward shift in the demand curve to D_2D_2 , supply curve remaining unchanged, at the original price OP_0 , the surplus E_0B of the quantity supplied over the quantity demanded emerges which exerts a downward pressure on price. The sellers which cannot sell the quantity which they want to sell at the original price will make offers to sell eggs at a lower price. As a result, price will fall. As price falls, the quantity supplied of eggs is reduced. At the new price OP_2 , the quantity supplied again equals quantity demanded and surplus is eliminated.

Apart from the changes in preferences for a good, as in case of eggs considered above, the decrease in incomes of the people such as when a large number of people are rendered unemployed during depression, the reduction of crop production in agriculture due to failure of monsoon leading to the drop in incomes of the Indian farmers can also cause a decrease in demand for goods resulting in lowering of prices and quantities of goods.

Impact of Changes in Supply on Market Equilibrium

Now, we explain the impact of changes in supply on price and output of commodity, the demand for the commodity remaining the same. Let us first examine the case of increase in supply. Suppose in a year there are good monsoon in India yielding bumper crop of wheat. This will increase the supply of wheat in the market causing a shift in its supply curve to the right. The impact of increase in supply of wheat on equilibrium price and quantity is graphically depicted in Fig. 21.5. Originally, demand curve DD and supply curve SS of wheat intersect at point E and determine equilibrium price equal to OP and equilibrium quantity OQ exchanged between the sellers and buyers. Now, due to good monsoon resulting in bumper crop of wheat causes the supply curve of wheat to shift to the right from SS to the new position S_1S_1 . The new supply curve S_1S_1 intersects the given demand curve DD at point E_1 at which the new

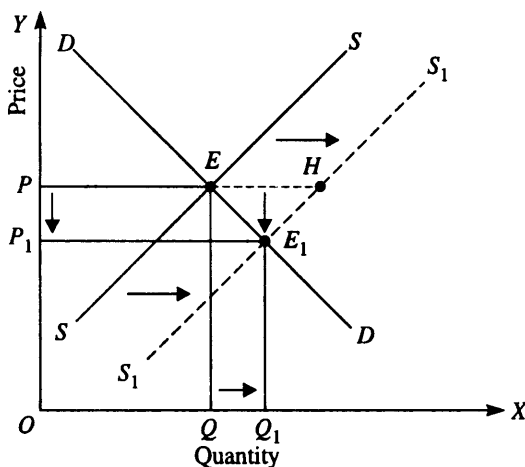


Fig. 21.5. Increase in supply results in lowering of price and increase in quantity.

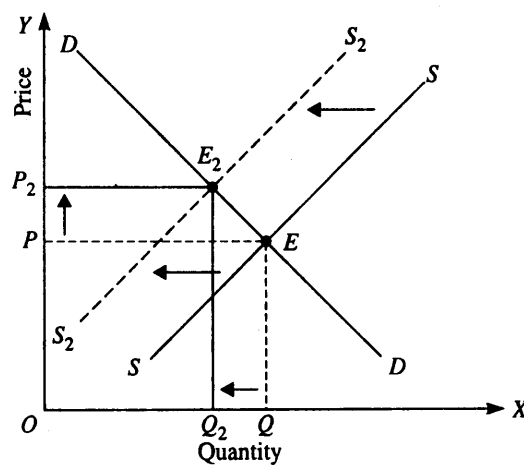


Fig. 21.6. Decrease in supply causes rise in price and fall in quantity.

lower equilibrium price OP_1 and larger quantity OQ_1 are determined. Thus, the increase in supply leads to the fall in price and increase in equilibrium quantity.

Improvements in technology, reduction in the prices of factors and resources used in the production of a commodity or lowering of excise duty on a commodity also leads to the increase in supply of the commodity. For example, in recent years improvements in technology in the manufacture of personal computers have served to increase the supply of personal computers causing their supply curve to shift to the right. This has resulted in lowering the prices of personal computers. A personal computer which was available at price above Rs. 60,000 a few years ago are now available at about Rs. 30,000. Similarly, in the Central Budget for 1993-94, the Finance Minister Dr. Manmohan Singh reduced excise duties on several commodities with the hope that this would pass on to the consumers and result in shifting their supply curve to the right and thereby causing the drop in their prices. At lower prices, he argued, more of these commodities would be demanded and therefore it would help the industries which were facing demand recession.

Impact of Decrease in Supply on Market Equilibrium

Let us now examine the effect of decrease in supply on the equilibrium price and quantity. It should be recalled that decrease in supply can occur when there is (1) increase in prices of factors and raw materials used in the production of a commodity, (2) the imposition of increase in the rate of excise duty or sales tax on the commodity. For instance, in 1973 and 1979 there was hike in petroleum prices by oil producing countries. This pushed up the price of fuel oil used in several industries which led to the decrease in supply causing a leftward shift in the supply curve. The effect of decrease in supply due to the hike in price of petroleum is graphically shown in Fig. 21.6 where prior to the rise in price of fuel oil, the demand for and supply of fuel oil are given by DD and SS curves. With the rise in price of fuel oil, each quantity of the fuel oil will be supplied at a higher price which will result in leftward shift in the supply curve to the new position S_2S_2 . The new supply curve S_2S_2 intersects the given demand curve DD at E_2 and accordingly determines new price OP_2 which is higher than the old price OP and the new equilibrium quantity has fallen from OQ to OQ_2 . Thus, oil price shocks in 1973 and 1979 resulted in prices of several commodities in which it was used as an energy input. Further, hike in oil price also raised the transportation costs of industries which also contributed to the decrease in supply and rise in prices of commodities.

The imposition of excise duty or sales tax on commodities or increase in their rates raises the supply price of the commodities causing the supply curve of a commodity to shift to the left and result in rise in equilibrium price and decrease in equilibrium quantity.

DEMAND SUPPLY MODEL OF PRICING : MATHEMATICAL ANALYSIS

It is quite often more useful and illuminating to study economic problems through mathematical equations. Demand-supply model of pricing can be presented in mathematical equations and solved for equilibrium price and quantity. In this model it is assumed that both demand and supply functions are of linear type. Further, in this demand-supply model of pricing it is assumed that perfect competition prevails in the market for the product. This implies that there are a large number of sellers and buyers of a homogeneous product so that no single seller or buyer has any influence over the price of the product. This demand-supply model consists of the following three equations:

$$Q^d = a - bP \quad \dots (i)$$

$$Q^s = c + dP \quad \dots (ii)$$

$$Q^d = Q^s \quad \dots (iii)$$

Where,

Q^d stands for quantity demanded

Q^s stands for quantity supplied

P stands for price of a commodity

a, b, c and d are constants

The above set of three equations constitutes a model. Here, in this model, the variables considered are price, quantity demanded, quantity supplied. The objective is to obtain the price and quantities demanded and sold when the system attains the equilibrium position. To find the equilibrium values of these variables, the above three equations are required to be solved simultaneously. The equation (i) describes that the quantity demanded is a decreasing function of price, that is, as price falls quantity demanded increases and *vice versa*. Equation (ii) describes that quantity supplied is increasing function of price, that is, as price rises quantity supplied increases and *vice versa*. Equation (iii) describes the equilibrium condition meaning thereby that the price that equates quantity demanded and quantity supplied will clear the market. Equilibrium price implies that both the buyers and sellers are satisfied with their purchases and sales and hence there is no tendency on their part to raise or lower the price. It is in this way that Marshall explained the determination of price of a commodity.

Equations of the model can be solved mathematically to obtain the equilibrium values of the variables. The equations of the model can also be represented by graphs to determine geometrically the equilibrium values of the variables.

Numerical Example

Let us illustrate this famous demand-supply micro-model of price determination of a commodity in a free market by taking specific demand and supply functions. Suppose the following demand and supply functions of a commodity are given :

$$Q^d = 100 - 20P$$

$$Q^s = -5 + 15P$$

Where Q^d stands for quantity demanded, Q^s for quantity supplied of a commodity and P for the price of the commodity.

Since for the equilibrium price the quantity demanded is equal to the quantity supplied, we put the two demand and supply equations equal to each other. Thus, we have

$$Q^d = Q^s$$

$$100 - 20P = -5 + 15P$$

$$15P + 20P = 100 + 5$$

$$35P = 105$$

$$P = \frac{105}{35} = 3$$

Thus we get Rs. 3 as price per unit of the commodity. Putting the value of P in either the demand or supply equation we can obtain the equilibrium quantities Q^d and Q^s . Thus

$$Q^d = 100 - 20 \times 3 = 40$$

$$\text{Or, } Q^s = -5 + 15 \times 3 = 40$$

Thus equilibrium price of the commodity equals Rs. 3 and the equilibrium quantity sold and purchased equals 40 units in a period.

IMPORTANCE OF TIME ELEMENT IN PRICE DETERMINATION

Marshall, who propounded the theory that price is determined by both demand and supply, also gave a great importance to the time element in the determination of price. Time element is of great relevance in the theory of value, since one of the two determinants of price, namely supply, depends on the time allowed to it for adjustment. It is worth mentioning that Marshall

divided time into different periods from the viewpoint of supply and not from the viewpoint of demand. Time is short or long according to the extent to which supply can adjust itself. Marshall felt it necessary to divide time into different periods on the basis of response of supply because it always takes time for the supply to adjust fully to the changed conditions of demand. The reason why supply takes time to adjust itself to a change in the demand conditions is that nature of technical conditions of production is such as to prevent quick adjustment of supply to changed demand conditions. A period of time is required for changes to be made in the size, scale and organisation of firms as well as of the industry.

Another point is worth noting. When Marshall distinguished short and long periods he was not using clock or calendar time as his criterion, but '*operational*' time in terms of economic forces at work. In this regard, as said above, supply forces were given the major attention and a time was short or long according to the extent of adjustment in the forces of supply. The greater the adjustability of the supply forces, the greater the length of the time irrespective of the length in clock-time.

Marshall divided time into following three periods on the basis of response of supply to a given and permanent change in demand.

(1) **Market Period.** The market period is a very short period in which the supply is fixed, that is, no adjustment can take place in supply conditions. In other words, supply in the market period is limited by the existing stock of the good. The maximum that can be supplied in the market period is the stock of the good which has already been produced. In this period more good cannot be produced in response to an increase in demand. This market period may be a day or a few days or even a few weeks depending upon the nature of the good, for instance, in case of perishable goods, like fish, the market period may be a day and for a cotton cloth, it may be a few weeks.

(2) **Short Run.** Short run is a period in which supply can be adjusted to a limited extent. During the short period the firms can expand output with given equipment by changing the amounts of variable factors employed. Short period is not long enough to allow the firm to change the plant or given capital equipment. The plant or a capital equipment remain fixed or unaltered in the short run. Output can be expanded by making intensive use of the given plant or capital equipment by varying the amounts of variable factors.

(3) **Long Run.** The long run is a period long enough to permit the firms to build new plants or abandon old ones. Further, in the long-run, new firms can enter the industry and old ones can leave it. Since in the long run all factors are subject to variation, none is a fixed factor. During the long period forces of supply fully adjust themselves to a given change in demand; the size of individual firms as well as the size of the whole industry expands or contracts according to the requirements of demand.

From above, it is clear that because of the varying response of supply over a period of time to a sudden and once-for-all increase in demand Marshall found, it necessary and useful to study the pricing process in (a) the market period, (b) the short-run and (c) the long-run depending respectively upon whether the supply conditions have time to make (i) *no adjustment*, (ii) *some adjustment of labour and other variable factors*, and (iii) *full adjustment of all factors and all costs*. Therefore, Marshall explained how the equilibrium between demand and supply was established in three time periods and determines market price, short-run price and long-run price.

We thus that the price that will prevail depends upon the period under consideration. If a sudden and a once-and-for all increase in demand takes place, the market price will register a sharp increase, since supply cannot increase in the market period. In this market period, firms can sell only the output that has already been produced. However, in the short run some limited adjustment in supply will take place as a result of the firms moving along their short run marginal cost curves by expanding output with the increase in the amount of variable factors. Consequently, the short run price will come down from the new high level of the market price.

But this short-run price will stand above the level of original market price which prevailed before the increase in demand occurred. In the long run the firms would expand by building new plants, that is, by increasing the size of their capital equipment. In other words, firms would expand along the long-run marginal cost curves. Besides, new firms will enter the industry in the long run and will add to the supply of output. As a result, long-run price will be lower than the short run price. But this long-run price will be higher than the original price which ruled before the increase in demand took place, if the industry happens to be an increasing-cost industry.

The adjustment of supply over a period of time and consequent changes in price is illustrated in Fig. 21.8 where long-run supply curve *LRS* of an increasing-cost industry along with the market-period supply curve *MPS* and the short-run supply curve *SRS* have been drawn. Originally, demand curve *DD* and market-period supply curve *MPS* intersect at point *E* and price *OP* is determined. Now suppose that there is a once-for-all increase in demand from *DD* to *D'D'*. Now, supply cannot increase in the market period and remains the same at *OM*. Market-period supply curve *MPS* intersects the new demand curve *D'D'* at point *Q*. Thus, the market price sharply rises to *OP'*. Short-run supply curve *SRS* intersects the new demand curve *D'D'* at point *R*. The short-run price will therefore be *OP''* which is lower than the new market price *OP'*. As a result of the long-run adjustment the price will fall to *OP'''* at which the long-run supply curve *LRS* intersects the demand curve *D'D'*. The long-run price *OP'''* is lower than the new market price *OP'* and the short-run price *OP''*, but will be higher than the original price *OP* which prevailed before the increase in demand took place. This is so because we are assuming an increasing-cost industry. If the industry is subject to constant costs, the long-run price will be equal to the original price. Further, if the industry is subject to decreasing costs, the long-run price will be lower than the original price.

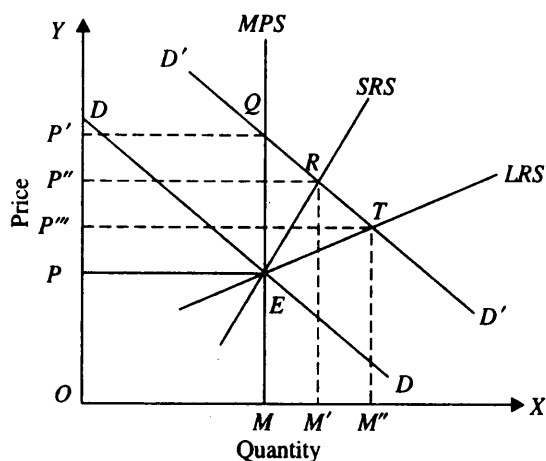


Fig. 21.8. The Role of Time Element in the Determination of Price

It follows from above that the price which prevails in the market depends upon the period under consideration. Thus the time plays an important role in the determination of price. The two forces of supply and demand furnished by the two opposing views were sufficient determining factors. Therefore, Marshall gave equal importance to both demand and supply as determinants of price, though the influence of the two varied in different time periods. Marshall introduced time period analysis into pricing process to bring out the varying influence of each of the two forces over price of the product in different time periods.

We shall explain below in detail the market-period equilibrium, short-run equilibrium, long-run equilibrium between demand and supply and thus the determination of equilibrium market price, equilibrium short-run price and equilibrium long-run price under conditions of perfect competition.

Determination of Market Period Price : Perishable Goods

Market price is the price of a good which prevails at any given time. Market price is determined by the momentary equilibrium between demand and supply at a time. In the market period, as has been already mentioned, the supply of the good is limited by the available stock of the good. But the quantity that may be supplied in the market period may not be equal to the given stock of the good. Whether the whole stock of the good is offered for sale or not

depends upon whether the good in question is perishable or durable. The perishable goods like fish and milk cannot be stored or kept back; they will go waste if stored. Therefore, the whole of the given stock of a perishable good has to be supplied in the market whatever the price of the good. As a result, the market-period supply curve of a perishable commodity is perfectly inelastic, that is, a vertical straight line. On the other hand, the sellers can hold back a durable good and wait for the time when the price of the good rises. Out of a given stock of a durable good, they will be prepared to sell a lesser amount at lower price, and a greater amount at a higher price. At some price, they will be willing to supply the whole stock of a durable good and beyond that price the supply of the good will be completely inelastic. Consequently, the supply curve of a durable commodity slopes upward to a point but becomes a vertical straight line after that.

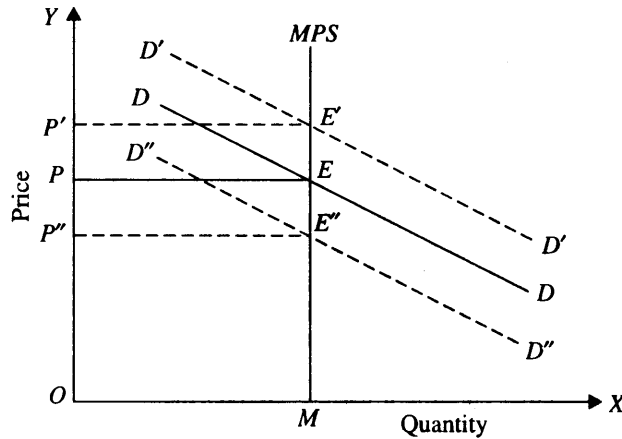


Fig. 21.9. Determination of Market-Period Price of a Perishable Commodity

Market price of a perishable commodity. Fig. 21.9 illustrates the determination of market price of a perishable commodity. OM is the given stock of the good and MPS is the market-period supply curve. Suppose, to begin with, DD is the demand curve of the commodity. Demand and supply are in equilibrium at price OP . Therefore, OP is the equilibrium market price. Now, if the demand increases from DD to $D'D'$, the market price will sharply rise from OP to OP' , the supply of the good remaining fixed at OM . On the contrary, if the demand decreases from DD to $D''D''$, the market price will fall from OP to OP'' , the supply again remaining constant at OM . We thus see that changes in demand produce sharp changes in price in the market period, supply being constant during this period.

It is noteworthy to mention here that in the determination of market price, cost of production incurred in the past on the good does not have any influence on the market price of a good. Cost of production has a relevance in determining price during a period in which output can be varied. Since, in the market period, what has already been produced is to be supplied in the market, costs incurred in producing the good do not have much influence over the market price. However, cost of production exercises a determining influence over the short-run price and long-run price of the good. This is because in the short run and the long-run output can be increased or decreased and what amount of the good will be supplied in the market depends to a great extent upon the cost of producing it.

Since a good under perfect competition is homogeneous, it will have a single uniform price in the market. Moreover, because there are a very large number of firms producing and selling a homogeneous product no one can influence the price by its own individual action. Therefore, once the market price is established an individual firm will take this price as given and constant for it and will adjust its level of output so as to get maximum profits.

Determination of Short-run Price

Short-run price is determined by short-run equilibrium between demand and supply. Supply curve in the short run under perfect competition is a lateral summation of the short-run marginal cost curves of the firm. Also, the short-run supply curve of the industry always slopes upward, since the short-run marginal cost curves of individual firms in their relevant parts slope upward.

Figure 21.10 illustrates the process of the price determination in the short run. In Fig. 21.10 DD represents the demand curve for the product of the industry. MPS is the market-period supply curve, and SRS is the short-run supply curve of the industry. To begin with, OP is both the market price as well as the short-run price since the given demand curve DD intersects both the market-period supply curve MPS and the short-run supply curve SRS at point E .

In order to make the process of determination of short-run price clear, we consider the effect of increase in demand on the short-run price. Suppose that in Fig. 21.10 the demand increases from DD to $D'D'$. In the market period the supply cannot be increased in response to this increase in demand and consequently the market-period supply curve is a vertical straight line.

Therefore, with the increase in demand from DD to $D'D'$ the market period price sharply rises from the level of OP to OH . But, in the short period, the supply of output is expanded by the firms in the industry by increasing the employment of variable factors to the given fixed capital equipment and therefore the short-run supply curve slopes upward to the right. The new demand curve $D'D'$ intersects the short-run supply curve SRS at point G and therefore new short-run price OK is determined, which is lower than the new market price OH . But the new short-run price OK is greater than the original price OP . This is because the marginal cost rises as more is produced by the firms in the short run.

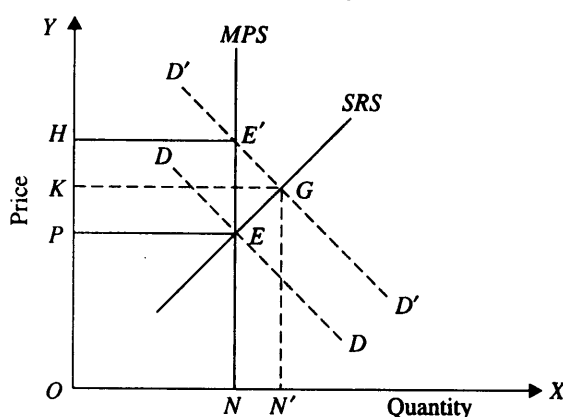


Fig. 21.10. Determination of Short-Run Price

DETERMINATION OF LONG-RUN NORMAL PRICE

Derivation of Long-run Supply Curve

Long-run price is also known as *normal price*. Long-run price or normal price is determined by long-run equilibrium between demand and supply when the supply conditions have fully adjusted themselves to the given demand conditions. Marshall says, "Normal or natural value of a commodity is that which economic forces, would tend to bring about in the long run". Given the demand, a price will tend to prevail in the long run when supply has fully adjusted to the given demand conditions and that price is known as long run price or normal price. It is worth noting that normal price of a good is not the same thing as the average price of the good. Normal price is the price to which actual prices tend to reach in the long run, while the average price is the arithmetical average of all actual prices over a period of time. Moreover, it should be borne in mind that long-run or normal price may never be actually achieved. There will usually be a change in either the demand or supply conditions underlying the long-run equilibrium before it is actually achieved. The long run like tomorrow never comes.

Whereas market price fluctuates from day to day due to temporary changes either in demand or supply, the normal price, on the other hand, remains the same under the given permanent conditions of demand and supply. Normal price is the centre round which the market price fluctuates due to temporary changes in demand or supply. However, it should be noted that normal price is not a permanently fixed level. If there is a permanent change in either demand or supply, the normal price will change.

As stated above, long-run normal price is determined by the long-run equilibrium between demand and supply. This long-run price under perfect competition cannot be above or below the long-run average cost. A firm under perfect competition is in long-run equilibrium at the

output where price is equal to both marginal cost and average cost. If the price is greater than average cost, the firms will earn more than normal profits. Attracted by these supernormal profits new firms will enter the industry in the long run and will add to the supply of the product. As a result of this process, the price will fall to the level of minimum long-run average cost. On the other hand, if price is below the average cost, the firms will be suffering losses and as a result some of the existing firms will quit the industry in the long run. With some of the firms going out of the industry, the output of the product will fall and price will rise to the level of long-run average cost so that the remaining firms make only normal profits.

It follows from above that when price is either above or below the long-run average cost certain forces in the system so operate as to bring the long-run normal price to the level of minimum long-run average cost. But to say that, in the long run, price will be equal to the minimum long-run average cost is not enough since what would be the level of minimum long-run average cost and hence of price depends upon what happens to the cost and therefore supply when industry expands or contracts in response to a given increase or decrease in demand. The long-run average cost shifts upward or downward or remains at the same level when the industry expands depending upon whether the industry in question is increasing-cost industry, decreasing-cost industry or constant-cost industry. We shall explain below what causes the industry to be increasing-cost, decreasing-cost or constant-cost and how long-run normal price is determined in each case. In our analysis *we shall explain how in response to an increase in demand for the product, there is adjustment in the industry and as a result new price is determined in the three types of industries; increasing, constant and decreasing cost industries.* This analysis will also enable us to derive the *long-run supply curve* in these three types of industries. Long-run supply curve shows how the quantity supplied changes in the long run in response to a change in demand and hence in price of the product.

Long-run Normal Price in Increasing-Cost Industry

When an industry expands in response to an increase in demand it experiences some external economies as well as some external diseconomies. Whereas external economies tend to reduce the cost and thereby tend to shift the long-run average cost downward, the external diseconomies tend to raise the costs and thereby shift the long-run average cost curve upward. So we have an increasing-cost industry when external diseconomies outweigh the external economies, that is, when there are net external diseconomies.

The external diseconomies which accrue to an expanding industry are generally the rise in prices of raw materials or factors used for production in the industry. As more firms enter the industry in response to the increase in demand for the product, the prices of scarce factors rise due to the increase in demand for them. In other words, more intensive bidding by the increased number of firms pushes up the prices of scarce raw materials. Wages of specialized labour, rent of land and the prices of scarce raw materials, capital equipment etc. are bound to rise as the demand for them increases as a result of the expansion of the industry. Generally, the same resources are used in different industries. As an industry expands, it has to take away the scarce resources from other industries by offering them higher prices. The rise in prices of the scarce factors raises the costs of production. Furthermore, the additional factors of production coming into the industry are generally less efficient or of inferior quality than the previous ones. This also brings about increase in cost of production as the industry expands. When these external diseconomies outweigh the external economies, the industry experiences rising costs and the average and marginal cost curves of the firms in the industry shift upward.

Figure 21.11 illustrates the determination of long-run normal price in an increasing-cost industry. To begin with, a given demand curve intersects the short-run supply curve at point Q . Therefore, the short-run price OP is determined. If the price OP is equal to minimum long-run average cost of the firms, it means that the size of firms as well as the number of firms have

already been fully adjusted to the given demand conditions as represented by the curve DD . Therefore, price OP is also a long-run normal price corresponding to the demand curve DD .

Now let us see what happens to the long-run normal price when a once-for-all increase in demand from DD to $D'D'$ occurs. In the short-run price will rise to OP' and quantity exchanged to ON' as a result of the given increase in demand. The firms will therefore expand output in response to the increase in demand from DD to $D'D'$ and the rise in short-run price from OP to OP' . The rise in price of the product in the short run, cost remaining the same, will bring supernormal profits to the firms. Lured by these supernormal profits new firms will enter the industry to produce the homogeneous product which will add to the supply of the product. As a result, the short-run supply curve will shift to the right. The new firms will continue entering the industry as long as supernormal profits are made and short-run supply curve will continue shifting rightward until its intersection with the new demand curve $D'D'$ determines a price at which supernormal profits are reduced to zero.

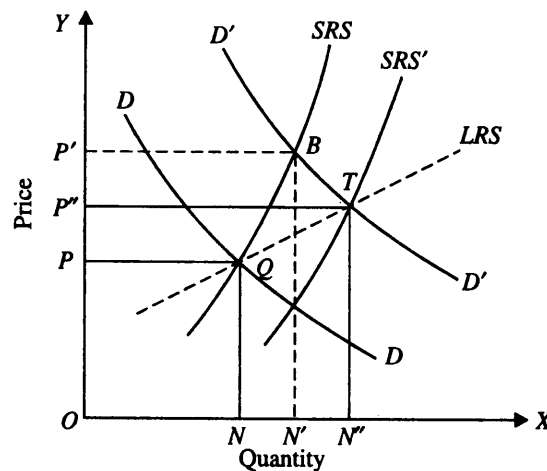


Fig. 21.11. Determination of Long-run Normal Price in Increasing-Cost Industry

It is evident from Fig. 21.11 above that short-run supply curve has shifted to the position SRS' due to the entry of a certain number of firms. It intersects the new demand curve $D'D'$ at point T and determines a price OP'' at which firms will make only normal profits (i.e., supernormal profits are reduced to zero). Price OP'' is assumed to be equal to the minimum average cost of the new long-run average cost curve of the firms. The long-run average cost curve would be shifted upward to a new position due to net external diseconomies which come about with the expansion of the industry. Thus OP'' is a long-run normal price and ON'' is the new long-run quantity supplied corresponding to the demand curve $D'D'$. Long-run price OP'' is higher than the original long-run price OP and also the quantity supplied ON'' at price OP'' is greater than the quantity supplied at price OP . If points Q and T are joined together we get the long-run supply curve LRS . The long-run supply curve LRS slopes upward to the right in the present case because the industry is subject to increasing costs.

It follows from above that the long-run price of a product rises as demand increases in the case of increasing-cost industry. In other words, in the case of increasing-cost industry, more quantity of the product can be obtained or supplied only at a higher price. The extent to which the new long-run price differs from the original long-run price depends upon the extent to which the increase in cost occurs following the expansion of the industry. It must be borne in mind that every point of the long-run supply curve LRS represents a long-run equilibrium as the demand shifts to the right. It is clear from the analysis made above that long-run supply curve of an increasing-cost industry slopes upward to the right and is more elastic than the short-run supply curve.

This case of increasing-cost industry or, in other words, rising supply price is believed to be the most typical of the competitive industries in the actual world. This is so because productive resources are scarce and are currently being used in various industries. Therefore, when an industry expands and requires more resources, it has to take away resources from others by paying higher price for them. Thus, Professor Samuelson writes : The case of increasing cost is "the normal one to be met in most sizeable competitive industries. Why normal? Because when a large industry (which has already achieved the economies of large-scale production)

expands, it must coax men and other productive factors away from the other industries by bidding up their prices and thus its own cost. So the long-run supply curve will usually be sloping gently upward.”²

Long-run Normal Price in the Constant-Cost Industry

If an industry on its expansion gives rise to some external economies and external diseconomies which cancel each other so that the constituent firms do not experience any shift in the cost curves, then that industry is a constant-cost industry. In case of constant-cost industry, we have neither *net* external economies, nor *net* external diseconomies. An industry can also be a constant-cost industry if its expansion breeds neither external economies nor external diseconomies. As more firms enter the industry the demand for productive factors like raw materials, labour, chemicals and machinery will increase and if prices of these productive resources go up as a result of the increase in demand, then the cost is bound to rise. It is, therefore, evident that an industry can be constant-cost industry if it makes little impact on the market for these productive resources, that is, if its demand for productive resources is a negligible part of the total demand for them so that the increase in demand for them by the industry does not push up their prices. To quote Prof. Samuelson, “only if the industry is small compared with the total of all other uses will Marshall’s long-run supply curve be horizontal—which is called the case of constant-cost.”³ If the industry on its expansion does not create external diseconomies, it will be a constant-cost industry only when its expansion also does not give rise to any external economies.

Thus an industry can be constant-cost in two ways. First, when the expansion of an industry creates both external economies and diseconomies but they cancel each other in their effect on

costs, and, secondly, when the expansion of an industry creates neither external economies nor external diseconomies. Figure 21.12 depicts the determination of long-run normal price in a constant-cost industry. To begin with a given demand curve *DD* intersects the short-run supply curve *SRS* at point *Q* and short-run price *OP* is determined. The price *OP* is assumed to be equal to the minimum long-run average cost of the firm. This means that the number of firms has already been fully adjusted to the given demand conditions. Therefore, price *OP* is also the long-run price corresponding to the demand conditions as represented by the curve *DD*. Now, suppose that the demand increases from *DD* to *D'D'*. As a result, price will rise to *OP'* in

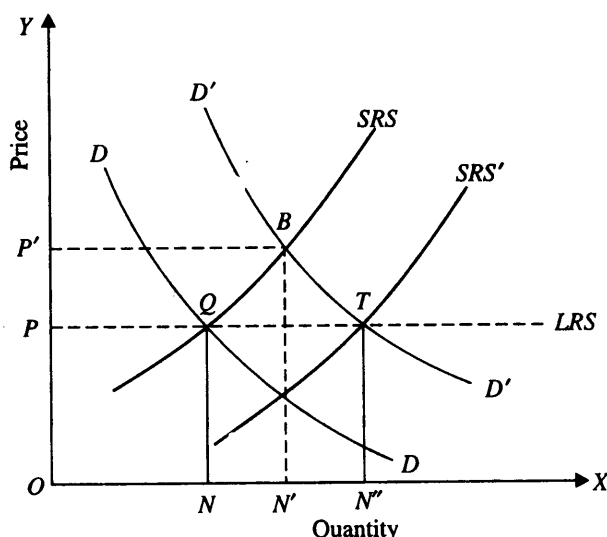


Fig. 21.12. Determination of Long Run Normal Price in Constant-Cost Industry

the short run at which the short-run supply curve *SRS* intersects the new demand curve *D'D'*. The quantity supplied by the industry will increase to *ON'* in the short run. The rise in price from *OP* to *OP'*, average cost curve remaining the same, will yield supernormal profits to the firms. This will attract other firms into the industry in question. As more firms enter the industry, the short-run supply curve will shift to the right. The new firms will go on

2. Paul A. Samuelson, *Economics*, 8th edition, p. 366.

3. *Ibid.* p. 366.

entering the industry and short-run supply curve will go on shifting rightward until its intersection with the demand curve $D'D'$ determines a price at which super-normal profits of the firms disappear completely.

It will be seen from Fig. 21.12 that when the short-run supply curve has shifted to SRS' it intersects the new demand curve $D'D'$ at T and once again determines price OP at which firms will make only normal profits. Thus, price OP is also a long-run price corresponding to the demand curve $D'D'$. The cost curves of the firms would not shift because external economies and diseconomies offset each other's effect. As a result of the increase in demand, the price went up in the short run but has returned to the original level of OP in the long run. In a constant-cost industry, long-run normal price remains the same whatever the level of demand. If points like Q and T are joined together we get a long-run supply curve LRS which is a horizontal straight line in the present case. It is thus clear that *in the constant-cost industry new firms enter the industry without raising or lowering cost curves of firms and make available additional supplies of output at the same price which is equal to the minimum long-run average cost of the firms*. Since long-run supply curve of the constant-cost industry is a horizontal straight line, any increase or decrease in demand will not produce any effect on the long-run price. In this case, increase or decrease in demand will in the long run only change the supply of output by causing a change in the number of firms without producing any effect on the long-run normal price.

Long-run Normal Price in the Decreasing-Cost Industry

When an industry grows in size by the increase in the number of firms, it may be that the external economies outweigh the external diseconomies so that there is a decline in the production cost of the firms. In other words, when an industry reaps *net external economies* as it expands, it is a decreasing-cost industry. There is every possibility of external economies to outweigh the external diseconomies when an industry grows in a new territory. In earlier stages of the growth of an industry in a new territory, not much diseconomies are created, while external economies are likely to accrue in greater amount. Costs may decline with the expansion of the industry due to the following external economies.

1. Some raw materials, tools and capital equipment may be made available to the industry at reduced prices since as the industry grows subsidiary and correlated firms may spring up in the vicinity of the industry which produce them on a large scale and therefore can provide the expanding industry with raw materials, tools and capital equipment at the reduced rates.

2. Cheaper and better trained labour may become available with the expansion of the industry.

3. With the growth of industry, certain specialised firms may come into existence which work up its waste products. The industry can then sell its waste products at better prices, while previously it may be throwing them away.

4. As the industry expands it may become worthwhile to publish trade journals which may help in discovering and spreading technical knowledge concerning the industry.

5. When there is enlargement of the industry, better information centres, research institutions etc. may emerge which greatly benefit the firms in the industry.

In case the above-mentioned external economies are more powerful than the external diseconomies that may arise, the cost curves of all firms in the industry will shift to a lower position as the industry expands.

Long-run pricing in a decreasing industry is illustrated in Fig. 21.13. To start with, demand curve DD and short-run supply curves SRS intersect at Q and determine short-run price OP . Price OP is also the initial long-run price since price OP is assumed to be equal to the minimum long-run average cost of the firms which are therefore making only normal profits. With the increase in demand from DD to $D'D'$ short-run price rises to OP' and the quantity exchanged

to ON . As a result of the rise in price from OP to OP' , each firm of the industry will expand output in the short run. The rise in price from OP to OP' in the short run will yield supernormal profits to the firms. These supernormal profits will attract other firms into the industry and as a result the industry will expand.

As the industry expands, its short-run supply curve will shift to the right. Owing to the decreasing cost industry, cost curves of the industry will shift downward. The short-run supply curve will continue to shift to the right and cost curves of the firms continue to shift downward until the short-run supply curve reaches the position where it intersects the new demand curve $D'D'$ at T' and determines price OP' at which firms make only normal profits. Price OP' is therefore long-run price corresponding to the demand curve

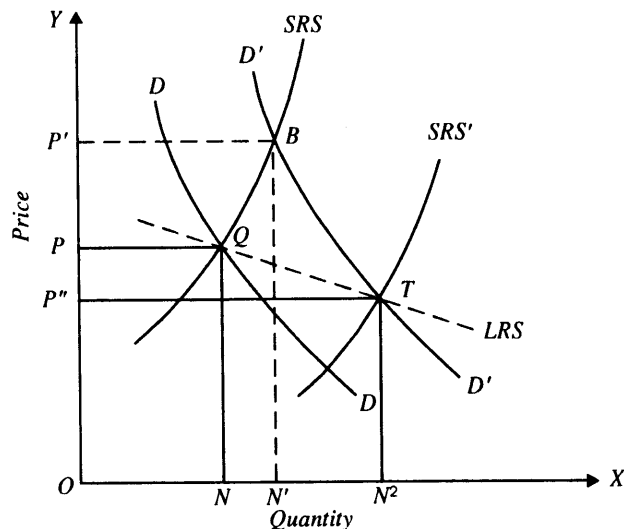


Fig. 21.13. Long-run Pricing in the Decreasing Cost Industry

$D'D'$. As is evident from Fig. 21.13, new long-run price OP'' is lower than the original long-run price OP . Connecting points Q and T , we get the downward sloping long-run supply curve LRS . We thus see that the long-run supply curve of a decreasing-cost industry slopes downward from left to right. In this case the greater supplies of the product will be forthcoming at reduced prices in the long run. Every increase in demand in this case will bring about a fall in the long-run price of the good. This is in sharp contrast to the increasing-cost industry in which case long-run price rises as the demand increases.

It follows from the analysis of long-run pricing made above that with the increase in demand, long-run price rises, remains constant, or falls depending upon whether the industry is subject to increasing cost, constant cost or decreasing cost.

QUESTIONS FOR REVIEW

1. The credit of finding the true answer to the pricing problem goes to Marshall who held that both demand and supply were equally important in determining prices of commodities. Discuss.
2. "Supply and demand are not ultimate explanations of price. They are simply useful catch-all concepts of describing many factors and forces that go to determine price" Discuss
3. Explain the importance of time element in the determination of prices in perfectly competitive markets.
4. Distinguish between a perishable commodity and durable commodity. How are their market prices determined in perfectly competitive markets.
5. Suppose there is once-and-for all increase in demand for a commodity. How will it affect its (a) market price, (b) short-run price and (c) long-run price? Illustrate diagrammatically.
6. How is short-run price of a commodity determined in a competitive market. Does increase in demand for a commodity always lead to rise in its price in the short run? Explain what is meant by long-run normal price? Show that long-run normal price under perfect competition is equal to the minimum long-run average cost.

7. What are external economies and external diseconomies ? When do we get increasing cost conditions in a competitive industry ?
8. Derive a long-run supply curve of increasing-cost industry working under conditions of perfect competition.
9. If all firms in a perfectly competitive industry have U-shaped cost curve, can the supply curve of the industry be a horizontal straight line ? Explain and derive a long-run supply curve of a constant-cost industry.
10. Suppose there is a permanent increase in demand for a product produced under conditions of perfect competition by an increasing-cost industry. What would be its effect on price and output in the short run and long run.
11. A perfectly competitive industry is in long-run equilibrium. What are the long-run effects of an increase in demand for its product given that it is an increasing-cost industry.
12. Under what conditions long-run supply curve of a competitive industry can slope downward ? If in such an industry demand for the product increases, how will its price change in (a) the short run, (b) the long run.
13. If all the firms in a perfectly competitive industry have U-shaped cost curves, can the supply curve for the industry be downward sloping ? Give reasons ?
14. Is it possible for an industry to be constant-cost industry though each firm in the industry has increasing marginal costs ? Explain.

APPENDIX TO CHAPTER 21

Practical Applications of Perfect Competition Model

In the last few chapters we have explained how prices of goods are determined by demand and supply under perfect competition. We have also brought out the importance of elasticities of demand and supply in the theory of price. But the analysis of price determination in terms of demand and supply is not merely of great theoretical significance but it has important several practical applications in economic life of a country. This analysis of demand and supply has been used to explain the implications of price control and rationing, minimum price fixation, incidence of taxes, the need for stabilization policies for agriculture and several other economic problems and policies. In the present chapter we shall explain some of these applications of demand and supply analysis.

PRICE CONTROL AND RATIONING

In times of war imposition of price control is quite common and was introduced by several countries during the Second World War. Even in peace time, price controls on essential commodities have been introduced in several countries to contain inflation. Generally, the maximum prices that can be charged by the sellers from the consumers are fixed at the level below the equilibrium price. When it is realised that the equilibrium price of a commodity is too high and consequently some buyers go unsatisfied, for they lack the means to pay for it, the Government may pass a law through which it fixes the maximum price of the commodity at a level below the equilibrium price. Now, at a price lower than the equilibrium price, quantity demanded will be of permitted larger than the quantity supplied and thus *shortage* of the commodity will develop; some consumers who are willing and able to buy at that price will go unsatisfied buyers would, if permitted, bid up the price to the equilibrium level. But under price control by the Government, price is not free to move to equate quantity demanded with the quantity supplied. Thus, when the Government intervenes to fix maximum price for a commodity, price loses its important function of a rationing device.

Price control and problems raised by it are graphically illustrated in Figure 21A.1 where demand and supply curves, DD and SS of sugar are given. As will be seen from this figure that demand and supply curves intersect at point E and accordingly OP_2 is the equilibrium price of sugar. Suppose that this equilibrium price OP_2 of sugar is very high so that many poor people are not able to obtain any quantity of it. Therefore, the Government intervenes and fixes the maximum price of sugar at the level OP_1 which is below the equilib-

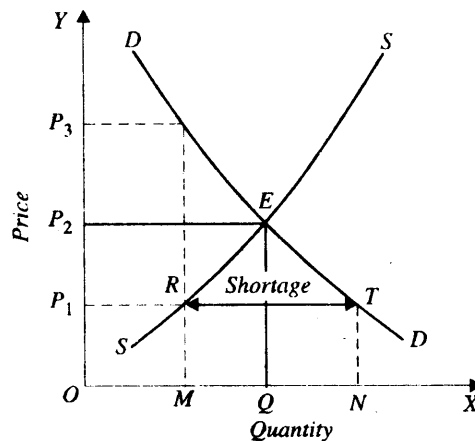


Fig. 21A.1. Price Control

rium price OP_2 . As will be seen from Figure 21A.1 at the controlled price OP_1 quantity demanded exceeds the quantity supplied. At price OP_1 , whereas the producers offer to supply P_1R quantity of sugar, the consumers are prepared to buy P_1T quantity of it. As a result, shortage of sugar equal to the amount RT has developed and some consumers will go unsatisfied.

In the absence of Government intervention fixing the maximum price at OP_1 level, the excess demand equal to RT would have led to rise in the price to the equilibrium level OP_2 where quantity demanded is equal to quantity supplied. But under price control by the government, the price is not allowed to change. Therefore, the available supply OM at the fixed price OP_1 has to be somehow allocated between the consumers. This task of allocating the available supply OM may be done by the producers or sellers themselves. The sellers may adopt the principle of "*first come first served*" and distribute the available supply of sugar among those who are first in the queue before their shops. The second method of allocating the scarce supply of the good is to distribute it on the basis of what has been called, "*allocation by sellers' preferences*". Under this, the available supply of good is sold to certain preferred consumers at the controlled price. The sellers may sell the good at the controlled price to their regular customers. They may also adopt the policy of selling the available supply to the buyers belonging to certain caste, religion, colour *etc.* and not to others.

If the Government does not like the allocation of a commodity among the population on the basis of either "*first come first served*" or arbitrary allocation by sellers' preferences, it may introduce *rationing* of the commodity. Under the rationing system consumers are given ration coupons just sufficient to buy the available quantity of the commodity. The number of ration coupons issued to a family may depend on the age of its members, sex, or the number of family members or on any other criterion considered desirable.

A point worth noting is that price control with or without rationing is likely to give rise to the *black market* in the commodity. By black market we mean the sale of a commodity by the producers or sellers at a price higher than the controlled price. As mentioned above, at the controlled maximum price fixed below the equilibrium price, the quantity demanded would exceed the quantity supplied and consequently shortage of the commodity would develop. It is thus clear that some buyers of the commodity will not be fully satisfied as they will not be able to get the quantity of the good they wish to buy at the controlled price. Therefore, they will be prepared to pay a higher price for procuring more quantity of the good, but they can do so only in the black market. Sellers will also be interested in selling the commodity, at least some quantity of it, in the black market at a higher price as it will fetch them larger profits.

Even when rationing is introduced there will be pressure for the black market to develop. This is because the consumers are willing to buy more quantity of the commodity than is available at the controlled price, whereas rationing only distributes the available quantity of the commodity. Therefore, the consumers who want to procure larger quantity than the rationing amount will be prepared to pay higher price to get some quantity in the black market.

There is sufficient evidence in India and abroad to confirm the predictions based on demand and supply analysis. When price control and rationing system for some commodities which were in shortage were introduced during the Second World War and after, black markets developed in spite of punitive measures taken by the authorities.

MINIMUM SUPPORT PRICE

In the price control we examined the case when the government fixed a *price ceiling* (that is, *maximum price*) to prevent it from rising to the equilibrium level. For many agricultural products the Government policy has been to fix a *price floor*, that is, the *minimum support price* above the equilibrium level which is considered to be low and unremunerative to the farmers. While in case of price control or fixation of price ceiling the Government simply announces the maximum price

above which price cannot be charged by the producers or sellers of a product, in case of minimum support price, the Government becomes an active buyer of the product in the market. It is not only in India but also in the developed countries such as the USA that price support policy for agricultural products is adopted to provide reasonable prices to the farmers and increase their income. The effects of imposition of minimum support price for wheat, an important agricultural product, in India is illustrated in Figure 21A.2 where demand curve DD and supply curve SS of wheat intersect at point E . Thus if price of wheat is allowed to be determined by the free working of demand for and supply of wheat, equilibrium price is OP and equilibrium quantity determined is OQ .

Now suppose this free market determined equilibrium price OP ($=$ Rs. 500 per quintal) is considered to be unremunerative which does not provide incentives to the farmers to produce wheat or expand its production. Therefore, to promote the interests of the farmers, the Government intervenes and fixes a higher minimum support price OP_1 (Rs. 550 per quintal) for wheat. It will be seen from Figure 21A.2 that at price OP_1 of wheat, the quantity demanded of wheat decreases to OQ_1 ($= P_1A$). On the other hand, at higher price OP_1 farmers expand their output and supply a greater quantity OQ_2 ($= P_1B$) of wheat. Thus at minimum support price OP_1 the quantity of wheat supplied by the farmers exceeds the quantity demanded of it by the consumers in the market. This means that the imposition of minimum support price of wheat higher than the equilibrium price OP leads to the emergence of *surplus of wheat* equal to AB or Q_1Q_2 . If the Government does not purchase this surplus this will tend to depress the price of wheat. Therefore, in order to ensure this minimum price of wheat OP_1 ($=$ Rs. 550 per quintal) to the farmers the Government will have to purchase the entire surplus AB or Q_1Q_2 from the farmers. It should be noted that to purchase the surplus Q_1Q_2 from the farmers, the Government will have to make expenditure equal to $OP_1 \times Q_1Q_2$, that is, equal to the area Q_1ABQ_2 . This expenditure on purchase of wheat surplus may be financed by taxation of the people.

It follows from above that under minimum support price OP_1 the farmers sell OQ_1 quantity of wheat in the free market and quantity Q_1Q_2 to the Government. At the free market determined equilibrium price OP and quantity OQ , the total income of the farmers will be equal to the area $OPEQ$. Now, with minimum support price equal to OP_1 and the total quantity sold equal to OQ_2 , the income of the farmers has increased to OP_1BQ_2 . Thus minimum support price policy has greatly benefited the farmers both in terms of price they receive for their product and the income they are able to earn.

A major problem facing the Government is how to dispose of the surplus it purchases from the farmer at the higher minimum support price. If the Government sells it in the market, the price of wheat in the market will fall which will defeat the purpose of support price policy.

Alternatively, the Government may store the surplus and in this case the Government will incur storage costs. Besides, the wheat and any other foodgrains get rotted if kept for longer time in storage bins. Thus while to produce surplus requires valuable resources such as labour, fertilizers, irrigation and other inputs, yet it is quite often left to decay in government warehouses. In America, one important way of disposing of surplus is to give them to the developing countries as food aid.

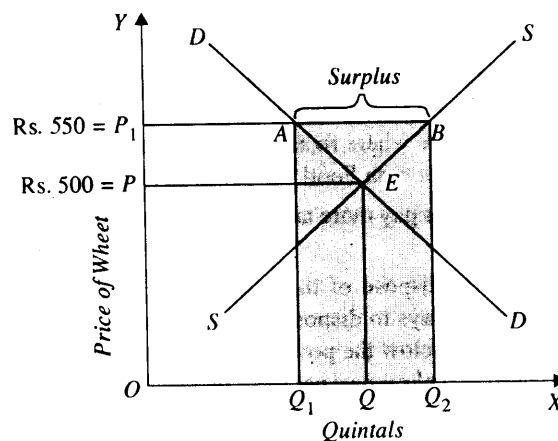


Fig. 21A.2. Minimum Support Price for Agriculture

But this food aid is not without problems. The American food aid to developing countries has tended to depress prices of foodgrains in these countries and therefore has harmed the interests of farmers of these developing countries.

In India Food Corporation of India on behalf of the Government procures surplus of wheat and rice production created as a result of fixation of minimum procurement or support prices of wheat and rice. Food Corporation of India then keeps it in its warehouses. The food surpluses are then used for distribution through Public Distribution System (PDS) at a lower rate. Since Government procures these food grains at a higher rate and sells to the consumers at lower issue prices, the Government subsidises the foodgrain consumption and has to incur several thousand crores on food subsidy annually.

Besides, food surplus procured by the Government is also used for giving to the workers under 'food for work' programme, Jawahar Rozgar Yojana and other such special employment schemes launched in India. A part payment of wages is made in food and a part in form of money. At present food surplus of wheat is also posing a problem in India. Due to the good monsoon in the last six successive years, food production has been substantial and the Government has purchased the surplus at higher procurement prices. The surplus with the Government has been mounting. It is estimated to about 50 million tons in June 2003. On the other hand, off-take from public distribution system has fallen. There is a real danger of these food surpluses getting rotted in warehouses of the Food Corporation of India. Therefore, Government of India deciding to export of wheat.

It should be noted that in Indian Government has been raising year after year the procurement or support prices for wheat and rice. This raises the food cost in every sector of the economy which must lead to higher prices all round. Thus, increase in procurement prices of wheat and rice have been an important factor that has created inflationary pressures in the Indian economy.

We summarise below the important results of price support policy:-

1. Price paid by the consumers who buy from the open market increases when the minimum support price of the agricultural product is fixed at a higher level than the equilibrium price. This is because supply of the agricultural product in the open market decreases as a result of Government purchases of it from the farmers.
2. Fixation of minimum support price (*i.e.*, price floor) leads to the emergence of wheat surplus which the Government has to purchase from the farmers. This is quite obvious from the Indian experience where fixation of higher minimum support price (*MSP*) has resulted in mountain of foodgrains with Food Corporation of India.
3. Taxpayers pay more tax money to finance the Government's wheat purchases as well as storage costs.
4. How to dispose of the surplus purchased from the farmers poses a big problem. There are several ways to dispose of the surplus procured. One way is to sell it at subsidised rate to the persons below the poverty line through public distribution system. Second, the surplus can be used to make a part payment of wages in terms of foodgrains under 'food for work' programme. Third, food surplus can be given to other countries as foreign aid or it can be exported.
5. Incomes of the farmers increase as a result of minimum support price fixed at a higher level than the free market equilibrium price. As a result of price support, they receive higher price than that which would prevail in the free market and also they produce and sell more than before. They sell a part of their larger production in the market and a part to the Government.

INCIDENCE OF INDIRECT TAXES

A significant application of demand-supply model is that it explains the problem of incidence of indirect taxes such as sales tax and excise duty on commodities. By incidence of taxes we mean

who bear the money burden of taxes. For example, if sale tax is imposed on a commodity the question is whether the producers will bear the burden of the tax or the consumers who buy the commodity or the money burden of the sales tax would be distributed in some way between the producers and the consumers. We will confine ourselves to the explanation of incidence of indirect taxes, that is, taxes which are levied on either production or sale or purchase of commodities.

It is worthwhile to note that the price of a commodity is determined by demand and supply only when perfect competition prevails in the market. Supply curve of a commodity slopes upward as it is assumed that marginal cost of production increases with the increase in output by the firms. The upward sloping supply curve implies that as the price of a commodity rises the producer would offer more quantity for sale in the market. If no tax is levied on the commodity, the seller or producer will receive the whole amount of the price. Now, if the sales tax is imposed equal to Rs. 5 per unit then the *supply price* of each unit of the quantity offered for sale in the market will rise by Rs. 5. In this case, the producer would receive the market price minus the amount of the tax per unit. Thus, if the producer is to receive the same amount of price as prior to the imposition of the sales tax, then ; *the supply price of each unit of the commodity sold will rise by the full amount of the tax*. This implies that the supply curve of the commodity will now shift upward by the amount of the tax as a result of the imposition of the sales tax. Consider figure 21A.3 where demand and supply curves of a commodity are shown. Before the imposition of any indirect tax, demand and supply curves intersect at point *E*, and accordingly, equilibrium price *OP* and equilibrium amount *OM* are determined. Now suppose that the sales tax equal to the amount *SS'* is imposed on the commodity. As explained above, the imposition of the sales tax will shift the supply curve vertically upward. The new supply curve *S' S'* has been drawn which depicts the supply position after the imposition of the sales tax. It will be seen from the Figure 21A.3 that the new supply curve *S' S'* intersects the given demand curve *DD* at point *E'*. Thus, as a result of the imposition of the sales tax the price of the commodity has risen from *OP* to *OP'*. It means that the consumer will have to pay price of a commodity which is higher by the amount *PP'* than before. Obviously, the burden of the tax borne by the consumer is equal to *PP'*(=*E' H*). This is the incidence of tax fallen on the consumer.

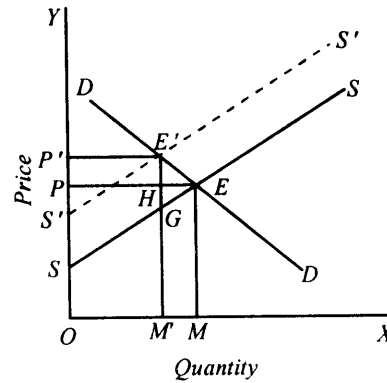


Fig. 21A.3. Incidence of Tax

It will be seen from the diagram that the quantity sold in the market would now be *OM'* and the Government would receive *E'G* per unit of it as tax. Since *E' H* will be paid by the consumer, the rest of the tax equal to the amount *GH* per unit will be borne by the producer or seller. Thus, a part of the tax has been passed on to the consumer through a higher price and a part has been borne by the producer himself. It is worthwhile to note that the *incidence of taxes borne by the producer and the consumer will depend upon the elasticity of demand as well as elasticity of supply. The lower the elasticity of demand, the greater will be the incidence of tax borne by the consumer.*

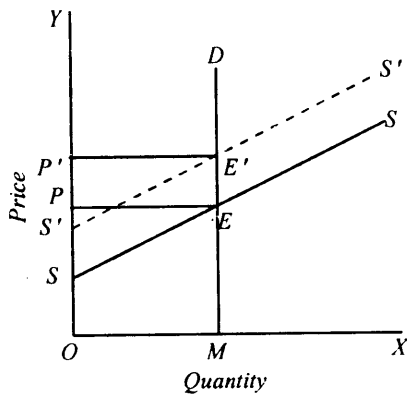


Fig. 21A.4. Incidence of Tax in case of Perfectly Inelastic Demand

If the demand for a commodity is perfectly

inelastic the whole of the burden of the commodity tax will fall on consumer. This is shown in figure 21A.4. In this figure demand curve DD is a vertical straight line showing that demand for the commodity is completely inelastic. As a result of the intersection of the demand and supply curves, price OP is determined. If now the tax equal to SS' is imposed on the commodity, the supply curve will shift vertically upward to the dotted position $S'S'$. It will be seen that the new supply curve $S'S'$ intersects the demand curve DD at point E' and the new equilibrium price OP' is determined. It will be noticed from Fig. 21A.4 that in this case the price of the commodity has risen by PP' or EE' which is equal to the full amount of the tax SS' . It means that producers pass on the full tax to the consumers and they themselves do not bear any incidence. It, therefore, follows that *in case of perfectly inelastic demand, the whole incidence of the tax falls on the consumer.*

On the contrary, if the consumer's demand for a quantity is perfectly elastic, as is shown by DD curve in Figure 21A.4 the imposition of the tax on it will not cause any rise in price. In this case, the whole burden will be borne by the manufacturers or sellers. It will be seen from Fig. 21A.5 that as a result of the indirect tax by the amount SS' and the resultant upward shift in supply curve to $S'S'$ the equilibrium price remains unchanged at the level OP . Since the price has not risen, the consumer would not bear any burden of the tax in this case. Therefore, the whole incidence of the tax will fall on the producer, or seller in case of perfectly elastic demand.

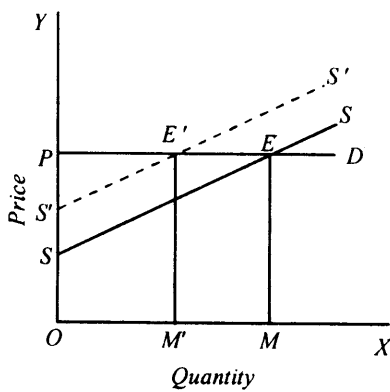


Fig. 21A.5. Incidence of tax in case of perfectly elastic demand

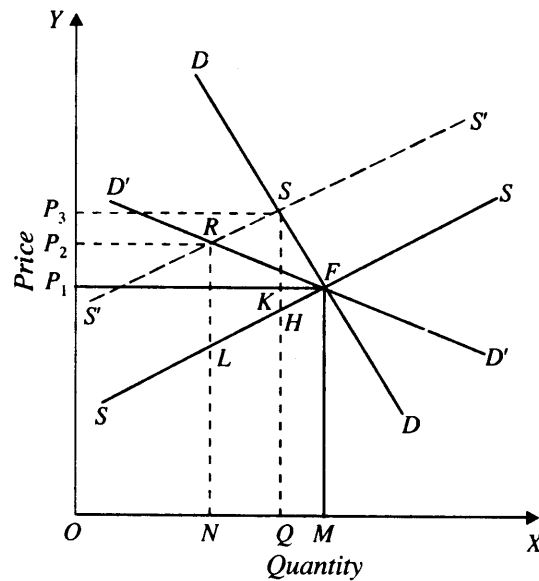


Fig. 21A.6. Incidence of an indirect tax in case of elastic and inelastic demand

It should be noted that the more inelastic the demand for a commodity, the greater the rise in the price paid by the consumer and the vice versa. In order to show this clearly we have drawn two demand curves—one inelastic and the other relatively more elastic in Figure 21A.6. Supply curve SS has been drawn which intersects the two demand curves DD and $D'D$ at the same point F . Now before the imposition of any tax, the quantity sold and purchased is OM and the price of the commodity is OP_1 . Now, if the sales tax is imposed, supply curve shifts upward to $S'S'$ by the amount of tax per unit imposed. It will be noticed from Fig. 21A.6 that the new supply curve $S'S'$ intersects the inelastic curve DD at point S according to which equilibrium price OP_3 is determined. In this case of inelastic demand price has risen by $P_1 P_3$ which is the burden borne by the consumers. Now, the new supply curve $S'S'$ intersects the relatively elastic demand curve $D'D'$ at point R according to which market price OP_2 is determined. Thus, in the case of elastic demand curve $D'D'$, the rise in price as

a result of the same tax, is equal to $P_1 P_2$ which smaller than $P_1 P_3$ borne by the consumer in case of inelastic demand. Therefore, *the extent to which the incidence of the tax will fall on the consumer, depends on their elasticity of the demand for the commodity in question.*

The predictions about the incidence of taxes borne by the consumers and the producers have been generally found true in the real world situation when the commodities on which taxes are imposed are sold under competitive conditions.

QUESTIONS FOR REVIEW

1. What would happen if the government imposes a ceiling on the retail price of a commodity, say petrol. Why do advocates of price control also recommend rationing ?
2. Explain the effects on a market of setting (a) a maximum controlled price for a commodity and (b) a minimum support price for a commodity.
3. Discuss the effects of setting by the government *procurement price* of wheat higher than the free market price. Explain with special reference to rising stocks of wheat with Food Corporation of India.
4. Analyse the incidence of a per unit tax imposed on a commodity with perfectly inelastic demand. Assume that the conditions in the market are perfectly competitive.
5. A unit excise duty is imposed on a firm in a competitive market. Examine its short run and long-run effects on industry and firm.
6. Analyse the incidence of a per unit tax imposed on a commodity with (i) perfectly elastic demand and (ii) perfectly inelastic demand.
7. Explain the circumstances under which rise in price of a commodity as a result of the imposition of a per unit tax on it is more than the tax.
8. How is a specific duty imposed on a commodity is shared by the consumers and producers? Show that the lower the price elasticity of demand, the higher is the incidence of a specific commodity tax on the consumers.

Price and Output Under Monopoly

Meaning of monopoly. Monopoly is an extreme form of market structure. *In monopoly, there is a single producer and seller of a product which has no close substitutes.* The monopoly has originated from the Greek words *Mono* meaning “single” and *Poly* meaning “seller”. Thus, monopoly means single seller. However, in economics absolute or pure monopoly exists when a single seller sells a product which has not to face any competition from any close substitutes. Therefore, a monopolist does not have any rivals or competitors. This implies that the degree of competition in monopolistic market structure is nil or extremely small.

Monopoly, as it is now generally understood, means the existence of a single producer or seller which is producing or selling a product which has no close substitutes. And as such it is an extreme form of imperfect competition. Since a monopoly firm has a sole control over the supply of a product which do not have close substitutes, the increase and decrease in its output will greatly affect the price of its product. Reduction in output by the monopolist will raise its price and expansion in output will lower it. Therefore, the demand curve facing a monopolist is downward sloping.

Conditions Necessary for the Existence of Monopoly

Three conditions are necessary for the monopoly to exist. First, *there must be a single producer or seller of a product* if there is to be monopoly. This single producer may be in the form of an individual owner or a single partnership or a joint stock company. If there are many producers producing a product, either perfect competition or monopolistic competition will prevail depending upon whether the product is homogeneous or differentiated. On the other hand, when there are a few producers or sellers of a product, oligopoly is said to exist. If then there is to be monopoly, there must be one firm in the field.

But to say that monopoly means one seller or producer is not enough. A second condition which is essential for a firm to be called monopolistic is that *no close substitutes for the product of that monopolistic firm should be available in the market.* If there are some other firms which are producing close substitutes for the product in question, there will be competition between them. In the presence of this competition a firm cannot be said to have monopoly. Monopoly implies absence of all competition. For instance, there is one firm in India which produces ‘Binaca’ toothpaste but this firm cannot be called monopolist since there are many other firms which produce close substitutes of Binaca toothpaste such as Colgate, Pepsodent, Forhans, Signal, Neem etc. These various brands of toothpaste compete with each other in the market and the producer of any one of them cannot be said to have a monopoly.

We can express the second condition of monopoly in terms of cross elasticity of demand also. Cross elasticity of demand shows a change in the demand for a good as a result of change in the price of another good. Therefore, *if there is to be monopoly the cross elasticity of demand between the product of the monopolist and the product of any other producer must be very small.*

The fact that there is one firm under monopoly means that other firms for one reason or other are prohibited to enter the monopolistic industry. In other words, strong barriers to the entry of firms exist wherever there is one firm having a sole control over the production of a commodity. The barriers which prevent the firms to enter the industry may be economic in nature or else of institutional and artificial nature. In case of monopoly, barriers are so strong that prevent entry of all firms except the one which is already in the field.

From above it follows that *for the monopoly to exist, three conditions are necessary:*

1. There is a single producer or seller of a product;
2. There are no close substitutes for the product; and
3. Strong barriers to the entry into the industry exist.

Nature of Demand and Marginal Revenue Curves under Monopoly

It is important to understand the nature of the demand curve facing a monopolist. The demand curve facing an individual firm under perfect competition, as explained in a previous chapter, is a horizontal straight line, but the demand curve facing the *whole industry* under perfect competition is sloping downward. This is so because the demand is of the consumers and the demand curve of consumers for a product usually slopes downward. The downward-sloping demand curve of the consumers faces the whole competitive industry. But an individual firm under perfect competition does not face a downward-sloping demand curve. This is because an individual firm under perfect competition is one among numerous firms constituting the industry so that it cannot affect the price by varying its individual level of output. A perfectly competitive firm has to accept the ruling price as given and constant for it. It can sell as much as it likes at the ruling price of the product. Therefore, the demand curve facing an individual firm under perfect competition is a horizontal straight line at the level of prevailing price of the product. A perfectly competitive firm is a mere quantity adjuster; it has no influence over price.

But in the case of monopoly one firm constitutes the whole industry. Therefore, the entire demand of the consumers for a product faces the monopolist. Since the demand curve of the consumers for a product slopes downward, the monopolist faces a downward-sloping demand curve. If he wants to increase the sale of his good, he must lower the price. He can raise the price if he is prepared to sacrifice some sales. To put it in another way, a monopolist can lower the price by increasing his level of sales and output, and he can raise the price by reducing his level of sales or output. A perfectly competitive firm merely adjusts the quantity of output

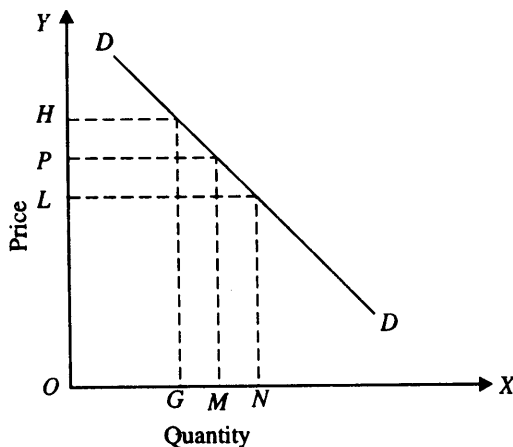


Fig. 22.1. Demand Curve of the Monopolist Slopes Downward

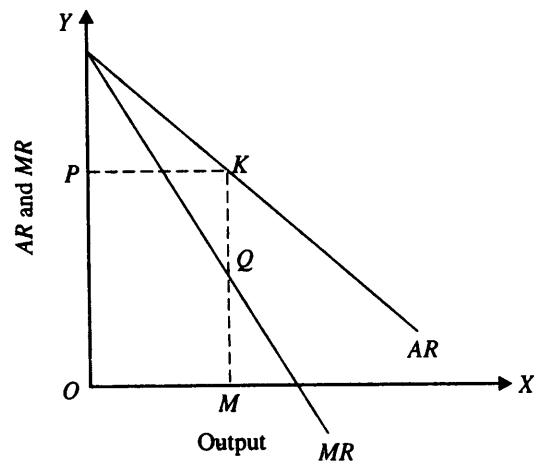


Fig. 22.2. Average and Marginal Revenue Curves under Monopoly

it has to produce, price being a given and constant datum for it. But the monopolist faces a more complicated problem. He cannot merely adjust quantity at a given price because each quantity change by him will bring about a change in the price at which the product can be sold. Consider Fig. 22.1. DD is the demand curve facing a monopolist. At price OP the quantity demanded is OM , therefore he would be able to sell OM quantity at price OP . If he wants to sell a greater quantity ON , then he will have to lower the price to OL . If he restricts his quantity to OG , price will rise to OH . Thus every quantity change by him entails a change in price at which the product can be sold. Thus the problem faced by a monopolist is to choose a price-quantity combination which is optimum for him, that is, which yields him maximum possible profits.

Demand curve facing the monopolist will be his average revenue curve. Thus, the average revenue curve of the monopolist slopes downward throughout its length. Since average revenue curve slopes downward, marginal revenue curve will lie below it. This follows from usual average-marginal relationship. The implication of marginal revenue curve lying below average revenue curve is that the marginal revenue will be less than the price or average revenue. When monopolist sells more, price of his product falls; marginal revenue therefore must be less than the price. In Fig. 22.2 AR is the average revenue curve of the monopolist and slopes downward. MR is the marginal revenue curve and lies below AR curve. At quantity OM , average revenue (or price) is OP or MK and marginal revenue is MQ which is less than average revenue OP or MK . In an earlier chapter we have explained that average and marginal revenue at a quantity are related with each other through price elasticity of demand.

Why under monopoly marginal revenue is less than price or average revenue can be easily proved. Consider Fig. 22.3 where DD' is the demand or average revenue curve of the monopolist. At price OP of the product the quantity OQ is demanded. Now, if the monopolist sells more than this, say OQ' , price falls to OP' . It should be noted that not only the additional unit QQ' , will be sold at the lower price OP' , but all the previous units OQ will now be sold at the lower price OP' . Thus, by selling one unit more (QQ' or $\Delta Q = 1$) of the product and with the reduction in price to OP' , the monopolist's gain in revenue is equal to the shaded area $QTSQ'$. Since the previous units OQ are now sold at the lower price OP' , the loss in revenue on these units is equal to the shaded area $PKTP'$. Therefore, to find out marginal revenue which is the net addition to the total revenue by selling one more unit of output, we have to subtract the loss in revenue $PKTP'$ incurred on the previous units from the gain in revenue $QTSQ'$ by selling an additional unit of output. Thus, marginal revenue is less than the average revenue or price at which the additional unit is sold.

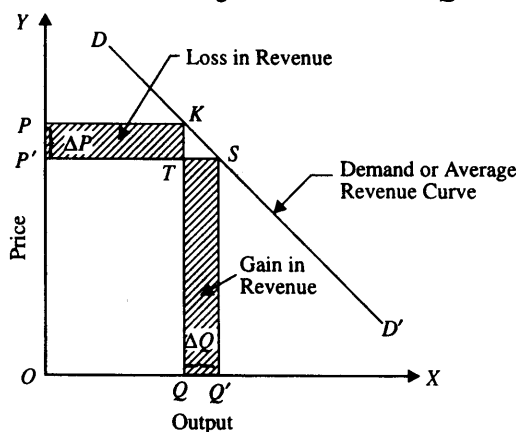


Fig. 22.3. MR is less than Price or AR under Monopoly.

PRICE AND OUTPUT UNDER MONOPOLY

With the given demand and cost conditions at what price and output a monopolist will be in equilibrium. It is worth noting that under perfect competition there is no difference between the firm and industry. Under it a single firm constitutes the whole industry. Therefore, the equilibrium of a single monopolist firm tells us what price and output will be determined under monopoly.

Like the firms working under perfect competition, the goal of the monopolist is also to maximise profits. In economic theory all producers whether they work under conditions of monopoly, monopolistic competition or perfect competition are assumed to be rational. The rational behaviour demands that the firms should try to maximise profits. Therefore, it is not the objective of the monopolist which is different from that of the firms working under perfect competition. But, it is demand and cost conditions facing the monopolist that make all the difference in the results in respect of price charged and output produced by him and not any different objective pursued by him.

The equilibrium of the monopolist regarding price and output is shown in Fig. 22.4. Since a monopolist has a control over the price of his product, he does not take the price as given and constant. But, as explained above, if he raises the price of his product, the quantity demanded of it will fall and if he lowers the price, the quantity demanded of his product will increase. He will therefore choose price-output combination which maximises his profits. Profits are maximised at the level of output at which revenue (MR) of an extra unit of output is equal to marginal cost (MC) of the extra unit. Thus, to achieve maximum profits the monopolist follows the following rule:

$$MR = MC$$

Thus, monopolist will go on producing additional units of output so long as marginal revenue exceeds marginal cost. This is because it is profitable to produce an additional unit if it adds more to revenue than to cost. His profits will be maximum and he will attain equilibrium at the level of output at which marginal revenue equals marginal cost. If he stops short of the level of output at which MR equals MC , he will be unnecessarily forgoing some profits which otherwise he could make. In Fig. 22.4 marginal revenue is equal to marginal cost at OM level of output. The monopolist will be earning maximum profits and will therefore be in equilibrium when he is producing and selling OM quantity of the product. If he increases his output beyond OM , marginal revenue will be less than marginal cost and he will be incurring loss on the additional units beyond OM . Therefore, the monopolist will be reducing his total profits by producing more than OM . Thus, he is in equilibrium at OM level of output at which marginal cost equals marginal revenue.

It will be seen from the AR curve in Fig. 22.4 that he will be charging the price MS or OP by selling OM quantity of output. The difference between average revenue and average cost, that is, TS in Fig. 22.4 represents the supernormal profits earned per unit of output by the monopolist. The total supernormal profits made by him are equal to the area of the rectangle $HTSP$.

Price and Marginal Cost Under Monopoly

There is here a significant difference between monopoly and perfect competition. The price under perfect competition is equal to marginal cost, but this is not so under monopoly. The monopolist, unlike perfectly competitive firm, faces a downward-sloping average revenue curve and his marginal revenue curve lies below average revenue curve. Therefore, in monopoly equilibrium when marginal cost is equal to marginal revenue, it is less than

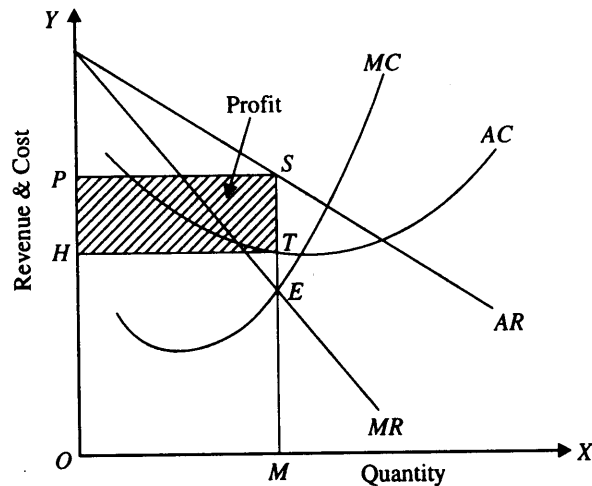


Fig. 22.4. Firm's Equilibrium under Monopoly: Maximisation of Profits

price (or average revenue). From Fig. 22.4 it will be noticed that at equilibrium output OM , marginal cost and marginal revenue are equal and both are here equal to ME . But price fixed is MS or OP which is greater than ME . It thus follows that price under monopoly is greater than marginal cost. (Price $>MC$). The extent to which price will exceed marginal cost depends on the price elasticity of demand at the equilibrium level of output. We know that :

$$\text{Price} = MR \frac{e}{e-1}$$

where MR stands for marginal revenue and e for price elasticity of demand.

But, in equilibrium, $MR = MC$

$$\text{Therefore, Price} = MC \frac{e}{e-1}$$

Since $\frac{e}{e-1}$ will be more than unity for a given value of price elasticity, it follows that under under monopoly.

$$\text{Price} > MC$$

Furthermore, from the fact that price = $MC \frac{e}{e-1}$ under monopoly it follows that the extent to which price would differ from marginal cost (MC) depends upon the value of price elasticity on the average revenue curve at the point corresponding to the equilibrium output. The precise extent to which price will be greater than marginal cost (MC) will be given by the value of expression $\frac{e}{e-1}$. The smaller the price elasticity, the greater the value of expression $\frac{e}{e-1}$ and hence greater the extent to which price would diverge from marginal cost. *Monopoly price is thus the function of marginal cost of production and price elasticity of demand.*

Monopoly Equilibrium and Price Elasticity of Demand

Another important feature of monopoly equilibrium is that the *monopolist will never be in equilibrium at a point on the demand curve or average revenue curve at which price elasticity of demand is less than one*. In other words, the monopolist will never fix his level of output at which price elasticity of the demand on the average revenue curve is less than one, provided the marginal cost is positive which is most usually the case. Since marginal cost can never be negative, equality of marginal revenue and marginal cost cannot be achieved where price elasticity of demand is less than one and marginal revenue is therefore negative. We know from the relationship between price elasticity and marginal revenue that whenever elasticity is less than one, marginal revenue is negative. Therefore, no sensible monopolist will produce on that portion of the demand or average revenue curve which give him negative marginal revenue, that is, which reduces his total revenue, while the production of additional units adds to his total cost.

That the equilibrium of the monopolist will never be in equilibrium at the level of output at which the elasticity of demand curve or average revenue curve is less than one is illustrated in Fig. 22.5. It will be seen from Fig. 22.5 (upper panel) that upto ON level of output, MR is positive and total revenue is increasing as upto this output level, price elasticity of demand on the demand or average revenue curve is greater than one. Equilibrium will always lie where price elasticity is greater than one. We know that at the middle point R of the straight-line demand or AR curve, price elasticity is equal to one and corresponding to this unit elasticity point, marginal revenue is equal to zero. Below the middle point R on the average revenue curve, elasticity is less than one and marginal revenue is negative. The equilibrium of the monopolist will never lie below the middle point of the average revenue curve AR as over this range, marginal revenue becomes negative and total revenue

(*TR*) decreases as is evident from the falling the *TR* curve beyond *ON* output in the lower part of the figure. Thus, given that *MC* is positive, equilibrium of a monopolist cannot lie below the middle point of the average revenue curve where price elasticity is less than one. It will always lie above the middle point of the average revenue curve where price elasticity is greater than one. The precise point on which equilibrium point lies depends, as already explained, upon the position of marginal cost curve and its intersection point with the marginal revenue curve. If marginal cost (*MC*) is zero, the monopolist will be in equilibrium at *ON* level of output at which marginal revenue (*MR*) is zero.

LONG-RUN EQUILIBRIUM UNDER MONOPOLY

In the long run monopolist would make adjustment in the size of his plant. The long-run average cost curve and its corresponding long-run marginal cost curve portray the alternative plants, *i.e.*, various plant sizes from which the firm has to choose for operation in the long-run. The monopolist would choose that plant size which is most appropriate for a particular level of demand. In the short run the monopolist adjusts the level of output while working with a given existing plant. His profit-maximizing output in the short run will be where only the short-run marginal cost curve (*i.e.*, marginal cost curve with the existing plant) is equal to marginal revenue. But in the long run he can further increase his profits by adjusting the size of the plant. So in the long run he will be in equilibrium at the level of output where given marginal revenue curve cuts the long-run marginal cost curve. Fixing output level at which marginal revenue is equal to long-run marginal cost shows that the size of the plant has also been adjusted. That is, a plant size has been chosen which is most optimal for a given demand for the product. It should be carefully noted that, in the long run, marginal revenue is also equal to short-run marginal cost. But this short-run marginal cost is of the plant which has been selected in the long run keeping in view the given demand for the product. Thus while, in the short run, marginal revenue is equal only to the short-run marginal cost of given existing plant, in the long run marginal revenue is equal to the long-run marginal cost as well as to the short-run marginal cost of that plant which is appropriate for a given demand for the

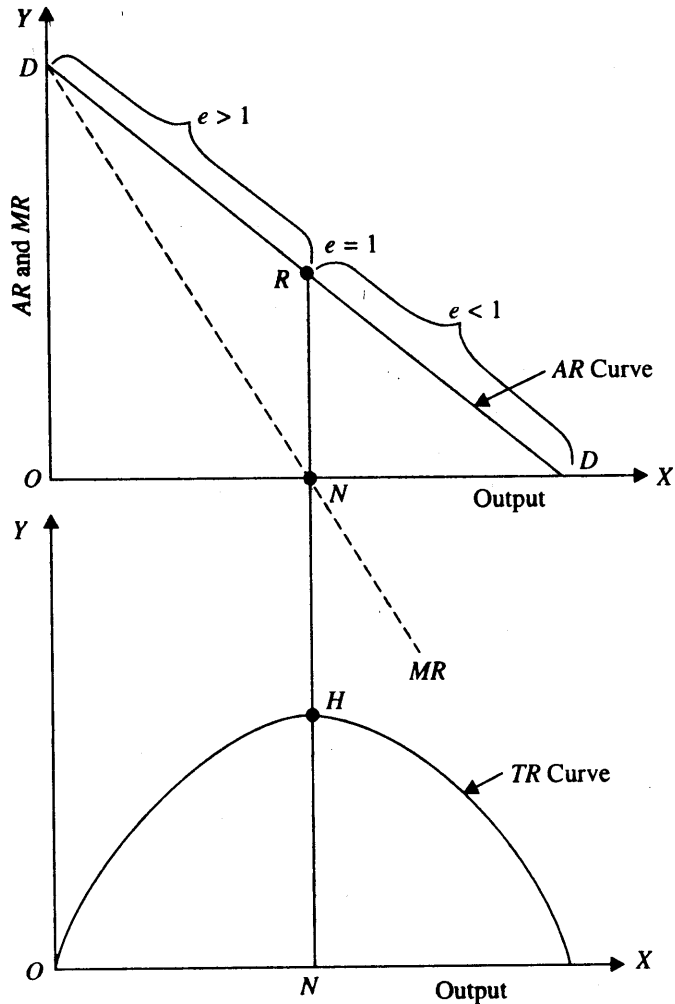


Fig. 22.5. Monopolist cannot be in equilibrium at a level of output where price elasticity of demand is less than one.

product in the long run. In the long-run equilibrium, therefore, both the long-run marginal cost curve and short-run marginal cost curve of the relevant plant intersect the marginal revenue curve at the same point.

Further, it is important to note that, in the long run, the firm will operate at a point on the long-run average cost curve (LAC) at which the short-run average cost is tangent to it. This is because it is only at such tangency point that short-run marginal cost (SMC) of a plant equals the long-run marginal cost (LMC). Figure 22.6 portrays the long-run equilibrium of the monopolist. He is in equilibrium at OL output at which long-run marginal curve LMC intersects marginal revenue curve MR . Given the level of demand as indicated by positions of AR and MR curves

he would choose the plant size whose short-run average and marginal cost curves are SAC and SMC . He will be charging price equal to LQ or OP and will be making profits equal to the area of rectangle $THQP$.

It therefore follows that for the monopolist to maximize profits in the long run, the following conditions must be fulfilled

$$MR = LMC = SMC$$

$$SAC = LAC$$

$$P \geq LAC$$

The last condition implies that in *long-run monopoly equilibrium* price of the product should be either greater than long-run average cost or at least equal to it. The price cannot fall below long-run average cost because in the long run the monopolist will quit the industry if it is not even able to make normal profits.

Long-run Equilibrium Adjustment under Monopoly

In order to understand fully the difference between the short-run equilibrium and long-run adjustment under monopoly, it is necessary to show short-run equilibrium and long-run equilibrium in one figure. This is done in Fig. 22.7 which shows that for a given level of demand, the monopolist will be in short-run equilibrium at point E or at output OQ_1 if he has plant size SAC_1 at that time. But in the long run he would not be in equilibrium at E since in the long run he can also change the plant and will employ that plant which is most appropriate for a given level of demand. In the long run he will be in equilibrium at point F where marginal revenue curve cuts his long-run marginal cost curve (LMC). But every point of the long-run marginal cost curve corresponds to a point of some short-run marginal cost curve. Long-run equilibrium point F at which marginal revenue curve cuts long-run marginal cost curve is also the point on short-run marginal cost curve SMC_2 which corresponds to the short-run average cost curve SAC_2 . It means that, in long-run equilibrium position, monopolist has chosen the plant with short-run average and marginal cost curves SAC_2 and SMC_2 . The plant having short-run cost curves SAC_2 and SMC_2 is optimal for him

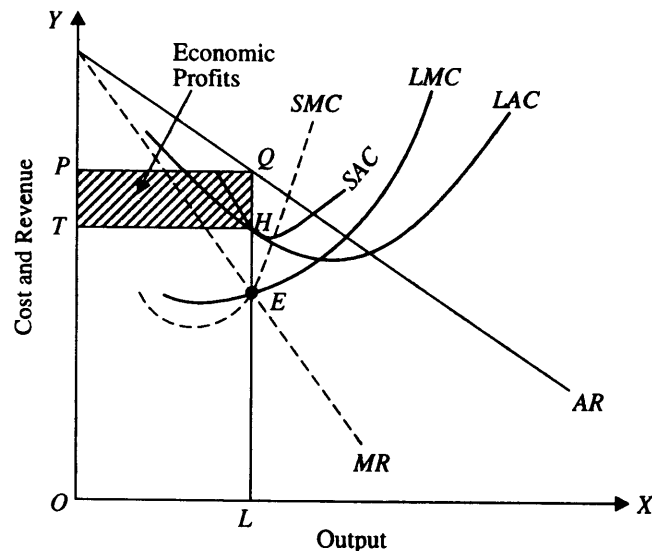


Fig. 22.6. Long-Run Equilibrium under Monopoly

in the long run, given the level of demand as given by AR and MR curves. It is now clear that the monopolist who was in equilibrium at E in the short run with the given plant having cost curves SAC_1 and SMC_1 has shifted to the plant having cost curves SAC_2 and SMC_2 in his long run adjustment, level of demand being given. It will be noticed that, in the long run, the output has increased from OQ_1 to OQ_2 and price has fallen from OP to OJ . Profits have also increased in the long run; area $GHKJ$ is larger than the area $TRSP$.

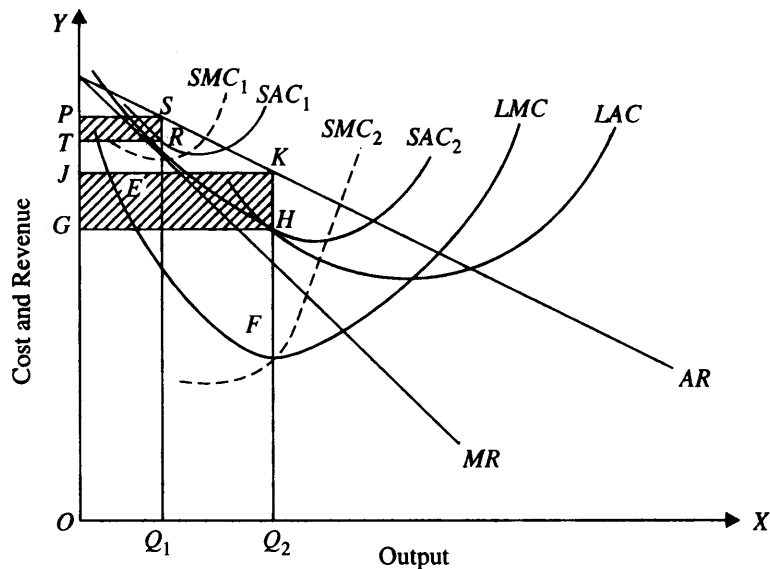


Fig. 22.7. Shift from a Short-Run to Long-Run Equilibrium Position under Monopoly

MONOPOLY EQUILIBRIUM AND PERFECTLY COMPETITIVE EQUILIBRIUM COMPARED

We have explained, in the preceding chapters, equilibrium of a perfectly competitive firm and industry and also how price is determined under perfect competition. In the present chapter we have explained above the equilibrium under monopoly. It is now in the fitness of things to make a comparative study of the two. Only similarity between the two is that a firm under both perfect competition and monopoly is in equilibrium at the level of output at which marginal revenue equals marginal cost. But there are many important points of difference which we spell out below.

1. Monopolist Fixes Price at a Higher Level than Marginal Cost.

A significant difference between the two is that while *under perfect competition price equals marginal cost at the equilibrium output, under monopoly equilibrium price is greater than marginal cost*. Why? Under perfect competition average revenue curve is a horizontal straight line and therefore marginal revenue curve coincides with average revenue curve and as a result marginal revenue and average revenue are equal to each other at all levels of output. Therefore, at the equilibrium output under perfect competition marginal cost not only equals marginal revenue but also average revenue, that is, price. On the other hand, average revenue curve facing a monopolistic firm slopes downward and marginal revenue curve therefore lies below it. Consequently, under monopoly average revenue (or price) is greater than marginal revenue at all levels of output. Hence, at the equilibrium output of the monopolist where marginal cost equals marginal revenue, price stands higher than marginal cost. Thus, under perfectly competitive equilibrium, price = $MR = MC$. In monopoly equilibrium, price > MC .

2. Monopolist Makes Supernormal Profits Even in the Long Run.

The second important difference between the two is that *while the perfectly competitive firm in the long run is able to make only normal profits, a monopolist can make supernormal profits even in the long run*. Under perfect competition, if firms in the short run are making profits above normal, the new firms will enter the industry to compete away the profits. But under monopoly the firm continues earning supernormal profits even in the long run since there are strong barriers to the entry of new firms in the monopolistic industry. It should not be

understood from this that monopoly always guarantees supernormal profits. When demand is low and costs are relatively higher the monopolist too would suffer losses, though only in the short run. These short-run losses are not due to competition from any new firms but due to low demand and high costs. The point is, if the monopolist, in the short run, is making profits above normal they cannot be eliminated by the entry of new firms in the long run with the result that these supernormal profits will persist even in the long run provided that the demand and cost situations do not change unfavourably.

3. Price is Higher and Output Smaller Under Monopoly.

Another important difference between monopoly equilibrium and perfectly competitive equilibrium is that *under monopoly price is higher and output smaller than under perfect competition*, assuming cost conditions in the two cases to be the same. Suppose a number of firms are producing homogeneous products and pure or perfect competition exists among them so that no one can individually affect the price. Price and output will be determined at the level where demand and supply curves intersect each other. Suppose that all the firms constituting the competitive industry combine together so as to form a monopoly. We assume that no economies, internal or external, accrue when the firms combine together so that the cost or supply conditions remain unchanged. The price and output under monopoly are determined by equality between marginal cost and marginal revenue.

Price-output equilibrium under perfect competition and monopoly are graphically shown in a single diagram (Fig. 22.8). Curves DD and SS are respectively demand and supply curves of the perfectly competitive industry. The two curves intersect each other at point E and as a result price OP and output OM are determined under perfect competition. The marginal revenue curve MR is drawn corresponding to the demand curve DD . Now, what is the marginal cost curve of the monopoly? The curve SS which is the supply curve of perfectly competitive industry will be the marginal cost curve under monopoly. It will be seen from Fig. 22.8 that the marginal revenue curve MR cuts the marginal cost curve SS of the monopolist and as a consequence monopoly price OP' and monopoly output OM' are determined. It is thus clear that if cost conditions remain unchanged, the combination of firms to form a monopoly results in a higher price and a lower output of the product. As a

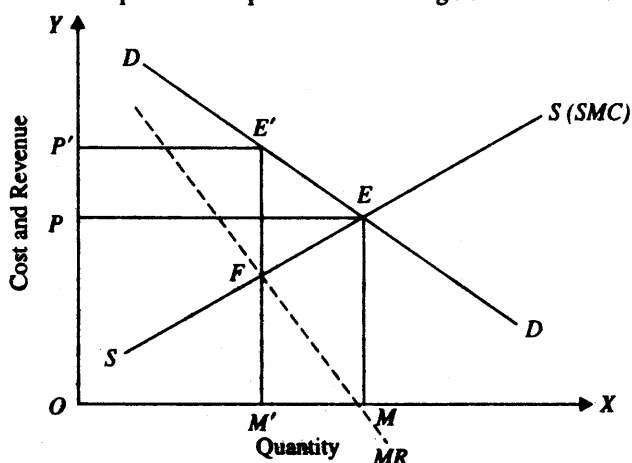


Fig. 22.8. Under Monopoly Price is Higher and Output Smaller than under Perfect Competition.

result of monopoly coming into existence price has risen from OP to OP' and output has fallen from OM to OM' . Monopoly thus restricts output to raise price.

4. Monopolist can Discriminate Prices.

The fourth significant difference between monopoly and perfect competition is that while *a monopolist can discriminate prices for his product, a firm working under perfect competition cannot*. The monopolist will be increasing his total profits by discriminating prices if he finds that elasticities of demand at the single monopoly price are different in different markets. But it is not possible for a firm under perfect competition to charge different prices from different buyers. This is because a seller under perfect competition faces a perfectly elastic demand curve at the level of going market price. Therefore, if he tries to charge a bit higher

price than the going market price from some buyers, they will turn to other sellers and purchase the same product at the going market price. But the monopolist has the sole control over supply of a product which has no close substitutes and therefore the demand curve of the product is very much less elastic. If the monopolist is able to break up his market into different parts on one basis or the other, it will be possible for him to discriminate prices in different parts of the market. But it will be profitable for him to charge different prices in the different parts only if the elasticity of demand at the single monopoly price is different in different parts.

5. Monopoly Equilibrium is Possible in all three of Cases Increasing, Constant and Falling MC

Another important difference between the two is that while under perfect competition, equilibrium is possible only when marginal cost is rising at the point of equilibrium, but monopoly equilibrium can be reached whether marginal cost is rising, remaining constant or falling

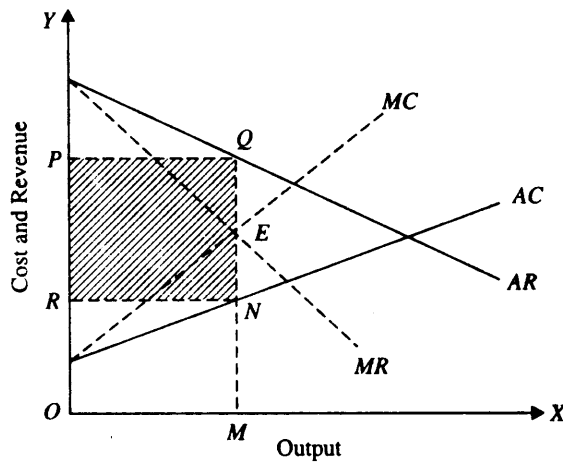


Fig. 22.9. Monopoly Equilibrium in Case of Rising Costs

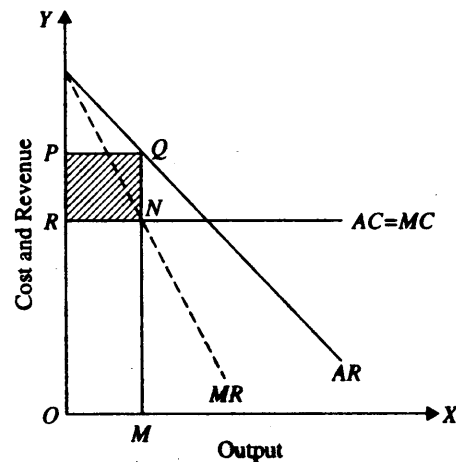


Fig. 22.10. Monopoly Equilibrium in Case of Constant Costs

at the equilibrium output. This is so because the second order condition of equilibrium, namely, *MC* curve should cut *MR* curve from below at the equilibrium point, can be satisfied in monopoly in all the three cases, whether *MC* curve is rising, remaining constant or falling, whereas in perfect competition the second order condition is fulfilled only when *MC* curve is rising. Since in perfect competition the marginal revenue curve is a horizontal straight line, marginal cost curve can cut the marginal revenue curve from below only when it (*MC* curve) is rising. But, under monopoly, marginal revenue curve is sloping downward and, therefore, marginal cost curve can cut the marginal revenue curve from below whether it (*MC* curve) is rising, remaining constant, or falling.

The equilibrium of the monopolist in these three cases is shown in Figs. and 22.9, 22.10 and 22.11. Figure 22.9 illustrates the equilibrium of the monopolist when marginal cost curve is rising at the equilibrium output.

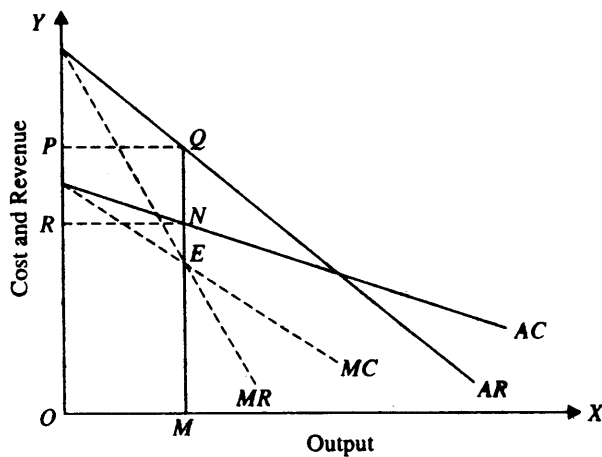


Fig. 22.11. Monopoly Equilibrium in Case of Falling Cost

Figure 22.10 shows monopoly equilibrium when marginal cost is constant at and near the equilibrium output. In Fig. 22.10 monopolist is in equilibrium when marginal cost is falling at and near the point of equilibrium. In all these three cases, OP represents the price determined, OM represents the equilibrium output, and $RNQP$ represents total positive profits made, though its amount differs in different cases.

6. Long-run Equilibrium under Monopoly is usually at a Less Than Optimum Size.

The last significant difference between the two is that *whereas a perfectly competitive firm is in long-run equilibrium at the minimum point of the long-run average cost curve, monopolistic firm is generally in equilibrium at the level of output where long-run average cost is still declining* and has not yet reached its minimum point. In other words, whereas a perfectly competitive firm tends to be of optimum size in the long run, a monopolist firm stops short of the optimum size. This is so because it pays a competitive firm to expand production so long as average cost is falling since average revenue and marginal revenue remain constant but it does not pay a monopolist firm to expand production to the minimum point of the average cost curve because it is often not worthwhile for it to do so. More frequently, the marginal revenue curve of the monopolist intersects the marginal cost curve at the level of output at which average cost is still falling, as will be seen from Fig. 22.6. On the other hand, in case of the competitive firm, marginal revenue or price, in long-run equilibrium, is equal to both marginal cost and minimum average cost. In other words, profits of the competitive firm are, in the long run, maximum at the level of output at which long-run average cost is minimum.

MONOPOLY, RESOURCE ALLOCATION AND SOCIAL WELFARE

Monopoly is often criticized that it causes misallocation of resources or economic inefficiency in resource allocation. By economic efficiency we mean that resource allocation to the production of a good is such that it maximizes social welfare, that is, the satisfaction of the consumers. Thus, whereas under perfect competition allocation of resources is pareto optimum and therefore social welfare is maximum, under monopoly resources are misallocated causing loss of social welfare. As seen above, when a product is produced and sold under conditions of monopoly, the monopolist gains at the expense of consumers, who have to pay a price higher than the marginal cost of production. This results in loss of consumers' welfare. Which is greater? monopolist's gain or consumers' loss and how total social welfare is affected by a monopoly. One method to evaluate the loss in welfare is the adoption of partial equilibrium approach by using the concept of consumer surplus.

To measure welfare gain or loss economists often use the concept of consumer's surplus. Consumer's surplus, it will be recalled, is the surplus of price which consumers are prepared to pay for a commodity rather than go without it over and above what they actually pay for it. The net loss in consumer's welfare, also called *dead weight loss* of welfare, due to monopoly, can be shown through Fig. 22.12 where TD is the demand curve for the monopolist's product, MR is the corresponding marginal revenue curve. It is assumed that the industry is a constant cost industry so that average cost (AC) remains the same as output is increased and marginal cost is equal to it.

Under perfect competition, industry will be in equilibrium with ON output being produced and price OP_c or NA of the product which has been determined by the forces of demand for and supply of the product and is equal to marginal cost of production. It will be seen from Fig. 22.12 that under perfect competition, price will be NA (or OP_c) which is equal to marginal cost at ON level of output. It will be seen from Fig. 22.12 with OP_c or NA as the market price, buyers obtain consumers' surplus equal to the area ATP_c . This is because total utility which they would get by consuming ON output will be equal to the area $OTAN$ (*i.e.*, the area under the demand curve) and the total price which they actually pay for it is measured by OP_cAN .

Now, the monopolist would produce output OM of the product as this will maximize his profits (It will be seen from Fig. 22.12, that marginal revenue (MR) and marginal cost (MC)

of the monopolist are equal at output level OM). The monopolist will set price OP_m or ML of the product. With output equal to OM and price OP_m , the monopolist profits are P_mLEP_c . On the other hand, with the rise in price to OP_m and fall in output to OM under monopoly, the consumer surplus has been reduced to LTP_m . That is, under monopoly consumers have suffered a loss of consumer surplus equal to the area ALP_mP_c . Out of the total loss of consumer surplus monopoly has gained profits equal to the area P_mLEP_c . Thus whereas consumers lose, the producers gain due to monopoly. In this way, there has been redistribution of income in favour of the monopolist. But the consumers' loss of consumer surplus is more than the gain of profits by the monopolist. It will be seen that there is net loss of consumer's welfare equal to the area of triangle LEA . Monopoly has caused this net welfare loss because it has reduced output from ON to OM . Between OM and ON outputs, consumers are prepared to pay higher price as indicated by portion of demand or average curve in this region than the marginal cost which the society has to incur on producing units of output between OM and ON .

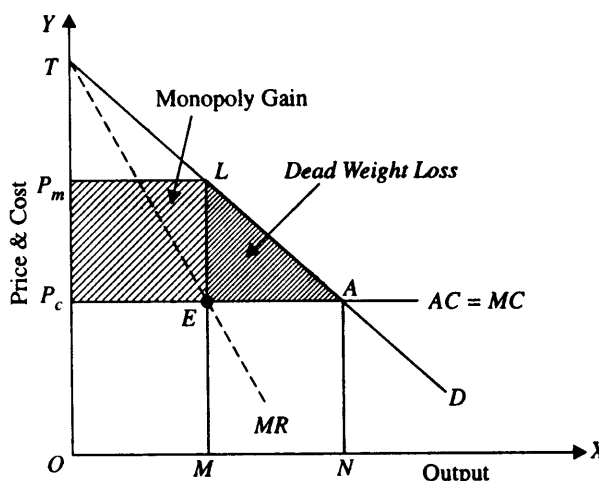


Fig. 22.12. Welfare Loss due to Monopoly under Constant cost Conditions.

With lower production of the product by the monopolist, relatively less resources will be allocated to its production. For optimum allocation of resources or for economic efficiency (i.e. achieving Pareto optimality) ON amount of the product, at which marginal cost equals price, should have been produced and resources allocated accordingly. To conclude, monopoly causes misallocation of resources and net loss of welfare (which is also known as *dead weight loss*) by not producing the level of output of the commodity at which price equals marginal cost of production.

It should be noted that in addition to causing dead weight or net welfare loss monopoly has also caused *transfer of income* away from the consumers. That is, *monopoly has also a distribution effect*. The monetary gain in income by the monopolist is equal to the area P_mLEP_c which represents this transfer of income to the monopolistic producer. The monopolist has gained at the expense of consumers. Thus monopoly adversely affects income distribution in an economy. However, it is worth mentioning that in sharp contrast to this adverse distribution effect under which one's gain is other's loss, the net welfare loss measured by the area AEL represents a loss for which no one has gained. This is why it is often referred to as *dead weight loss* in welfare. This is due to economic inefficiency or misallocation of resources caused by monopoly.

MULTIPLANT MONOPOLY

In our analysis of determination of price and output under monopoly we considered the case of single plant monopoly. That is, a monopolist was producing a product by operating a single plant. We will now analyse determination of price and output of a monopolist who is producing an identical product in different plants. For the sake of simplicity we assume the monopolist operates two plants. It is further assumed that the cost structure of the two plants is different. In order to achieve his goal of profit maximisation, he has to take the following two decisions :

1. How much total output he should produce and what price he should fix for his product.
2. How to allocate the total profit-maximising output between the two plants for producing the product. That is, of the total output how much he should produce with plant *A* and how much with plant *B*.

Price-Output Equilibrium

As before we assume that monopolist is aware of demand for his product. Demand curve for his product is downward sloping and marginal revenue curve lies below it. In order to determine price and output that maximises his profits, the monopolist has to find out the total or combined marginal cost of production in the two plants. To obtain the total or combined marginal cost of production in the two plants, he will sum up horizontally the marginal cost (*MC*) curves of the two plants. In panel (c) of Fig. 22.13 combined marginal cost curve *CMC* has been obtained by adding up horizontally MC_a and MC_b of the two plants *A* and *B*. In order to maximise profits, the monopolist equates this combined marginal cost *CMC* with marginal revenue. It will be seen from Fig. 22.13 that combined marginal cost is equal to marginal revenue at *OQ* level of output, which can be sold at price *OP*. Therefore, the multiplant monopolist will produce *OQ* output and charge price *OP* of his product which will yield him maximum profits.

Allocation of Production between the Plants

To maximise profits for producing a given level of output cost needs to be minimised. Cost of producing a given level of output will be minimised if a given level of production is allocated between the two plants so that marginal costs in each plant are equal to each other and to the marginal revenue at the equilibrium level of total output. This is because if marginal cost of production in plant *A* is lower than *MC* in plant *B*, then cost of producing a given output can be reduced by

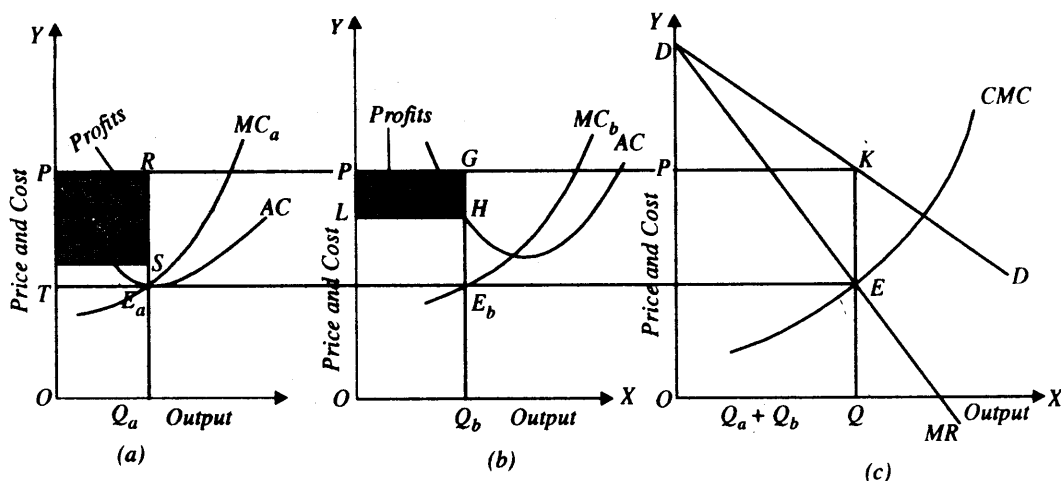


Fig. 22.13. Multiplant monopoly : Allocation of Production Between the Plants

increasing production in plant A and reducing production in plant B. until the MC in the two plants become equal. Thus cost will be minimised and profits maximised by allocating production between the two plants when the following rule is satisfied :-

$$MC_a = MC_b = CMC = MR$$

In graphic terms the above rule is fulfilled when from the equilibrium point E in panel (c) we draw a horizontal straight line which intersects the marginal cost curve MC_a of plant A at point E_a and marginal cost curve MC_b of plant B at point E_b . At these points equilibrium condition ($MC_a = MC_b = MR = CMC$) is satisfied if output OQ_a (corresponding to point E_a) in plant A and output OQ_b (corresponding to point E_b) in plant B are produced. It may be noted that outputs OQ_a and OQ_b of the two plants will be equal to the total equilibrium output OQ because by summing up horizontally such outputs that we have obtained the combined marginal cost curve CMC .

Since cost structure in the two plants is different, (in plant A, cost of production is lower than in plant B). profits earned in the two plants will also differ as the price charged for the product is the same. It will be seen from Fig. 22.13 that with output OQ_a and price OP , the profits earned by plant A are equal to the area $PRST$ and with output OQ_b in plant B, the profits made by output in plant B are equal to the area $PGHL$. Thus both output and profits in plants A are much larger than those in plant B. This is as was expected because cost of production is lower in plant A as compared to plant B.

QUESTIONS AND PROBLEMS FOR REVIEW

1. What is monopoly? Explain the three conditions necessary for the existence of monopoly.
2. Explain the relationship between average revenue, marginal revenue and price elasticity of demand under the conditions of monopoly.
3. Explain the equilibrium of a monopoly firm? Show that price fixed by the monopolist is less than marginal cost of production.
4. How are price and output determined under monopoly? Show that under monopoly price is higher and output smaller than under perfect competition
5. Show that a monopolist will always operate on the elastic part of the demand curve.
6. A monopolist will never be in equilibrium on the inelastic ($e_p < 1$) portion of the demand curve. Explain.
7. A monopolistic firm has the following total cost function and demand function.

Price (Rupees)	Quantity demand (Units)	Total cost (Rs)
8	5	20
7	6	21
6	7	22
5	8	23
4	9	24
3	10	25

Explain what price will be charged and what output will be produced.

[Hint: From the given data of price and quantity demanded, first find out total revenue ($TR = P \cdot Q$). From TR , marginal revenue can be obtained at different levels of quantity demanded or sold. From total cost data, MC can be obtained. Then the output level at which $MC = MR$, will be the equilibrium output and price at that will be equilibrium price. In the above table, MC is constant at Re. 1. When 6 units of sold, $MR = 2$ and when 7, units are sold, $MR = 0$, therefore the firm should produce 6 units of output to maximise profits].

8. How is monopoly power measured? State Lerner's measure of degree of monopoly power. Show that degree of monopoly power is inverse of the price elasticity of demand.

9. A simple monopolist is in equilibrium. At the point of equilibrium the coefficient of price elasticity is -2.0 and the marginal cost is Rs. 4.0. Calculate his equilibrium price. How will this price be effected by an increase in the fixed cost of the monopolist.

[Hints : In equilibrium, $MC = MR$

$$\text{Since } MR = P\left(1 - \frac{1}{|e|}\right)$$

$$\text{Given } MC = 4 \text{ and } e = -2$$

$$\text{i.e. } 4 = P\left(1 - \frac{1}{2}\right) = P\left(\frac{1}{2}\right)$$

$$P = 4 \times \frac{2}{1} = 8]$$

10. When a monopolist is maximising profits price is greater than marginal cost. Thus consumers will be paying more for additional units of output than it costs to produce. So why does not the monopolist produce more ?
11. A monopolist plans to produce 100 units of a commodity and observes that the price elasticity of demand at this output is 0.5. What advice would you give to the monopolist ?
[Hints. Since MR is negative at an output level where price elasticity is less than one, the monopolist will not be making maximum profits. In fact, he may be making losses if he pursues his plan. Therefore, the monopolist should restrict output of the commodity to the level where price elasticity of demand is greater than one and where his $MC = MR$]
12. A monopolist will never sell its product at a price less than its average total cost. Is it true or false ? Give reasons.
13. Explain why marginal revenue of a monopolist is less than the price charged.
14. Explain why a perfectly competitive firm will never operate when marginal cost is declining but a monopoly firm can do so.
15. If a price making monopolistic firm wants to maximise its sales revenue, it should :
(a) set the highest price it can get.
(b) set the lowest price it can get.
(c) choose a selling price at which the elasticity of demand for its product is unity.
(d) choose a selling price where the extra revenue received from the last unit sold exceeds the extra cost of making that unit. *Tick the right answer.*
16. Suppose that at the profit maximising output, a monopolist price is twice as high as his marginal cost. What is the price elasticity of demand ?
17. Does a monopolist always set his price above marginal cost ? Will he ever produce at the minimum point of long-run average curve ?
18. A monopolist has attained equilibrium at a point on the demand curve where the coefficient of price elasticity is -2.5 and the equilibrium price is Rs. 20.00. Calculate his marginal revenue.
19. What do you understand by 'dead-weight loss' of monopoly ? If the gains to producers be redistributed to consumers, would the "dead-weight loss" be eliminated ?
20. What is a social cost of monopoly ? If the gains to the monopolist could be redistributed to consumers, would the social cost of monopoly be eliminated. Explain briefly.
21. Let the demand function for an industry's output be $Q = 50 - 5P$, where P is price and Q is the output. Assume constant costs at Rs. 6 per unit of output.
(i) How much would a profit-maximising monopolist produce ? What would be the equilibrium price ?
(ii) Now assume the commodity is produced by a public sector undertaking which follows the *marginal cost pricing principle*. What would be the optimal quantity produced ?

[Hints (ii) A public sector undertaking following marginal cost-pricing principle would set the price equal to marginal cost of production. Thus

$$Q = 50 - 5P \quad \dots (1)$$

$$5P = 50 - Q$$

$$P = 10 - 1/5 Q \quad \dots (2)$$

Setting price (P) equal to marginal cost we have

$$6 = 10 - 1/5 Q$$

$$1/5 Q = 10 - 6 = 4, \text{ or } Q = 20$$

22. Consider a shift in demand under monopoly. In two separate diagrams, show that this can result in:
- Different quantities being supplied at the same price.
 - Different prices supporting the same quantity. Hence show that a monopolist does not have a unique supply curve.
23. We write the percentage make-up of price over marginal cost as $(P - MC)/P$. For a profit maximising monopolist, how does this mark-up depend on the elasticity of demand? Why can this mark-up be viewed as a measure of monopoly power?
24. Show why supply curve does not exist under monopoly.
[D.U.B. Com. (H), 1997, C.U., B.Com., (H), 1998, 95]
25. Explain the long-run equilibrium under monopoly. Explain the adjustment process how a monopoly firm will shift from the short-run equilibrium to the long-run equilibrium position. Why is monopoly profits not likely to be eliminated?
26. Show how monopoly causes misallocation of resources and thereby causes loss of social welfare

OR

Monopoly is said to be economically inefficient. Explain and show how it causes dead weight loss.
[D.U. B.Com. (H), 1996]

27. Suppose the price elasticity of demand for the product of a monopolist is -2.0 . Show that price fixed by him will be twice the marginal cost of production.

Solution. In price-output equilibrium of the monopolist

$$MR = MC$$

Since $MR = P \left(1 - \frac{1}{|e|} \right)$

In equilibrium, $MC = P \left(1 - \frac{1}{|e|} \right)$

If $e = 2.0$

$$MC = P \left(1 - \frac{1}{2} \right) = \frac{1}{2} P, \quad P = 2MC$$

Price Discrimination

MEANING OF PRICE DISCRIMINATION

Price discrimination refers to the practice of a seller of selling the same product at different prices to different buyers. A seller makes price discrimination between different buyers when it is both possible and profitable for him to do so. If the manufacturer of a refrigerator of a given variety sells it at Rs. 5000 to one buyer and at Rs. 5,100 to another buyer (all conditions of sale and delivery being the same in two cases), he is practising price discrimination.

Price discrimination, as defined above, is not a very common phenomenon. It is very difficult to charge different prices for the identical product from the different buyers. More often, the product is slightly differentiated to successfully practise price discrimination. Thus, the concept of price discrimination can be broadened to include the sale of the various varieties of the same good at prices which are not proportional to their marginal costs. Thus, Prof. Stigler defines price discrimination as "*the sales of technically similar products at prices which are not proportional to marginal costs.*"¹ On this definition, a seller is indulging in price discrimination when he is charging different prices from different buyers for the different varieties of the same good if the differences in prices are not the same as or proportional to the differences in the costs of producing them. For example, if a book costs the publisher Rs. 28 per unit and its *de luxe* edition Rs. 30 per unit, then he will be practising price discrimination if he sells the ordinary edition at Rs. 30 per unit and the *de luxe* edition at Rs. 60 per unit. In this case, he is said to be practising price discrimination because the price difference between the two editions (Rs. 60 - 30 = 30) is greater than the cost difference between them (Rs. 30 - 28 = 2).

Though this second case of price discrimination is very relevant, but is more complicated. Therefore, for the purpose of analysis given below, we shall restrict ourselves to the simple case of price discrimination—the sale of the same product at different prices to different buyers. But the conclusions arrived at in this simple case will be generally valid in case of the more complicated case.

Three types of price discrimination may be noted. Price discrimination may be (a) *personal*, (b) *local*, or (c) *according to use or trade*. Price discrimination is personal when a seller charges different prices from different persons. Price discrimination is local when the seller charges different prices from people of different localities or places. For instance, producer may sell a commodity at one price at home and at another price abroad. Discrimination is according to use when different prices of a commodity are charged according to the uses to which the commodity is put. For example, the electricity is usually sold at a cheaper rate for domestic uses than for commercial purposes.

Degrees of Price Discrimination

Prof. A.C. Pigou has distinguished between the following three types of price discrimination

1. G.J. Stigler, *The Theory of Price*, revised edition 1952, p. 215.

on another ground (i) price discrimination of the first degree; (ii) price discrimination of the second degree; and (iii) price discrimination of the third degree.

Price Discrimination of First Degree. Price discrimination of the first degree involves maximum possible exploitation of each buyer in the interest of a seller's profits. Price discrimination of the first degree is also called *perfect price discrimination*. *Price discrimination of the first degree or perfect price discrimination is said to occur when the monopolist is able to sell each separate unit of the output at a different price.* Thus under discrimination of the 'first degree' every buyer is forced to pay the price which is equal to the maximum amount he is willing to pay rather than do without the good altogether. In other words, under perfect price discrimination, the seller leaves no consumer's surplus to any buyer.

Price Discrimination of the Second Degree. Price discrimination of the second degree would occur if a monopolist were able to charge separate prices in such a way that all units with a demand price greater than, say X , were sold at a price X , all units with a demand price greater than Y but less than X at a price Y , and so on. *In price discrimination of the second degree buyers are divided into different groups and from each group a different price is charged which is the lowest demand price of that group.* In this way, the seller divides his market into different groups of buyers in such a way that from each group of buyers he charges a different price and the price which he charges from each group is that which a marginal individual of that group is just willing to pay.

Price Discrimination of Third Degree. Price discrimination of the *third degree* is said to occur when the seller divides his buyers into two or more than two sub-markets or groups and charges a different price in each sub-market. The price charged in a sub-market need not be the lowest demand price of that sub-market or group. The price charged in each sub-group depends upon the output sold in that sub-market and the demand conditions of that sub-market. Price discrimination of the third degree is most common. A common example of such discrimination is found in the practice of a manufacturer who sells his product at a higher price at home and at a lower price abroad. Again, the third degree price discrimination is found when an electric company sells electric power at a lower price to the households and at a higher price to the manufacturers who use it for industrial purposes. In our analysis of price discrimination made below, we will assume only third degree price discrimination since this is usually more practicable as well as most commonly found in case of the real world.

WHEN IS PRICE DISCRIMINATION POSSIBLE?

Two fundamental conditions are necessary for the price discrimination to become possible. First, price discrimination can occur only *if it is not possible to transfer any unit of the product from one market to another.* In other words, a seller can practise price discrimination only when he is selling in different markets which are divided in such a way that product sold by him in the cheaper market cannot be resold in the dearer market. Price discrimination by the original seller will break down if his buyers in the cheaper market purchase the product from him and resell it to the buyers in the dearer market. Buyers in the dearer market of the original seller will instead of buying from him will buy the product from the buyers of his cheaper market. Thus, a seller can charge different prices in the two markets when there is no possibility of the product being transferred from the cheaper market to the dearer market.

Second essential condition for price discrimination to occur is that *it should not be possible for the buyers in the dearer market to transfer themselves into the cheaper market to buy the product or service at the lower price.* For instance, if a doctor is charging a smaller fee from the poor than from the rich, then his price discrimination will break down if a rich man can pretend to be poor and pay a poor man's charges to the doctor.

It is now clear that for the price discrimination to become practicable, neither the unit of the good, nor the unit of demand (*i.e.*, buyer) can be transferred from one market to the other. In other words, there should not be any seepage or communication between the two markets.

Thus price discrimination depends upon the ability of the seller to keep his two markets quite separate. If he is not able to keep the different markets separate, the price discrimination by him will break down. Price discrimination is possible in the following cases.

1. **Nature of the Commodity.** The nature of the commodity or service may be such that there is no possibility of transference from one market to the other. The most usual case is the sale of direct personal services like that of a surgeon or lawyer. The surgeons usually charge different fees from the rich and the poor for the same kind of operation. This is possible for them since the service has to be delivered personally by the surgeon and therefore it cannot be transferred. Neither is it possible for the rich men to assume to be poor so easily in order to pay the smaller fee.

2. **Long Distances or Triff Barriers.** Discrimination often occurs when the markets are separated by large distance or tariff barriers so that it is very expensive to transfer goods from a cheaper market to be resold in the dearer market. A monopolist manufacturer at Madras may sell his product in one town, say Calcutta, at Rs. 20 and in another town, say Delhi, at Rs. 15. If the transport cost between Delhi and Calcutta is greater than Rs. 5 per unit it will not be worthwhile for the buyers in Delhi to transfer the goods to Calcutta on their own. Similarly, if a seller is selling his good in two different markets, say, in a home market which is protected by a tariff and in a foreign market without a tariff, he can take advantage of the tariff barrier and can raise the price of his product in the home market (which is protected by the tariff). As a result, he will be selling the product in the foreign market at a lower price than at home. This practice of selling the product at cheaper rates abroad than at home is known as dumping.

3. **Legal Sanction.** In some cases there may be *legal sanction for price discrimination*. For example, an electricity company sells electricity at a lower price if it is used for domestic purposes and at a higher price if it is used for commercial purposes. In this case customers are liable to be fined if they use electricity for commercial purposes if the sanction has been granted for domestic purposes only. The same is the case with railways which charge different fares for travelling in First Class, and Second Class compartments. Though the service of carrying rendered in three classes of compartments slightly differs in each case but the differences in fares are out of proportion to the differences in comforts provided. So this is a clear case of price discrimination by legal sanction. It is unlawful and a criminal offence to travel in the first class with a ticket for the second class.

4. **Preferences or Prejudices of the Buyers.** Price discrimination may become possible due to *preferences or prejudices of the buyers*. The same good is generally converted into different varieties by providing different packings, different names or labels in order to convince the buyer that certain varieties are superior to others. Different prices are charged for different varieties, although they differ only in name or label. In this way the producers are usually able to break up their market and sell the so-called superior varieties to the rich people at higher prices and the so-called inferior varieties to the poor people. Sometimes there is some actual difference in the various varieties of the good, for instance, generally there is a difference in the paper used and quality of the binding between the *de luxe* edition and ordinary edition of a book, but the difference in prices of the two kinds of editions is more than proportional to the extra costs incurred on the *de luxe* edition. So, this is a clear case of price discrimination based on the preferences or prejudices of the various buyers of the product. It is worth quoting Mrs. Joan Robinson in this connection. "Various brands of a certain article which in fact are almost exactly alike may be sold as different qualities under names and labels which induce rich and snobbish buyers to divide themselves from poor buyers, and this way the market is split up and the monopolist can sell what is substantially the same thing at several prices."²

Another case of price discrimination falling in this category is that when some people prefer to buy goods in a particular locality at a higher price. For example, if a seller has two

2. Joan Robinson, *Economics of Imperfect Competition* pp. 180-81.

shops, one in Connaught Place which is the most fashionable shopping centre in Delhi and another at Sadar Bazar which is very congested and ugly locality in Delhi, he may be selling the same product at a higher price at Connaught Place and at a lower price in Sadar Bazar. It is the fashionable and rich people who usually buy goods at Connaught Place and they will be prepared to pay a higher price rather than go for shopping in the congested and ugly locality of Sadar Bazar.

5. **Ignorance and Laziness of Buyers.** Price discrimination may become possible due to *ignorance and laziness of buyers*. If a seller is discriminating between two markets but the buyers of the dearer market are quite ignorant of that fact that the seller is selling the product at a lower price in another market, then price discrimination by the seller will persist. Price discrimination will also persist if the buyers of the dearer market are aware of the seller's act of selling the same product at a lower price in another market but due to laziness may not go for shopping in the cheaper market. In these cases if the ignorance is removed or laziness is given up, the price discrimination will break down.

6. Price discrimination may become possible *when several groups of buyers require the same service for clearly differentiated commodities*. For example, railways charge different rates of fare for the transport of cotton and coal. In this case price discrimination is possible since bales of cotton cannot be turned into loads of coal in order to take advantage of the cheaper rate of transport for coal.

Price Discrimination is not Possible under perfect competition.

We have seen above those conditions under which price discrimination is possible. Now the question arises under what market from a seller can practise price discrimination. It is obvious that *under perfect or pure competition no seller can charge different prices from different buyers for the same product*. Under perfect or pure competition, there are many sellers selling the homogeneous product. If any seller tries to charge from some buyers a higher price than the prevailing market price, they will refuse to buy from him and will buy the same product at the prevailing price from other sellers. It is worth noting that under conditions of perfect or pure competition price discrimination cannot prevail even if the market can be easily divided into separate parts. This is so because if conditions of perfect or pure competition prevails in each part of the whole market, then every seller will confront a perfectly elastic demand curve in each part and every seller will like to sell the whole of his output in that part of the market in which the highest price prevails. But their attempt to do so would force down the price to the competitive level so that a single price will prevail throughout the whole market. But if all sellers under perfect competition, combine or arrive at some understanding, then they can discriminate prices. "So long as market is perfect it is only if all sellers are combined or are acting in agreement that they can take advantage of the barriers between one part of a market and another to charge different prices for the same thing."³ However, it may be pointed out that if all sellers combine or enter into an agreement regarding price, discrimination, perfect competition ceases to exist. We thus see that price discrimination is not possible under perfect competition.

Price Discrimination occurs under Monopolistic Competition and Monopoly

Under imperfect or monopolistic competition, price discrimination can occur. The degree of price discrimination practised depends upon the degree of imperfection in the market. The imperfect or monopolistic competition prevails when the product is differentiated and every seller has some attached customers who will not move so readily from one seller to another. Therefore, if imperfect or monopolistic competition exists and also the market can be divided into different parts by a seller, then price discrimination becomes possible. It should be noted that in this case an individual seller may not produce a single variety of the product but may produce various varieties of his product and thus may break up his market into different parts

3. Joan Robinson, *Economics of Imperfect Competition*, p. 179.

and charge different prices for different varieties of his good. Price discrimination will occur only if extra prices charged for the so-called superior varieties are not proportional to the extra costs incurred on them.

But price discrimination is more likely to occur when there is monopoly of the product by a single seller or when there is agreement among the various sellers selling the same product or service. Monopoly exists when there are no other sellers selling the same good or its close substitutes. Therefore, monopolist is in a position to charge different prices from different buyers for the same good. Price discrimination also usually occurs when there are various sellers selling the same product or same service but there is agreement among them for charging different prices from different groups of buyers. For instance, doctors have generally some understanding with each other to charge higher fees from the rich and lower fees from the poor.

WHEN IS PRICE DISCRIMINATION PROFITABLE?

We have seen above under what conditions price discrimination is possible. Price discrimination may be possible yet it may not pay the monopolist to discriminate prices in the separate markets. In other words, the monopolist may be able to discriminate prices but it may not be profitable for him to do so. We have to see now under what conditions it is profitable for the monopolist to discriminate prices between the two markets. *Price discrimination is profitable only if elasticity of demand in one market is different from elasticity of demand in the other.* Therefore, the monopolist will discriminate prices between two markets only when he finds that the price elasticity of demand of his product is different in the different sub-markets. We shall analyse below this condition for the profitability of price discrimination.

(a) When Demand Curves in the Separate Markets are Iso-elastic.

If the demand curves in the two markets are iso-elastic so that at every price the elasticity of demand in the two markets is the same, then it will not pay the monopolist to charge different prices in the two markets. Why? When elasticity of demand is the same in the two markets, it follows from the formula, $MR = AR \frac{e-1}{e}$ that marginal revenues in the two markets at every price of the good will also be the same. Now, if marginal revenues at every price of the product are same in the two markets, it will not be profitable for the monopolist to transfer any amount of the good from one market to the other and thus to charge different prices of the good in the two markets.

(b) When Elasticity of Demand is Different in Various Markets at the Single Monopoly Price.

It will be to the advantage of the monopolist to set different prices if price elasticities of demand in the two markets at the single monopoly price are not the same. In fact, if he wants to maximize profits he must discriminate prices if the price elasticities of demand in the two markets at the single monopoly price are different. If the producer regards the two markets as one and charges a single monopoly price on the basis of aggregate marginal revenue and marginal cost of the output, he would not be maximizing profits if elasticities of demand in the two markets at the single monopoly price are different. If price elasticity of demand is the same in the two markets at the single monopoly price, it will not pay the monopolist to discriminate between the two markets, even if the elasticities are different at *other prices*.

Suppose on the basis of aggregate marginal revenue and marginal cost, a monopolist fixes a single price (which is called the single monopoly price) and charges the same price in both the markets. If he now finds that price elasticity of demand at this single monopoly price is different he can increase his total profits by discriminating prices between the two markets. How is it profitable for the monopolist to charge different prices in the two markets when elasticities of demand in them at the single monopoly price are different? This follows from

the formula, $MR = AR \frac{e-1}{e}$. When average revenue in both the markets is the same, that is, when the monopolist charges a single monopoly price in both the markets, but elasticities are different in the two markets, then marginal revenues in the two markets will be different. Suppose the single monopoly price is Rs. 15 and elasticity of demand in markets *A* and *B* is respectively 2 and 5. Then,

$$\begin{aligned} MR \text{ in market } A &= AR_a \frac{e_a - 1}{e_a} \\ &= 15 \frac{2-1}{2} = 15 \times \frac{1}{2} = 7.5 \end{aligned}$$

$$\begin{aligned} MR \text{ in market } B &= AR_b \frac{e_b - 1}{e_b} \\ &= 15 \times \frac{5-1}{5} \\ &= 15 \times \frac{4}{5} = 12 \end{aligned}$$

It is thus clear that marginal revenues in the two markets are different when elasticities of demand at the single monopoly price are different. Further, from the above numerical example, it is manifest that the marginal revenue in the market in which price elasticity is higher is greater than the marginal revenue in the market where elasticity is lower. Now, it is profitable for the monopolist to transfer some amount of the product from the market *A* where elasticity is less and therefore marginal revenue is low to the market *B* where elasticity is higher and, therefore, marginal revenue is larger. In this way, the loss of revenue by reducing sales in market *A* by some marginal units will be smaller than the gain in revenue from increasing sales in market *B* by those units. Thus, in the above example, if one unit of the product is withdrawn from market *A*, the loss in revenue will be Rs. 7.5, while with the addition to sales by one more unit of the product in market *B*, the gain in revenue will be about Rs. 12. It is thus clear that the transference will be profitable, when there is difference in price elasticities of demand and hence in marginal revenues.

It is worth mentioning that when some units of the product are transferred from market *A* to market *B*, price in market *A* will rise and price in the market *B* will fall. This means that the monopolist will now be discriminating prices between the two markets.

But here a relevant question arises: how long will it be profitable for the monopolist to continue shifting his product from the market with lower elasticity of demand to the market with higher elasticity of demand? It is worthwhile for the monopolist to go on transferring units from market *A* (with lower elasticity of demand) to market *B* (with higher elasticity of demand) until the marginal revenues in the two markets are equal. This is because as long as marginal revenue in market *B* is greater than that in market *A*, he will be making addition to revenue in market *B* by selling an additional unit of the product more than the loss he will be incurring in market *A* from reducing sales by one unit. When the marginal revenues in the two markets become equal as a result of transference of some output, it will no longer be profitable to shift more output from market *A* to market *B*. When the position of equality of the marginal revenues in the two markets is reached, he will be charging different prices in the two markets—a higher price in market *A* with lower elasticity of demand and a lower price in market *B* with a higher elasticity of demand.

PRICE AND OUTPUT EQUILIBRIUM UNDER PRICE DISCRIMINATION

We have explained above the conditions under which price discrimination is possible and profitable. We now turn to analyse the equilibrium of a discriminating monopolist. Under simple monopoly, a single price is charged for the whole output; but under price discrimination the

monopolist will charge different prices in different sub-markets. First of all, therefore, the monopolist has to divide his total market into various sub-markets on the basis of differences in price elasticity of demand in them. The monopolist can divide his total market into several sub-markets according to the differences in demand elasticity, but for the sake of making our analysis simple we shall explain the case when the total market is divided into two sub-markets.

In order to reach the equilibrium position, the discriminating monopolist has to take two decisions: (1) how much total output should be produced; and (2) how the total output should be distributed between the two sub-markets and what prices he should charge in the two sub-markets.

The same marginal principle will guide his decision to produce a total output as that which guides a perfect competitor or a simple monopolist. In other words, the discriminating monopolist will compare the marginal revenue with the marginal cost of the output. But he has to find out first the aggregate marginal revenue of the two sub-markets taken together and then compare this aggregate marginal revenue with the marginal cost of the total output. Aggregate marginal revenue curve is obtained by summing up laterally the marginal revenue curves of the sub-markets. Consider Fig. 23.1. MR_a is the marginal revenue curve in sub-market A corresponding to the demand curve D_a . Similarly, MR_b is the marginal revenue curve in sub-market B corresponding to the demand curve D_b . Now, the aggregate marginal revenue curve AMR , which has been shown in diagram (iii) of Fig. 23.1, has been derived by adding up laterally MR_a and MR_b . This aggregate marginal revenue curve depicts the total amount of output that can be sold in the two sub-markets taken together corresponding to each value of the marginal revenue. Marginal cost curve of the monopolist is shown by the curve MC in Fig. 23.1 (iii).

The discriminating monopolist will maximize his profits by producing the level of output at which marginal cost curve MC intersects the aggregate marginal revenue curve AMR . It is manifest from Fig. 23.1 (iii) that profit-maximizing output is OM , for only at OM aggregate marginal revenue (AMR) is equal to the marginal cost (MC) of the whole output. Thus the discriminating monopolist will decide to produce OM level of output.

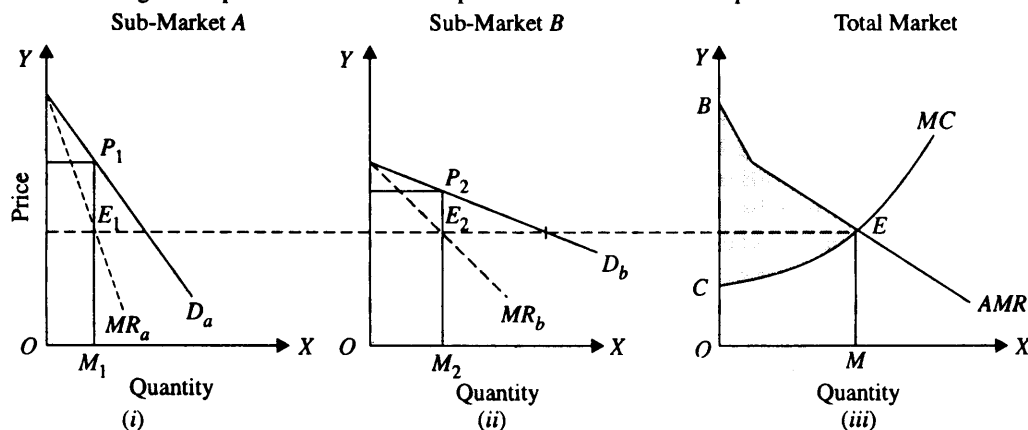


Fig. 23.1. Fixation of Total Output and Different Prices in the Two Markets

Once the total output to be produced has been determined the next task for the discriminating monopolist is to distribute the total output between the two sub-markets. He will distribute the total output OM in such a way that marginal revenues in the two sub-markets are equal. Marginal revenues in the two sub-markets must be equal if the profits are to be maximized. If he is so allocating the output in two markets that the marginal revenues in the two are not equal, then it will pay him to transfer some amount from the sub-market in which the marginal revenue is less to the sub-market in which the marginal revenue is greater. Only when the marginal revenues in the two markets are equal, it will be unprofitable for him to shift any amount from one market to the other.

But for the discriminating monopolist to be in equilibrium it is essential not only that the marginal revenues in the two markets should be the same but that they should also be equal to the marginal cost of the whole output. Equality of marginal revenues in the two markets with marginal cost of the whole output ensures that the amount sold in the two markets will together be equal to the whole output OM which has been fixed by equalizing aggregate marginal revenue with marginal cost. It will be seen from Fig. 23.1 [diagram (iii)] that at equilibrium output OM , marginal cost is ME . Now, the output OM has to be distributed in the two markets in such a way that marginal revenue in them should be equal to the marginal cost ME of the whole output. It is clear from the diagram (i) that OM_1 should be sold in sub-market A, because marginal revenue M_1E_1 at amount OM_1 is equal to marginal cost ME . Similarly, OM_2 should be sold in sub-market B, since marginal revenue M_2E_2 at amount OM_2 is equal to the marginal cost ME of the whole output. To conclude, demand and cost conditions being given, the discriminating monopolist will produce total output OM and will sell amount OM_1 in sub-market A and amount OM_2 in sub-market B. It should be carefully noted that the total output OM will be equal to $OM_1 + OM_2$.

Thus, for the discriminating monopolist to be in equilibrium, the following conditions must be fulfilled:

1. $AMR = MC$
2. $MR_1 = MR_2 = MC$

Another important thing to discover is what price will be charged in the two markets. It is clear from the demand curve that amount OM_1 of the good can be sold at price M_1P_1 in sub-market A. Therefore, price M_1P_1 will be set in sub-market A. Likewise, amount OM_2 can be sold at price M_2P_2 in sub-market B. Therefore, price M_2P_2 will be set in sub-market B. Further, it should be noted that *price will be higher in market A where the demand is less elastic than in market B where the demand is more elastic*. Thus, price M_1P_1 is greater than the price M_2P_2 . The relation between prices in the two markets and demand elasticities in them can be derived as follows.

We know that the following relationship between price, marginal revenue and price elasticity in a market holds good.

$$MR = \text{Price} \left(\frac{e-1}{e} \right)$$

Therefore,

$$MR_a = P_a \left(\frac{e_a-1}{e_a} \right) \quad \dots(i)$$

where P_a stands for price, MR_a for marginal revenue and e_a for price elasticity in market A.

Likewise,

$$MR_b = P_b \left(\frac{e_b-1}{e_b} \right) \quad \dots(ii)$$

where P_b stands for price, MR_b for marginal revenue and e_b for price elasticity in market B.

Since in equilibrium under price discrimination, $MR_a = MR_b$, we get from (i) and (ii)

$$P_a \left(\frac{e_a-1}{e_a} \right) = P_b \left(\frac{e_b-1}{e_b} \right)$$

$$\frac{P_a}{P_b} = \frac{\frac{e_b-1}{e_b}}{\frac{e_a-1}{e_a}} = \frac{\left(1 - \frac{1}{e_b}\right)}{\left(1 - \frac{1}{e_a}\right)}$$

Suppose price elasticity in market A is equal to 2 and price elasticity in market B is equal to 3, then

$$\begin{aligned}\frac{P_a}{P_b} &= \frac{\frac{3-1}{3}}{\frac{2-1}{2}} = \frac{\frac{2}{3}}{\frac{1}{2}} \\ &= \frac{2}{3} \times \frac{2}{1} = \frac{4}{3}\end{aligned}$$

Thus, when elasticities in markets A and B are 2 and 3 respectively, the prices in the two markets will be in the ratio of 4:3.

From the forgoing analysis it follows that the following two conditions are required to be satisfied for the equilibrium of a discriminating monopolist:

- (1) Aggregate Marginal Revenue (AMR) = Marginal Cost (MC) of the total output.
- (2) $MR_a = MR_b = MC$.

An Important Application : Price Discrimination in Case of Dumping

Theory of pricing of a discriminating monopolist has an important application in the field of international marketing. *Dumping is international price discrimination.* Dumping occurs when a producer sells a commodity in a foreign country at a price that is lower (net of transportation costs, tariffs) than the price which he charges in the domestic market. It may be noted that price discrimination of the dumping type is possible because domestic and foreign markets are separated from each other because of large geographical distances, tariffs, quota etc. We shall explain a simple case of dumping type of price discrimination when a producer is selling in the international market where he faces perfect competition,

while in the domestic he has a monopoly. The demand curve for the product will be perfectly elastic for him in the international market in which he faces perfect competition, while the demand curve will be sloping downward in the home market in which he enjoys monopolistic position. Equilibrium in this situation is depicted in Fig. 23.2. In the home market in which the producer has a monopoly, demand curve or the average revenue curve AR^H is sloping downward. So does the marginal revenue curve MR^H . In the international or world market in which he faces perfect competition, the demand for his product is perfectly elastic. The average revenue curve AR^W of the producer in the world market is therefore a horizontal straight line and marginal revenue curve MR^W coincides with it. MC is the marginal cost curve of output. Aggregate marginal revenue curve in this case is the composite curve $BFED$ which is the lateral summation of MR^H and MR^W . The marginal cost curve MC intersects the aggregate marginal revenue curve $BFED$ at point E and equilibrium output OM is determined. The total output OM is to be distributed between the home market and the world market in such a way that marginal revenue in each market is equal to each other and to the marginal cost ME . It is clear from Fig. 23.2 that when amount OR is sold in the home market, the marginal revenue is RF which

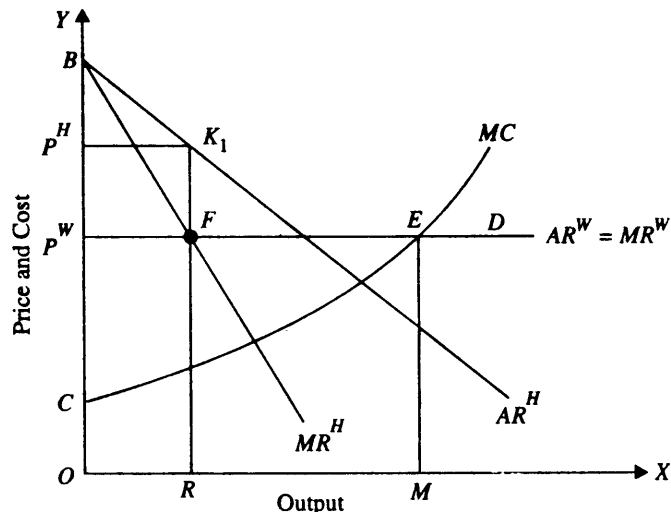


Fig. 23.2. Equilibrium of the discriminating monopolist when he has a monopoly in the home-market and faces perfect competition in the world market.

in which he faces perfect competition, the demand for his product is perfectly elastic. The average revenue curve AR^W of the producer in the world market is therefore a horizontal straight line and marginal revenue curve MR^W coincides with it. MC is the marginal cost curve of output. Aggregate marginal revenue curve in this case is the composite curve $BFED$ which is the lateral summation of MR^H and MR^W . The marginal cost curve MC intersects the aggregate marginal revenue curve $BFED$ at point E and equilibrium output OM is determined. The total output OM is to be distributed between the home market and the world market in such a way that marginal revenue in each market is equal to each other and to the marginal cost ME . It is clear from Fig. 23.2 that when amount OR is sold in the home market, the marginal revenue is RF which

is equal to marginal cost ME . Thus, out of total output OM , amount OR will be sold in the home market. From the curve AR^H , it is clear that price OP^H will be charged in the home market. Rest of the amount RM will be sold in the world market at price OP^W . Area $CEFB$ represents the total profits earned by the producer from both the markets. Price in the world market OP^W is lower than the price OP^H in the home market. *When a producer charges a lower price in the world market than in the home market, he is said to be dumping in the world market.* It is worth mentioning that difference in prices in the world market and home market is due to the differences in price elasticity of demand in them. In the domestic market, price elasticity of demand is less and therefore price charged is higher as compared to the international or world market where elasticity is higher (in fact, it is equal to infinity), the price charged is lower.

It may be noted that the type of dumping which we have explained above is called *persistent dumping* by the economists. This persistent dumping is the most usual one and arises when a monopolist pursuing the objective of profit maximization perceives that there exist differences in price elasticity of demand in the domestic market and international market. He therefore finds that he can enlarge his profits by discriminating prices in the two markets. As mentioned above, the price elasticity of demand is usually higher in the international market because there is severe competition among countries to sell their products in the world markets and also a relatively large number of substitutes are available there. Thus, the monopolist maximizes profits by charging a higher price in the domestic market and a lower price in the international market.

There is another type of dumping which is known as *predatory dumping*. Predatory dumping represents unfair method of competition because under it a producer deliberately sells his product in a foreign country at a lower price in order to eliminate competitors and gain control of the foreign market for a short period of time. When the producer succeeds in his ulterior motive of gaining monopoly control of the foreign market, he then exploits the foreign buyers by substantially raising the price of his product and thus maximizing his long-run profits. It is this type of dumping that is severely criticized and opposed.

COMPARING DISCRIMINATING MONOPOLY OUTPUT AND SIMPLE MONOPOLY OUTPUT

It is now proper to discuss whether the total output of the product under price discrimination will be greater than, equal to or smaller than output under simple monopoly in which a single price for the product is charged. There is no single rule in regard to the effect of price discrimination on output. Whether the price discrimination will increase output or reduce output or leave output unchanged depends upon the various conditions.

First of all, *there are cases in which no output will be produced at all under simple monopoly.* In such cases, output of the product is possible only under price discrimination. The fact that the average revenue under price discrimination is greater than the average revenue under simple monopoly has an important bearing over this question. If the average cost curve of a product lies above the demand curve for it throughout its length, then it will not be profitable for the simple monopolist to produce any output at all. He may find that if he breaks up the market and charges different prices in the various separate markets, it may be profitable for him to produce some output of the product. This is so because the average revenue obtained by discriminating prices in the two separate markets is greater than the average revenue under simple monopoly. The average revenue under price discrimination (DAR) may therefore be greater than the average cost, when average revenue under simple monopoly (SAR) is less than the average cost. This situation is depicted in Fig. 23.3 in which average cost of output is shown by the curve AC . D_1 is the demand curve facing the monopolist in one market and D_2 is the demand curve facing him in the other market. The composite curve BRT is the aggregate demand curve (AD) or the average revenue curve under simple monopoly (SAR).

It is evident from Fig. 23.3 that aggregate demand curve (AD) lie below the average cost

curve AC throughout its length. In other words, average cost is greater than average revenue at all levels of output when a single price is charged for the product. For instance, suppose a

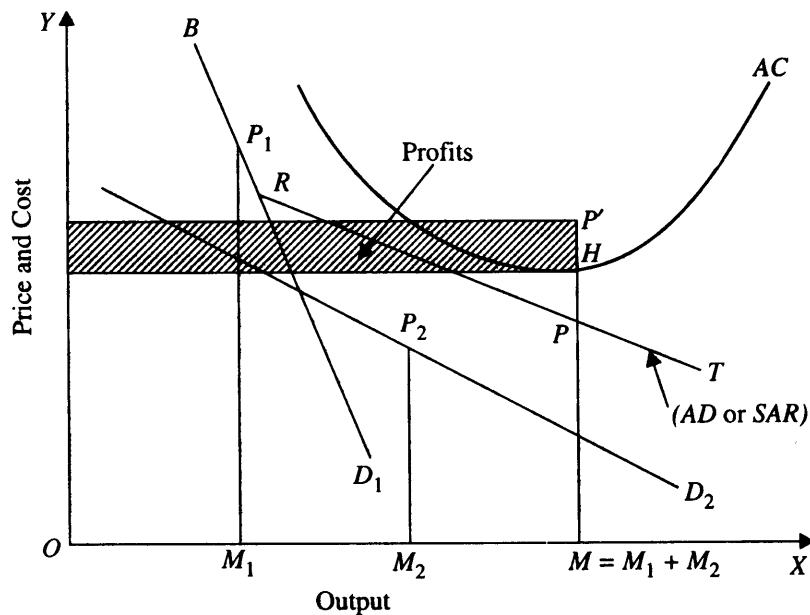


Fig. 23.3. The case where there will be production only under price discrimination.

simple monopolist decides to produce OM level of output, the single price which he will be able to charge from both markets is MP which is less than the average cost MH . So it will not pay the simple monopolist to produce OM output and charge the single price. But it will be profitable for him to produce OM output if he discriminates prices in the two markets. Under discrimination he can sell output OM_1 in one market at price M_1P_1 and output OM_2 in the other market at price M_2P_2 , ($OM_1 + OM_2 = OM$). By discriminating prices in this way, suppose the average revenue obtained by him is equal to MP' . It will be seen from Fig. 23.3. That MP' is greater than the average cost MH of output OM . Whereas it is not profitable for the simple monopolist to produce any output under single price system, it pays him to produce output by discriminating prices in the two markets.

We have discussed above the extreme case when there will be no output without price discrimination. In less extreme cases, output under price discrimination may be larger than or smaller than or equal to output without discrimination. These cases are explained below.

1. If the simple monopoly output (when only one price is charged for the product) is very small, the power to introduce price discrimination will have no effect at all on the output. This happens when above a certain price the product has a demand in only one market and the simple monopoly price is so high that only the buyers in the stronger market⁴ will purchase the good, then the power to discriminate prices in the two markets will be infructuous. This is because the marginal revenue in the weaker market is so small that it does not pay the discriminating monopolist to sell any output in the weaker market. This can be easily understood from Fig. 23.4. It is clear that if simple monopoly output is so small that price set is greater than OP , then the good is demanded only in the stronger market. Power to introduce price discrimination will be of no avail and will have no effect on output since there are no sales

4. Stronger market is one where intensity of demand is very high so that some amount of the good is demanded even at higher prices.

and no revenue earned in the weaker market above price OP . In such case only the stronger market is served whether discrimination is possible or not. It follows, therefore, that a single price will be charged in this case even when discrimination is possible.

2. When output is so large and simple monopoly price set is such that marginal revenue in the stronger market is equal to the price at which some output will be purchased in the weaker market, it will begin to be profitable for the monopolist to discriminate prices and sell some output in the weaker market as well. In Fig. 23.4 when output is ON simple monopoly

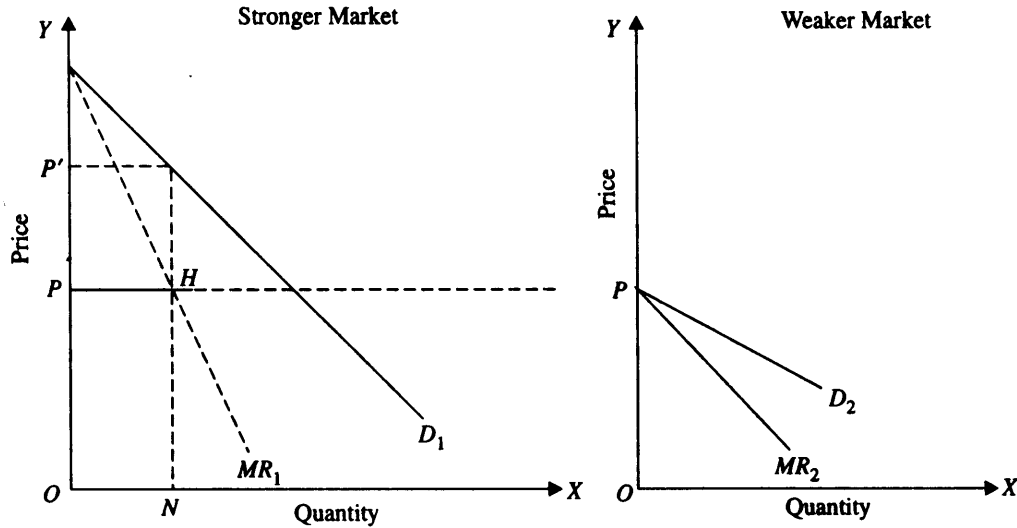


Fig. 23.4. Price discrimination will not affect output if simple monopoly output is so small that price set is greater than OP .

price is OP' , marginal revenue in the stronger market is NH and is equal to the highest price OP in the weaker market. Now, if the output is increased beyond ON and price falls down below OP it will pay the discriminating monopolist to sell some output in the weaker market, although the simple monopolist will sell only in the stronger market. In this case the effect of price discrimination will be to increase output. When the output is increased by the introduction of price discrimination, the marginal cost may change. The increase in output as a result of price discrimination will be greater than the amount of the good sold in the weaker market if the marginal cost is falling. If marginal cost is rising, the increase in output under discrimination will be less than the output sold in the weaker market. If marginal cost is constant, the increase in output will be exactly equal to the amount of the good sold in the weaker market.

3. If output fixed and price set are such that even the simple monopolist is able to sell in both the stronger and weaker markets, then it will pay the monopolist to discriminate prices in the two markets if elasticities at the single monopoly price are unequal. If the elasticities are different at the single monopoly price, the monopolist will reduce output sold and thereby raise price in the market where price elasticity is low and increase output sold and thereby lower price in the market where price elasticity is high. In this way the total output will be shared between the two markets in such a way that the marginal revenues in the two markets are equal. In one market output will be reduced, and in the other output will be increased. But the question is whether the output on the whole will increase or remain the same as a result of the introduction of price discrimination in this case. Joan Robinson gives the answer: "Total output under discrimination will be greater or less than under simple monopoly according as the more elastic of the demand curves in the separate markets is more or less concave than the less elastic demand curve; and that the total

output will be the same if the demand curves are straight lines, or indeed in any other case in which the concavities are equal.”⁵

Further, output under simple and discriminating monopolies also depends upon the position of the marginal cost curve. When marginal cost is very high so that the output fixed is small, the power to discriminate prices, as noted above in the beginning, will be ineffective since neither the simple monopolist nor the discriminating monopolist will sell any amount of the good in the weaker market.

PRICE DISCRIMINATION AND SOCIAL WELFARE : IS PRICE DISCRIMINATION SOCIALLY JUSTIFIED?

Whether price discrimination promotes social welfare or not is difficult to say. Judgement as to whether price discrimination promotes social welfare partly depends upon whether with the adoption of price discrimination, total output of the product increases or not.

If we put aside the output effect of price discrimination and consider only the *distribution of a given output* in case when price discrimination is being practised, then economist’s verdict would be that this price discrimination will adversely affect social welfare since it will be misallocating the output between various individuals. According to the economists, ideal market situation from the point of view of social welfare is perfect competition in which there is no price discrimination. One of the economic conditions for maximum social welfare is that marginal rate of substitution of different consumers between any two goods should be the same. And it is this condition of maximum social welfare that is violated by price discrimination.

That the price discrimination violates the optimum condition of distribution (or exchange) and therefore leads to maldistribution of goods between individuals and misallocation of resources between goods is illustrated in Fig. 23.10. We have assumed that there are two individuals *A* and *B*. Individual *A*’s indifference curves between two goods are shown in this figure

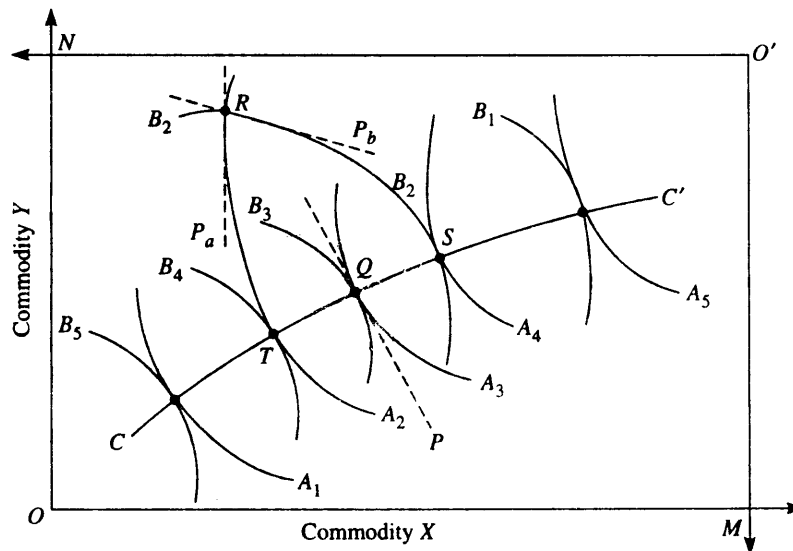


Fig. 23.5. Price discrimination reduces social welfare by causing maldistribution of goods between two individuals.

as A_1, A_2, A_3 etc. with O as the origin and indifference curves of individual B are B_1, B_2, B_3 etc. with O' as the origin. Individual B ’s indifference map has been turned upside down by rotating it 180° . Suppose the output of commodity X is OM and output of commodity Y is ON .

5. Joan Robinson, *Economics of Imperfect Competition*, p. 190.