profits because of his inability to increase his output further. But, according to Edgeworth, equilibrium is not attained at price OQ. Edgeworth argues that each producer will have no incentive to lower the price below OQ, but each will have incentive to raise it above OQ. Thus, Edgeworth says: "At this point it might seem that equilibrium would have been reached,. Certainly it is not the interest of either monopolist to lower the price still further. But it is in the interest of each to raise it." At price OQ, one of the two producers, say producer 1, may realise that his rival producer 2 is selling his entire.

Comments over the above three Classical Models of Duopoly (Oligopoly)

In our analysis of three classical models of duopoly we saw that one common assumption in them is that the duopolists have zero conjectural variation, that is, while deciding about his output or price policy, each dupolist believes that his rival will hold output or price constant at the present level whatever he himself might do. Further, a producer remains unshaken in this erroneous belief even when he constantly finds himself to be proved incorrect since after his action the rival does react and changes his output or price. This is a chief logical error in classical models.

Furthermore, by assuming zero conjectural variation on the part of the dupolists (oligopolsits), classical models ignore the mutual interdependence which is the chief characteristic of oligopoly. Thus, classical models provide solution for oligopoly problem by removing from it is most important feature.

CHAMBERLIN'S OLIGOPOLY MODEL

In his now famous work *"The Theory of Monopolistic Competition"* Chamberlin made an important contribution to the explanation of pricing and output under oligopoly. His oligopoly model makes an advance over the classical models of Cournot, Edgeworth and Bertrand in that in

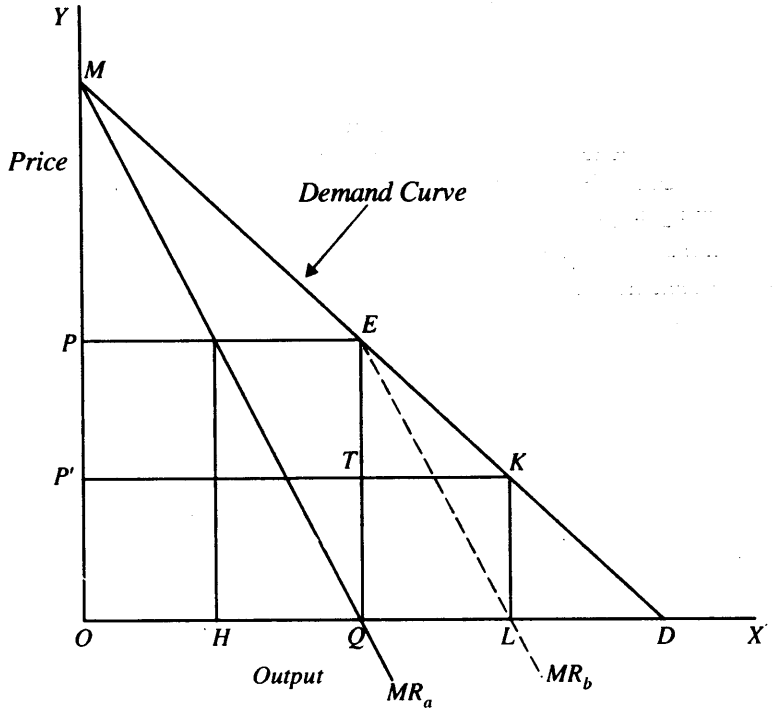

Fig. 25A.5 *Chamberlin's Stable Model of Duopoly with Mutual Dependence Recognised*

sharp contrast to these classical models *his model is based on the assumption that the oligopolists recognise their interdependence and act accordingly.* Chamberlin criticises the behavioural assumption of Cournot, Bertrand and Edgeworth that the oligopolists behave independently in the

sense that they ignore their mutual dependence and while 'deciding about their output or price assume that their rivals will keep their output or price constant at the present level. According to him, oligopolists behave quite intelligently as they recognise their interdependence and learn from the experience when they find that their action in fact cause the rivals to react and adjust their output level. This *realisation of mutual dependence on the part of the oligopolists leads to the monopoly output being produced jointly and thus charging of the monopoly price.* In this way, *according to Chamberlin, maximisation of joint profits and stable equilibrium are achieved by the oligopolists even though they act in a non-collusive manner.* Given identical costs, they will also equally share these monopoly profits.

Chamberlin's Approach to Stable Equilibrium under Oligopoly

The process by which stable equilibrium under oligopoly is reached in Chamberlin's oligopoly model is illustrated in Figure 25A.5. Chamberlin, considers the case of a duopoly with zero cost of production of the two producers, *A* and *B*. Like Cournot he also assumes that the market demand curve for the product is linear. In Figure 25A.5, *MD* represents this linear demand curve for the homogeneous product of the duopolists. As in Cournot's model, suppose producer *A* is the first to start production. He will view the whole market demand curve *MD* facing him and corresponding to it MR_a is the marginal revenue curve. In order to maximise his profits he will equate marginal revenue with marginal cost (which is here taken to be equal to zero). It will be seen from Fig. 29A.3 that he will be in equilibrium ($MR = MC$) when he produces *OQ* output (*i.e.* half of *OD*), which is in fact the monopoly output, and will fix price equal to *OP*.

Now, suppose producer *B* enters the market. He thinks, as in Cournot' s model, that producer *A* would continue to produce *OQ* output and therefore views *ED* portion of the demand curve as the relevant demand curve facing him and corresponding to him MR_b is the marginal revenue curve. With marginal cost being equal to zero, for maximing profits he will produce half of *QD*, that is, *QL* or at point *L* at which his marginal revenue curve intersects the *X*-axis along which output is measured. With aggregate output *OL* (*OL* = *OQ* of *A* + *QL* of *B*), price will fall to the level *LK* or *OP'* with the result that profits earned by producer *B* will be equal to the area of rectangle *QLKT*, and due to the fall in price the profit of producer *A* will decrease from *OPEQ* to *OP' TQ*.

However, from this point onward Chamberlin's analysis deviates from Cournot's model. Whereas in Cournot's model, the firm *A* will readjust his output and will continue to assume that his rival will keep his output constant at *QL* level, but in Chamberlin's model producer *A* learns from his experience that they are interdependent. With the realisation of mutual dependence, producer *A* decides to produce output *OH* equal to output *QL* of producer *B* and half of monopoly output *OQ* so that the aggregate output of both of them is the monopoly output (*OQ* = *OH* of *A* + *QL* of *B*). With *OQ* as the aggregate output level, price will rise to *QE* or *OP*. Firm *B* also realises that in view of interdependence it is in the best interest for both of them to produce half of monopoly output and will therefore maintain output at the *QL* or *OH* level which is half of the monopoly output. Thus, *each producer producing half of monopoly output, will result in maximisation of joint profits though they do not enter into any formal collusion.* In this way Chamberlin explains that duopolists behaving intelligently and realising their interdependence reach a stable equilibrium and together produce monopoly output and charge monopoly price each sharing profits equally.

Comments. Chamberlin's model is an advance over the classical models in that the firms behave intelligently and recognise their interdependence. Their behaviour leads them to the *monopoly solution of output and pricing which ensures maximisation of joint profits though they do not formally collude.* This implies that firms have full information about the market demand curve and quickly learn from the experience and realise that the ultimate consequence of alternative chain of adjustments to rival's moves will be less profitable than sharing the monopoly profits equally with him.

Further, it is assumed in Chamberlin's model that the oligopolists know fully the costs of produc-

tion of their rivals which enable them to arrive at a monopoly output and price which is in the best interest of all of them. Thus, unless all oligopolists have identical costs and demands, it seems impossible that the oligopolists will be able to reach monopoly solution, that is, maximisation of joint profits without collusion. It may be noted that *even in a formal collusion there is always incentive on the part of rival firms to cheat by under-cutting price to increase their individual profits*. In Chamberlin's model of oligopoly without collusion, incentive for the firms to undercut price to increase their share of profit will be relatively more. Besides, Chamberlin's model has another great flaw as *it ignores the entry of new firms* and is thus a closed model. Due to the attraction of monopoly profits jointly earned by the existing firms, the new firms are likely to enter the industry. With the entry of new firms the attainment of stable equilibrium of oligopoly is unlikely to occur.

QUESTIONS FOR REVIEW

1. Explain how equilibirum output and price are determined in Cournot's duopoly model. State the underlying assumptions.
2. How is Cournot equilibrium determined ? Why is it stable ? Why don't the duopolists set the outupt at joint-profit maximizing level by tacit collusion.
3. (*a*) Explain Cournot's duopoly model. What should the firms do to maximise their profits.
   (*b*) Bring out precisely the difference between Cournot equilibrium and profit maximising behaviour.
4. Explain Chamberlin's model of duopoly. How does it differ from Cournot's solution of duopoly problem.
5. (*a*) Explain Bertrand's model of oligopoly taking the case of two firms. How does it differ from Cournot's model ?
   (*b*) Shwo that in Bertrand model a price war between the two rival firms will drive the price to the competitive level.
6. Explain Edgeworth's duopoly model of pricing Show that in Edgeworth model price goes on moving perpetualy between monopoly price and competitive price and no stable equilibrium is reached.

26

Pricing in Practice : Mark-up Pricing and Sales Maximization Models

Having discussed some important theoretical models of price and output determination under oligopoly or duopoly we now turn to explain two important models which are claimed to be based on actual pricing practices in the real world. One such model was jointly propounded by two professors Hall and Hitch of Oxford University and is known by the name *Mark-up Pricing*. This is also called *Cost-plus pricing* or *Full-cost pricing*. Hall and Hitch contend that firms in the real world do not follow marginal analysis in fixation of price of their products (that is, they do not fix price and output on the basis of equality of marginal cost with marginal revenue), but instead add a *margin* (usually considered as a percentage of average variable cost) to the average variable cost.

The second model which is claimed to be based on actual behaviour of firms in the real world market has been put forward by Baumol who opine that firms try to maximise sales rather than profits. By sales maximisation Baumol means maximisation of total revenue obtained by a firm selling a quantity of output (Sales = $TR = Q.P$). Further, according to him, firms charge price of product based on this sales-maximisation level.

MARK-UP PRICING

After the marginalist revolution, profit maximization by the firm is generally explained by the marginal analysis, that is, by the use of marginal revenue and marginal cost concepts. An important alternative approach to profit maximization and marginal analysis based upon it is the mark-up pricing theory which does not assume that rational firms seek to maximize profits. It may be pointed out in the beginning that mark-up pricing has been given several names. It is also called *cost-plus pricing* or *full-cost pricing*. It is also known as *average-cost pricing* theory, since in this theory price of a product is fixed on the basis of average cost. This theory is called mark-up or cost-plus pricing because in this it is visualised that in order to fix price businessmen add a mark-up to their average cost of production.[1]

Hall and Hitch of Oxford University made a root and branch attack on the marginal analysis and on the notion of profit maximization, and put forward the view that business firms in the real world fixed prices on the basis of direct cost (variable cost) per unit of output by adding to it overhead cost per unit and a margin of normal or conventional profits. To quote them, "the way in which businessmen decide what price to charge for their products and what output to produce, casts doubt on the general applicability of conventional analysis of price and output policy in terms of marginal cost and marginal revenue and suggest a mode of entrepreneurial behaviour which current economic doctrine tends to ignore."[2]

Hall and Hitch made an empirical study of the behaviour of business firms regarding

1. R.L. Hall and C.J. Hitch, Price Theory and Business Behaviour. *Oxford Economic Papers*, Vol. 2, 1939.
2. *Op. cit.*, p. 2.

fixation of prices of the products. In this study they interviewed 38 entrepreneurs of whom 33 were manufacturers of various products, 3 were retailers, and 2 were builders. From this empirical study they found, as is clear from the above quotation, that firms for fixing prices do not maximize profits by equating marginal cost with marginal revenue. It is worth mentioning here that they argued not only against marginal analysis of pricing by firms but also challenged the notion that in fixing prices firms maximize their profits. Profit maximization, according to them, was a wrong way to approach the question of pricing by business firms. Indeed, they pointed out that business firms in the real world only tried to seek a satisfactory profits or, in other words, normal or conventional rate of profit. Thus, according to them, prices are fixed on the basis of full cost, that is, average direct (variable) costs plus average overhead cost plus a margin of profit. Thus, a full-cost price includes

(*i*) average variable cost (This is also called average direct cost)

(*ii*) average overhead cost, and

(*iii*) a normal or satisfactory margin of profit.

It should be noted that the average direct cost as well as average overhead cost is calculated on the basis of expected output in a period or on the basis of some conventional output.

Many reasons were provided by entrepreneurs as to why they fixed prices on the basis of full cost. Firstly, they pointed out that if they fixed prices above average cost which would yield abnormal profits to them, there was threat of actual or potential competitors competing away these profits. Further, they expressed ignorance of the concept of average and marginal revenues and also pointed out the absence of any data regarding marginal revenue and marginal cost. In view of the absence of data regarding *MC* and *MR*, how could they fix price on their basis. Furthermore, according to Hall and Hitch, in fixing prices of their products, entrepreneurs behave according to the moral principle that there is a price that *ought* to be charged and this price is the full-cost price which includes normal profit and they think this is the right price that ought to be charged in periods of both good and bad business, that is, in periods of both depression and boom. Thus, according to Hall and Hitch, there are no frequent changes in prices. Full-cost pricing, according to them, is the result of (*a*) tacit or open collusion, (*b*) considerations of long-run demand and costs, (*c*) moral conviction of firms and (*d*) uncertain effects of the increases and decreases in price.

They held that oligopolistic firms faced *kinked demand curve* and on account of this they emphasised stickiness of prices in the short run. As has been explained in a previous chapter, kinked demand curve with a kink at the current price, is formed on the assumption that the increase in price by an oligopolist will not be matched by its rivals, while the reduction in price will be immediately followed with the result that part of the demand curve above the current price will be highly elastic whereas the part of the demand curve below the ruling price will be very much less-elastic.

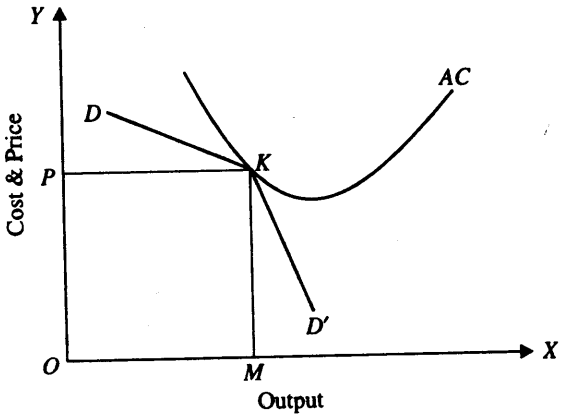

Fig. 26.1. *Full-Cost Pricing and Kinked Demand Curve*

Hall and Hitch combine full-cost pricing with kinked demand curve analysis. Current price is fixed on the basis of full-cost[3] (as defined above), and a kink in the demand curve is formed at this price. Full-

3. As we mentioned in Chapter 25, Sweezy version of kinked demand curve theory of oligopoly cannot explain how the current price came to be what it is. This flaw is not present in Hall and Hitch's version of kinked demand curve analysis.

cost pricing together with the kinked demand curve analysis is illustrated in Fig. 26.1. Suppose the firm decides to produce *OM. This output, as pointed above, is fixed on the basis of expected sales in the period or on some conventional standard.* With *OM* as the output, the firm then calculates the (1) average direct cost incurred on labour, raw materials, etc. and (2) the average overhead costs incurred on capital equipment, etc. He then adds to it his normal or conventional margin for profit. Addition of these three items yields full cost, which let us suppose is *MK* in Fig. 26.1. He will therefore set the price *OP* which is equal to *MK*. It will be noticed that the kink in the demand curve *DD'* is formed at this price *OP* or *MK*.

Kinked demand curve analysis as used by Hall and Hitch along with his full-cost pricing theory provides an explanation for the stability or rigidity of prices under oligopoly in the short run. Increases or decreases in demand will usually shift the kink to the right or left but will leave the price unchanged. But Hall and Hitch have mentioned *the following two exceptions to* this general rule in which case price of the product changes.

(1) If there is a large decrease in demand and the demand remains at a low level for some time, there is every likelihood that price will be reduced so as to maintain output. According to Hall and Hitch, the explanation for this reduction in price in the context of depressed demand is that one entrepreneur may become panicky and his irrational behaviour forces the others to cut prices.

(2) If the average cost curves of all firms shift by similar amounts on account of changes in factor prices or technology, then this is "likely to lead to a revaluation of the full cost" price. However, Hall and Hitch point out that "there will be no tendency for prices to fall or rise more than the wage and raw material costs."[4]

It should be noted that, given that the average cost curve falls for quite a large range of output, the mark-up pricing suggests that price of the products will vary inversely with output; smaller levels of output will involve higher cost per unit and therefore higher prices will be fixed. But, according to Hall and Hitch, the oligopolists will not produce small outputs and therefore will not charge higher prices. This is because oligopolists (1) prefer price stability, (2) are prevented by the kink to raise price, and (3) they have propensity to produce larger levels of output or, in the words of Hall and Hitch, they desire to "keep plant running as full as possible, giving rise to a general feeling in favour of price concessions."[5]

Critical Evaluation of Mark-up Pricing Theory

We have elaborately explained the mark-up pricing theory. In spite of its being based upon empirical investigations, mark-up-cost pricing theory has not found general acceptance among economists. Many have criticised this theory and have defended marginalism and profit maximization.

Synthesis Between Mark-up Pricing with Marginal Analysis. First, it has been asserted that mark-up or full-cost theory does not amount to the refutation of pricing based on the equality of marginal revenue with marginal cost (profit maximisation) and that the full-cost pricing (or mark-up pricing as it is sometimes called) is *quite consistent with the pricing based on marginal analysis and profit maximization.* It has been asserted that costing margin or mark-up is chosen by considering and guessing what the price elasticity of demand for a particular product is. If the elasticity of demand for a product is greater, smaller mark-up is fixed; and if elasticity of demand for the product is less, greater mark-up is fixed. How the consistency and compatibility of mark-up pricing with marginal analysis of pricing is proved is explained below.

We know from our previous analysis of the relationship between price (*P*), elasticity (*e*) and marginal revenue (*MR*) that

4. *Op. cit.* p. 32.
5. *Ibid*, p. 28.

$$P = MR \frac{e}{e-1} \quad ...(i)$$

Since, in equilibrium, $MR = MC$, it follows that

Now, if constant-costs prevail as is generally the case in the real world, and is also generally assumed in full-cost theory, then marginal cost (MC) will be equal to the average variable cost (AVC). Therefore, writing AVC for MC in equation (i) we get

$$P = AVC \frac{e}{e-1}$$

$$= AVC \left(1 + \frac{1}{e-1}\right)^{*}$$

$$= AVC + AVC \times \frac{1}{e-1}$$

Therefore, Price or $P = AVC$ + Mark-up

We thus see that, on the basis of profit maximization assumption, mark-up or costing margin is equal to $AVC \frac{1}{e-1}$.

Suppose price elasticity of demand for the product is 5, then mark up = $AVC \frac{1}{e-1} = AVC \times \frac{1}{5-1} = \frac{1}{4} AVC$. That is, mark-up fixed will be 25% of AVC. Price will be equal to AVC plus 25% of AVC as mark-up.

It follows from above that pricing fixed on the basis of marginal revenue and marginal cost is consistent with the mark-up or full-cost pricing based on adding a mark-up to the average variable cost. Therefore, it is asserted that mark-up pricing does not necessarily mean that firms are not maximizing profits. Mark-up fixed on the basis of price elasticity of demand amounts to maximizing profits.

But the whole synthesis established above between mark-up or full-cost and marginal pricing is based upon the view (which has some empirical support too) that mark-up is fixed by taking into account price elasticity of demand for the product. Further, the above conclusion that full-cost pricing and marginal analysis of pricing based on profit maximization amount to the same thing is based upon the assumption that the average variable cost remains constant with changes in output. If average variable cost is not constant but changes with output, marginal cost in equilibrium will not be equal to AVC and therefore the synthesis established above will not hold good. Secondly, in bringing out the synthesis, it is assumed that mark-up is based on average variable cost (AVC) rather than the average total cost. If the mark-up is based on average total cost, cost-plus pricing would not maximize profits.

It should be noted that there is little disagreement about the fact that firms in the real world follow mark-up or cost-plus pricing. There are enough empirical studies which support this mark-up pricing. However, what is contended here is that changing the mark-up with changes in the demand and other conditions means that firms are following profit maximizing principle in fixing prices, although they may be pricing on the basis of mark-up or cost-plus. In fact, cost-plus pricing can be used whether the aim of the firm is to maximize short-run profits, long-run profits, total revenue from sales. Thus, Professor Hawkins remarks, "there is no reason why short-run profit maximizers, long-run profit maximizers and revenue maximizers should not

*6. That $\frac{e}{e-1} = \left(1 + \frac{1}{e+1}\right)$ can be easily understood by a numerical example. If $e = 4$, then $\frac{e}{e-1} = \frac{4}{4-1} = \frac{4}{3} = 1 + \frac{1}{3}$ where $3 = 4 - 1$, *i.e.*, $e - 1$.

all use cost-plus as a *means* of setting price. They could all, however, choose different mark-up in order to meet their objectives."[7]

Further, an important question which is raised in connection with cost-plus pricing is that *why cost-pricing is used,* in other words, what is the motivation behind pricing on the basis of mark-up. To quote Hawkins again, "It is after all not enough just to say that in practice it (cost-plus pricing) is used, since no motivation is implied. And until the motivation is known, there is no way of predicting firms' responses to varying conditions or knowing why they choose any particular size of mark-up.[8]

It may, however, be noted that who support the full-cost theory do point out the motivations for fixing full-cost price. One suggestion regarding the motivational aspect of full-cost pricing is that firms are *'satisficers'* and not *'maximizers'* that is, they aim to make a resonable (or satisfactory) level of profit and not the maximum possible level. Therefore, according to them, margin or mark-up just includes this reasonable and satisfactory level of profit. Another, though a related one, is the suggestion that firms want only a *fair or just rate of profit* and consider it immoral and unethical to charge more than a fair rate of profit.

This argument for mark-up pricing that firms seek merely reasonable or fair rate of profit is thought by many economists to be unconvincing and unrealistic. The critics point out that a good deal of empirical evidence, including even that provided by Hall and Hitch, indicates that mark-up varies in response to changing economic conditions.[9] Now if the firms want merely resonable, fair or just profits, then why should they raise the mark-up or margin during the boom periods and lower it during the depression periods. Prof. Hawkins rightly assets "the bulk of the evidence suggests that the size of the 'plus' margin varies: it grows in boom times and it varies with elasticity of demand and barriers to entry. It seems strange that people's concept of a 'fair' profit should generally vary so systematically with the ease of making profits."[10]

However, it should be noted that though the variation in the profit margin does not appear to be consistent with the notion of fair or just profits, but it is consistent with the *'satisficing' behaviour* as suggested by H.A. Simon.[11] According to Simon's satisficing behaviour, people set an *aspiration level* regarding profit. And when this aspired level of profit is achieved, they may raise the aspired level of profits which they hope and desire to achieve. This aspired level of profits need not be fixed at the maximum possible level. The point is that the motive of firms for using cost-plus pricing need not be maximizing short-run profits. There is an empirical evidence which shows that firms often keep prices *below the equilibrium level,* (that is, where quantity demanded is equal to the quantity supplied). It is contended that if they were following the principle of maximization of profits, they should have raised the price in the face of excess demand and shortage of the product.

However, Hawkins have asserted that from the behaviour of firms keeping their prices below the equilibrium level when there is excess demand, one should not conclude that motive of the firms is merely to obtain fair or just profits. He has argued that the firms may be keeping the prices below the equilibrium level when there is excess demand because "increasing the price would discourage long-run demand, reduce customer goodwill and would look like ex-

7. Hawkins, *Theory of the Firm.* Macmillan, 1973, pp. 76-77.
8. *Op. cit* p. 74.
9. Besides that of Hall and Hitch's Business Behaviour and Price Policy, 1939, other empirical works which find that mark-up or margin varies are (1) A.D.A. Kaplan. J.B. Dirlam and R.P. Janzillotti, *Pricing in Big Business: A Case Approach,* Brookings Institution. Washington D.C. 1958. (2) B. Fog. *Industrial Pricing Policies,* translated by I.A. Bailey, North Holland Publishing Co., Amsterdam, 1960.
10. *Op. cit.,* p. 75.
11. H.A. Simon, Theories of Decision Making in Economics and Behavioural Sciences, *American Economic Review,* 1959.

ploitation. The excess demand may be only temporary and price need to be lowered again in the near future."[12] In other words, the motive of the firms in keeping prices below the equilibrium level in the short run may be to *maximize long-run profits.*

The second main reason for the use of full-cost or mark-up pricing by businessmen which has been provided is that *we live in a very uncertain world where due to lack of perfect information, demand for a product cannot be correctly predicted for the current month or the current year, let alone for the future years.* And, it is asserted that the present price policy may affect the demand for a product in the future years. It is further pointed out that in practice it is very difficult to determine what is the profit-maximizing or optimum price in view of the fact that so many variables affect this and firm has to estimate *all the permutations* of all the variables that influence the profit-maximizing (optimum) price. The number of permutations may be so large that even computer can be of no help. Further, to estimate the profit-maximizing price in view of these numerous determining variables is a *costly* process. For instance, for a typical departmental store which sell hundreds of articles, to calculate the profit-maximising prices of hundreds of goods is well-nigh impossible.

In view of the above Cyert and March[13] in their *Behavioural Theory of the Firm* suggest that for the firms it is better to use cost-plus pricing by applying a standard mark-up as a first approximation which, according to the experience of the firm, works reasonably well. They argue that the firm is then ready to supply whatever is demanded at that cost-plus price. Further, according to them, stocks can be used to cushion the effects of unexpected changes in demand. But, over a period of time, they argue that the firm may decide to change the plus-margin or mark-up in response to changing conditions (booms, slumps, degree of competition, and so on) and by doing experiments with different margins (mark-up), and learning from experience, they would be able to arrive at the proper mark-up. On this view, *firms use cost-plus pricing because it is the best that they can do in a very uncertain world where conditions regarding demand, strength of competition, technology etc. are fast changing.* Further, according to this view, whether pursuing this cost-plus pricing while varying the mark-up in response to the changing conditions, profits are actually maximized or not depends upon the skill and ability of the firms in making correct responses to the changing conditions.

Further, mark-up pricing theory has been criticized for its assertion that firms in the real world do not maximize profits. It has been asserted by many that *profit maximization is the valid and theoretical sound assumption regarding the behaviour of the firms.* Thus, according to Ryan, "There seems to be little evidence that businessmen do not seek to earn the greatest net revenue: when they have other aims, such as security, the extent to which these are achieved will usually vary more or less directly with the profits earned; where they appear to eschew the quest for the maximum profits, the explanation is likely to lie in idiosyncracies in their expectations about the behaviour of demand and cost or in the extent of their planning horizon."[14] Similarly, Stonier and Hague conclude their section of the discussion of full-cost pricing. "Nevertheless, as we have explained on several occasions, we believe that in many industries, for much of the time, an analysis assuming that firms equate marginal cost and marginal revenue will not be far from the truth."[15]

Further, Machlup, a staunch supporter and defender of profit maximization, argues that the real point at issue is not whether in the real world firms try to maximize profits or not, but that whether the conclusions and predictions regarding firms behaviour derived from profit-maximization assumption are valid (or approximately so) description of the real world. He thinks that profit maximization does lead us to the correct conclusions and predictions regarding the business behaviour in real world. To quote him, "the question is not whether the firms of the real world will really

12. *Op. cit.* p. 75.

13. Cyert and March, *Behavioural Theory of the Firm*, Prentice Hall, 1963, pp. 446-47.

14. *Op. cit.* p. 379.

15. *Op. cit.* p. 248

maximize profits or whether they even strive to maximize their money profits, but rather whether *assumption* that this is the objective of the theoretical firms in the artificial world of our construction will lead to conclusions very different from those derived from admittedly more realistic assumptions."[16]

Further, it may be pointed out that empirical evidence against profit maximization which is based upon the interviews given by businessmen or the questionaires which they have filled up are not beyond suspicion because what the people say they are doing may not be what they are actually doing. There are a good number of difficulties in knowing about the motivations of business firms, enterpreneurs and managers. Often they give contradictory answers to the various questions asked from them regarding profit and price. For instance Lanzillotti[17] who interviewed a large number of American companies concluded that profit was not their dominant motive. But when the same companies were asked questions about pricing they replied that they did not change prices because it would not increase their long-run profits[18]. This means that in changing prices, long-run profits was the main consideration, although to the question regarding profit motive they replied that profit was not their dominant motive. Likewise, E.A.G. Robinson and Kahn[19], among many others, have pointed out that important elements of profit maximization or loss minimization, entered into the pricing decisions of many oı the businessmen investigated by Hall and Hitch. Moreover, Hall and Hitch themselves greatly emphasized that under conditions of oligopoly, individual firms confront kinked demand curve which ensures sticky prices in the short run. As they themselves point out, the kink in the demand curve at the ruling price renders this price as the profit-maximizing price for a wide range of marginal costs, because due to the kink, there is a discontinuity in the marginal revenue curve vertically below the kink.

Another, important criticism against full-cost pricing has been made by R.F. Kahn who has raised the interesting question on *whose full-cost,* price of a product will be fixed when a large or few firms compete to sell the same or similar product. According to him, if an industry is competitive in some sense, firms will not be able to fix their prices on their own full costs, regardless of the costs of others. Thus, there must be some firms on whose costs the other firms will base their prices. The firm on the basis of whose cost the other firms in the industry will fix price will emerge as the price leader. Therefore, the theory of full-cost pricing must consider the possibility of price leadership satisfactorily while Andrews did not touch this subject. In fact, Andrews lays a much stress on the costing margin, a firm *has to add* and therefore a firm in Andrews' analysis, according to Silberston pursues "defensive type of price policy, which... is a policy more appropriate to a price *follower* than a price leader."[20]

Another reason or motive which has pointed out for the adoption of full-cost (cost plus) pricing is that the firms do not charge more than the normal or fair level of profits in order to forestall entry. That is, due to the fear of potential competition from the new firms which may enter the industry, the existing firms will use cost-plus pricing with only normal profits. Another reason which has been given for the use of the cost-plus pricing policy of the firm is that it can ameliorate the problem of uncertain competitors' reactions in oligopoly. The use of cost-plus pricing enables the firms of an industry to have tacit collusion regarding the price to be charged. The various firms in an oligopolistic industry recognising their interdependence come to use the same standard mark-up. With the use of same standard mark-up by all the firms in the industry, they can predict each other's reactions to changing conditions such as cost increases. The fact that firms apply a same standard mark-up to their costs, make their prices staying closely in line with their rivals without any formal price collusion. Cyert and March[21] have argued that

16. Machlup, Theories of the Firm: Marginalist, Behavioural, Managerial, *American Economic Review,* March 1967.
17. R.F. Lanzillotti, Pricing Objectives in Large Companies, *American Economic Review*, December 1958.
18. E.A.G. Robinson. The Pricing of Manufactured Products, *Economic Journal*, December 1950.
19. R.F. Kahn, Oxford Studies in the Price Mechanism, *Economic Journal*, March 1952.
20. Aubrey Silberston, Price Behaviour of Firms, *Economic Journal*, 1970.

the *business firms in an oligopolistic industry use mark-up pricing partly for the very reason that they recoginise their interdependence, dislike the prospect of price wars and accept the need for a "community of outlook"*

SALES MAXIMIZATION MODEL OF OLIGOPOLY

Sales maximization model of obligopoly is another important alternative to profit maximization model. This has been propounded by W.J. Baumol, an American economist. In an earlier chapter we have explained sales maximization objective and saw how Baumol challenged the profit maximization assumption regarding business behaviour in these days of manager-dominated corporate form of business organisation and showed how sales maximization was more valid and realistic assumption of business behaviour. Further, we pointed out there that sales maximization was quite consistent with *rationality* assumption about business behaviour. It may also be noted that sales maximization model represents one of the managerial theories of the firm because in it, the great importance has been given to the manager's role and to his pursuing self-interest in making price, output and advertising policies, Prof. Baumol thinks that *managers are more interested in maximizing sales than profits.*

It should be noted that by sales maximization Baumol does not mean the maximization of the *physical volume* of sales but the maximization of *total revenue from sales,* that is, the rupee value of the sales made. Therefore, his theory is also known as *revenue maximization model.* Further, as has been mentioned in a previous chapter, Prof. Baumol does not ignore profit motive altogether. He argues that there is a minimum *acceptable level of profits* which must be earned by the management so as to finance future growth of the firm through retained profits and also to induce the potential shareholders for subscribing to the share capital of the company. Thus, according to him, management of oligopolistic firms *seeks to maximize sales or, in other words, total revenue subject to this minimum profit constraint.* He thus writes: "My hypothesis then is that oligopolists typically seek to maximize their sales subject to a minimum profit constraint. The determination of the minimum just acceptable profit level is a major analytical problem and I shall only suggest here that it is determined by long-run considerations. Profits must be high enough to provide the retained earnings needed to finance current expansion plans and dividends sufficient to make future issues of stocks attractive to potential purchasers"[22].

Sales Maximization : Price-output Determination

It is better to explain graphically price-output determination in Prof. Baumol's sales or total revenue maximization model. Consider Fig. 26.2 where on the *Y*-axis we measure total revenue, total cost and total profits in terms of rupees and on the *X*-axis we measure the total output. *TR* and *TC* are respectively total revenue and total cost curves. Since total cost curve *TC* starts from the origin, it means the diagram refers to the long-run cost-revenue situation. *TP* is the total profit curve which first rises and then after a point falls downward. Since total profits are the difference between total revenue and total costs at various levels of output, the total profit curve measures the vertical difference between the *TR* and *TC* at various levels of output.

If the firm aims at maximizing profits, it will produce *OA* output. This is because corresponding to *OA* output, the highest point of *TP* curve lies. But, as we have seen above, according to Prof. Baumol, the firm does not seek maximisation of profits. On the other hand, if the firm wants to maximise sales (or total revenue) it will fix output at *OC* level which is greater than *OA*. At output *OC* total revenue is CR_2, which is maximum in the diagram. At this total revenue (sales) maximising output level *OC,* the firm is making total profits equal to *CG* which are less than the maximum attainable profits *AH*. It will be clear from the figure that sales (or total revenue) maximisation output *OC* is larger than profit-maximising output *OA*. Prof. Baumol

21. *Behavioural Theory of the Firm,* Prentice Hall, 1963.

22. W.J. Baumol, On the tTeory of Oligopoly, *Economica,* new series, Vol. 25, 1958.

contends that the business firms aim at total revenue (sales) maximization subject to a minimum profit constraint. Now, if *OM* is the minimum total profits which a firm wants to obtain, then *ML* is the minimum profit line. Now, this minimum profit line *ML* cuts the total profit curve *TP* at point *E*. Therefore, if the firm wants total revenue (sales) maximisation subject to the minimum profits of *OM*, as has been contended by Prof. Baumol, then it will produce and sell output *OB*. At output *OB*, the firm will be having total revenue equal to BR_1 which is less than the maximum possible total revenue of CR_2. But the total revenue BR_1 is the maximum obtainable revenue to earn the minimum desirable profits *OM*. It should be noted that the firm can earn the minimum profit *OM* even by producing *ON* output. (Minimum profit line *ML* also cuts the total profits curve *TP* at point *K*). But the total revenue at output *ON* is much less than at output *OB*. Therefore, given the firm's objective of maximising the total revenue subject to the minimum profit constraint, the firm will not produce *ON* output or at point K. It will be noticed from the figure that the output *OB* lies in between *OA* and *OC*, that is, it is larger than profit-maximising output *OA* but smaller than the total revenue-maximising output *OC*. Thus, in Prof. Baumol's model, oligopolistic firm will be in equilibrium at output *OB* and will be earning profits *BE* (or *OM*). It should be carefully noted that the objective of total revenue (or sales) maximization subject to the minimum profit constraint leads to a greater output and lower price than does profit maximization. Price will be lower under revenue maximization because the output under it, as seen above, is greater and given that demand or average revenue curve is sloping downward, the price will be less when the output is larger. To quote Prof. Baumol "The profit-maximizing output *OA* will usually be smaller than the one which yields either type of sales maximum, *OC* or *OB*. This can be proved with the aid of the standard rule that at the point of maximum profit marginal cost must equal marginal revenue. For marginal cost is normally a positive number (we can't usually produce more of a good for nothing). Hence *marginal revenue will also be positive when profits are at a maximum, i.e.* a further increase in output will increase total sales (revenue). Therefore, if at the point of maximum profit the firm earns more profit than the required minimum, it will pay the sales maximizer to lower his price and increase his physicial output."[23]

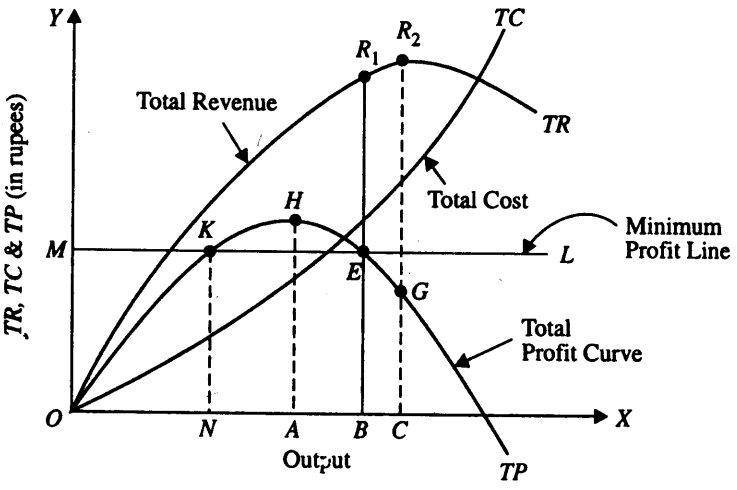

Fig. 26.2. *Prof. Baumol's sales maximisation hypothesis.*

The price charged at output *OB* will be equal to $\frac{\text{total revenue}}{\text{output}}$, that is, $\frac{BR_1}{OB}$.

Now suppose the minimum acceptable profits are equal to *AH* (which are maximum possible profits under the given cost-revenue situation), then even under total revenue maximization objective subject to the minimum profit constraint, the firm will produce the profit-maximising output *OA*. But it will produce output *OA* not to maximise profits but to maximise total revenue given the minimum profit constraint *AH*. Now, suppose the minimum acceptable profits for an entrepreneur are larger than *AH*, then it is obvious from the figure that given the cost-revenue

23. William J. Baumol, *Economic Theory and Operations Analysis*, 3rd, ed., pp. 326-27.

situations depicted in the figure that he cannot earn profits greater than *AH*. Therefore, the entrepreneur must either lower his minimum acceptable profit level or go out of the industry.

Emphasis on Non-price Competition in Sales Maximisation Model

Another important feature of sales-maximization theory of the firm of Baumol is its emphasis on non-price-competition in oligopoly as compared to the price competition. It has been observed by many economists that oligopolists are often very much reluctant to use price cutting to promote their sales. Baumol rightly argues that this reluctance on the part of the oligopolists to use price as a competitive weapon should not be explained merely by that they want to live in *quiet life.* This is because when competition under oligopoly does become more intense and vigorous, it may not be in terms of price cutting but in terms of non-price weapons, that is, in the form of more advertising expenditure, product modification, introduction of special services for the customers etc.

This greater propensity to indulge in non-price competition under oligopoly can be better explained with sales-maximization objective rather than with profit-maximization objective. This is because extra expenditure on advertising etc., increases the physical volume of sales, it must also increase the total revenue, whereas the effect of price cutting on the total revenue is doubtful. This is because, "a price reduction is a double-edged sword which, while it serves as an influence to increase total revenue in that it usually adds to the number of units which can be sold, simultaneously it also works in the opposite direction by reducing the revenue on each unit sold. In other words, as the economists know so well, depending on whether demand is or is not elastic, price cutting is an uncertain means for increasing dollar sales."[24] The effect of price cutting on profits is more uncertain because if it fails to raise total revenue, it will most probably reduce profits because the increase in output as a result of reduction in price, will increase total costs. On the other hand, while the profitability of advertising, product modification, improved service is doubtful, their favourable effect on the sales is quite certain. Thus, according to Baumol, "the effect of advertising, improved services, etc., on sales is fairly sure while, very often, their profitability may be quite doubtful. Thus, *sales maximization makes for greater presumption that the businessman will consider non-price competition to be more advantageous alternative.*"[25]

We now turn to explain that, according to Baumol's sales maximisation model, how much advertising expenditure a firm will undertake.

Sales Maximization Model : Optimal Advertising Expenditure

We know that firms in oligopolistic market conditions compete not only in terms of price but also in terms of advertising expenditure, product variation and special services offered to the buyers. We shall discuss here the question of optimal advertising expenditure to be incurred by an oligopolist and the conclusions reached in this connection will apply equally to the questions of optimal product adjustment and the optimal amount of special services to be provided by an oligopolist when he chooses to maximize sales (total revenue).

The important question in regard to the advertising is how much advertising expenditure a firm will make so as to achieve its objective. How much advertising outlay will be incurred by a firm is greatly influenced by the objective of the firm as to whether it seeks to maximize sales or profits. This optimal advertising expenditure from the viewpoints of both sales maximization and profit maximization is illustrated in Fig. 26.3 in which advertising outlay is measured along the *X*-axis and total cost, total revenue and total profits on the *Y*-axis. Baumol takes an important assumption in connection with the effect of advertising outlay on total revenue or sales. He assumes, and he quotes empirical evidence for this, that the increase in advertising outlay by a firm *will always* raise the *physical volume of sales*, though after a point these sales will increase at a diminishing rate. Now, given the price of product, the total revenue (*i,e.*, monetary value of the sales) will increase in proportion to the increase in the physical value

24. Baumol, *Theory of Oligopoly,* p. 266.

25. *Ibid.*, p. 266-67.

of sales as a result of the increase in advertising outlay. Therefore, the increase in advertising outlay will always cause the total revenue to increase, though after a point diminishing returns are likely to set in. In Fig. 26.3, *TR* is the total revenue curve which represents the change in total revenue as the advertising outlay is raised, given the price of the product. Curve *OD* represents the advertising cost and has been so drawn as to make 45° angle with *X*-axis. (This is because we have simply transferred the advertising outlay shown on the *X*-axis to the vertical axis as advertising cost, (for instance *OS=SK*). The *other costs* of the firm incurred on fixed and variable factors are taken to be independent of the amount of advertising outlay. Therefore, by adding a fixed amount of other costs (equal to *OT*) to the advertising curve *OD*, we obtain the total cost curve *TC*. Finally, by taking out the difference between total revenue curve (*TR*) and total cost curve (*TC*) we draw the total profit curve *PP'*.

Now, it will be seen from Fig. 26.3 that if the firm seeks to maximize its profits, it will incur advertising outlay equal to OA_1, at which the profit curve reaches its maximum point *M*. On the other hand, if OP_1 is the minimum profit constraint and the firm chooses to maximize its total revenue with OP_1 as the minimum profit constraint, it will spend OA_2 on advertisement which is greater than OA_1. We thus see that objective of constrained revenue maximization leads to a greater level of advertising outlay than the objective of profit maximization. In this connection, it should be noted that here there is no possibility of *unconstrained sales or revenue maximum*, as is there corresponding to output *OC* in the previous Fig. 26.2. This is because, unlike a reduction in price, *increase in advertising outlay always raises total revenue or sales* (by assumption). As a result, Baumol concludes that "it will always pay the sales maximizer to increase his advertising outlay until he is stopped by the profit constraint—until profits have been reduced to the minimum acceptable level. This means that sales maximizer will normally advertise no less than, and usually more than, do profit maximizers. For, unless the maximum profit level A_1M is not greater than the required minimum OP_1 it will be possible to increase advertising somewhat beyond the profit-maximizing level OA_1 without violating the profit constraint. Moreover, this increase will be desired since, by assumption, it will increase physical sales, and with them, dollar sales will rise proportionately."[26]

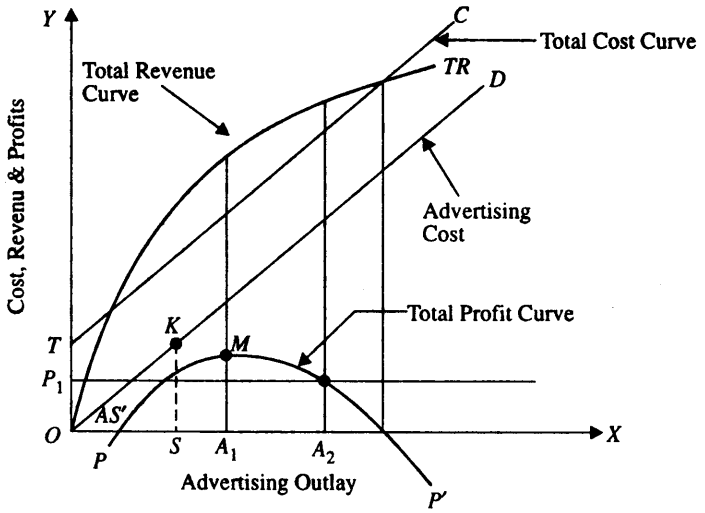

Fig. 26.3. *Optimal Advertising Outlay with Sales Maximization and Profit Maximization*

Critical Appraisal of Sales Maximization Theory

Implication of sales maximization theory of Baumol is that price would be lower and output greater under sales maximization than under profit maximization. This is because total revenue is maximized at the price-output level where marginal revenue is zero, while at the profit-maximizing level of output marginal revenue is positive, given that marginal costs are positive. We have explained above that even under sales maximization with a minimum profit constraint, output will be greater and price lower than under profit-maximization objective. If

26. *Op. cit.*, p. 262.

this is true that oligopolists seek to maximize sales or total revenue, then the greater output and lower-price will have a favourable effect on the welfare of the people.

As explained above, another implication of sales maximization objective is more advertising expenditure will be incurred under it. Further, under sales maximization objective of oligopolists, price is likely to remain sticky and the firms are more likely to indulge in non-price competition. This is what actually happens in oligopolistic market situations in the real world. Another significant implication of Baumol's model is that "there may be a conflict between pricing in the long and short run. In a short-run situation where output is limited, revenue would often increase, if prices were raised: but in the long-run it might pay to keep price low in order to compete more effectively for a large share of the market. This price policy to be followed in the short run would then depend on the expected repercusions of short-run decisions on long-run revenue."[27]

But sales maximization model has not been without its critics. Shepherd[28] has asserted that an oligopolist confronts kinked demand curve and that if the kink is quite large, total revenue (*i.e.*, sales) and total profits would be maximised at the same level of output. But Hawkins[29] has shown that Shepherd's conclusions are invalid if the oligopolistic firms indulge in any form of non-price competition such as advertising, product variation, improvement in service, etc. and normally in the real world they do so.

An important and convincing criticism against sales maximization model has been made by Hawkins.[30] As has been noted above that, according to Baumol, sales-maximizing firm will generally produce and advertise more than the profit-maximizing firm. But Hawkins has shown that this conclusion is generally invalid. According to him, in case of single-product firms as compared with profit maximizing firm, whether a sales maximizing firm will produce greater, smaller or same output and incur a greater, smaller or same advertising outlay depends upon the responsiveness of demand or total revenue to advertising expenditure as compared with the responsiveness of demand and total revenue to price cuts. As regards multi-product firms, which are generally found these days in the real world, in the *static model,* both sales maximization and profit maximization arrive at the same conclusion regarding choice of output and input combinations.[31]

But besides a static model, Baumol has also developed a *growth model*[32] of a sales maximizing firm which as has been shown by Williamson that different results follow as compared with profit maximisating firm.

In spite of the above cirticisms, the present author is of the view that Prof. Baumol's sales maximization model is a significant alternative to profit maximization and brings us closer to reality, for in many cases as we brought out above in the explanation of the model, it explains the business behaviour in the real world better than profit maximization. Even if in certain cases, sales and profit maximization yield same or similar results, even then by providing intersting insight into managerial motivation in these days of manager-dominated big business corporations Baumol has made an inportant contribution to the theory of firm. Further, by explicitly incorporating advertising and other forms of non-price competition in his model, Baumol has made a significant contribution to our price theory.

27. A Siberston, Price Behaviour of Firms, *Economic Journal*, 1970.
28. W.G. Shephered. On Sales Maximising and Oligopoly Behaviour, *Economica*, 1962.
29. C.J. Hawkins, 'On the Sales Revenue Maximization Hypothesis, *Journal of Industrial Economics*, April 1970.
30. C.J. Hawkins, "The Revenue Maximization Oligopoly Model", Comment, *American Economic Review*, March 1971.
31. Sec C.J. Hawkins, On the Sales Revenue Maximization Hypothesis', *Journal of Industrial Economics*, April 1970.
32. See W.J. Baumol's (1) *Business Behaviour, Values and Growth* 1957 (2) On the Theory of Expansion of the Firm, *American Economic Review*. Vol. 52, pp. 1078-87.

QUESTIONS FOR REVIEW

1. What is mark-up pricing followed by business firm in the real world ? Show that make-up depends on the price elasticity of demand
2. Expiain make-up pricing theory. How would you bring about synthesis between profit maximisation pricing and mark-up pricing ?
3. "In corporate form of business organisation managers are more interested in maximising sales rather than profits" Discuss.
4. What is meant by sales-maximisation ? Explain how a firm determines optimal price and output when it pursues the goal of sales maximisation.
5. Explain Baumol's sales maximisation model using a suitable diagram. Campare it with profit, maximisation objective of the firm.
6. What is meant by non-price competition ? Explain that sales maximisation objective brings out that businessmen will consider non-price competition to be more advantageous than price competition. Show, through sales maximisation model, the optimal amount of advertising expenditure.
7. If a price-aking monopolist 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) *D.U. B.A.(Hons) Economics*

   [**Hint.** (C) is correct. This is because total revenue is maximum at the point on a demand curve at which price elasticity of demand is equal to unity.
8. Assuming that a firm pursues the objective of sales maximisation. How much advertising expenditure it will incur to maximise value of sales subject to minimum profit constraint. Compare it with the amount of advertising expenditure incurred for maximising profits.
9. Critically evaluate full-cost pricing theory. Does it contradict with the profit-maximisation theory of pricing ?

27

Practical Applications of Monopoly Model

In the last two chapters we have explained how price and output are determined under monopoly. The essence of monopoly model is that the monopolist exercises control over the price of the commodity. There are several applications of monopoly model. We will examine some of these applications in this appendix. The following applications of monopoly model will be discussed in the analysis that follow :

1. Incidence of lump-sum taxes
2. Incidence of commodity taxes
3. Government Regulation of Monopoly

INCIDENCE OF LUMP-SUM TAX UNDER MONOPOLY

Various types of taxes can be levied on monopoly and their incidence on the monopoly will be different. We shall consider the incidence of (*a*) lump-sum tax, (*b*) tax proportionate to total sales or output, (*c*) a unit tax imposed on the commodity being produced by the monopolist. *A lump-sum tax such as a licence fee is fixed irrespective of the level of output.* A lump-sum tax is just like an increase in fixed cost which does not affect the marginal cost. Therefore, a lump-sum tax does not affect the marginal cost of production which along with marginal revenue determines equilibrium output and price. Since lump-sum tax does not affect marginal cost, nor does it affect marginal revenue, the equilibrium (*i.e.*, profit maximising) output and price will remain unchanged. Therefore, a lump-sum tax cannot be shifted to the buyers. This is because in order to shift the tax burden if a monopolist raises the price of his commodity and reduces his output, his profits will be less than the maximum net profits which can be earned without raising price. On the other hand, if monopolist continues to produce the same output and pays the lump-sum tax, his profits will be reduced by the amount of the tax but his *net profits* after deducting the tax will be maximum if he continues to produce the same level of output as before and sell at the same price as before. Thus, the whole burden of a slump-sum tax falls on the monopolist and none of it will be passed on to buyers. But it is important to note that as lump-sum tax is a sort of increase in fixed cost, *it will reduce profits*, though the price and output that maximises

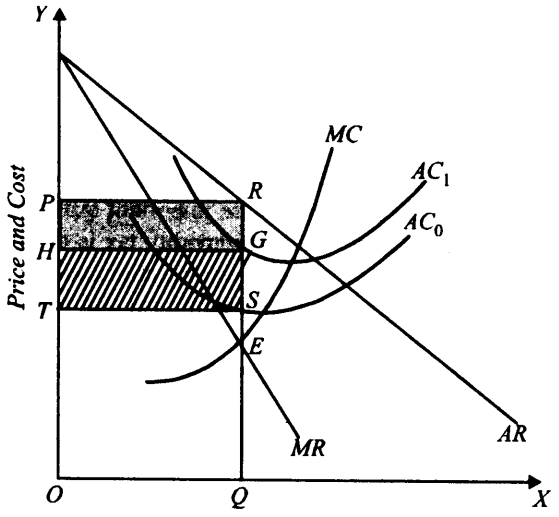

Fig. 27.1. *Effect of a Lump-Sum Tax on Price and Output under Monopoly*

net profits will remain the same. This is illustrated in Fig. 27.1 where *AR* and *MR* are the average and marginal revenue curves of a monopolist. Suppose before the imposition of a lump-sum tax, average total cost curve is AC_0 and marginal cost curve is depicted by *MC*. Before the lump-sum tax is imposed, monopolist is in equilibrium by producing output *OQ* and charging price *OP*. Monopolist is earning economic profits equal to *PRST*. Suppose now a lump-sum tax is introduced. It is a fixed amount not related to the level of output or price charged. Since lump-sum tax is a fixed amount, it will not affect the marginal cost. However, average total cost consisting of average variable cost and average fixed cost will increase when lump-sum tax is levied and incorporated in the average total cost as a form of fixed cost. In Fig. 27.1 with lump-sum tax average total cost curve shifts upward to the new position AC_1. It should be noted that the gap between AC_1 and AC_0 representing lump-sum tax per unit of output becomes narrower as level of output is increased. This is because a fixed amount of lump-sum tax spreads over a larger number of units of output as output is expanded yielding successively lower lump-sum tax per unit of output.

With marginal cost curve remaining unchanged when lump-sum tax is levied and, given the marginal revenue curve *MR*, the equilibrium or profit maximising output and price will remain the same as it will be seen from Fig. 27.1. However, as average total cost curve has shifted upward to AC_1, the economic profits of the monopolist will decrease. With unchanged price *OP* and higher average total cost curve AC_1 inclusive of lump-sum tax, the profits of the monopolist has decreased to the area *PRGH*. Thus, the whole of the burden of lump-sum tax is borne by the monopolist and he cannot pass it on to the consumers. It is also important to note that if lump-sum tax levied is very large so that it pushes up the average cost curve above the demand or average revenue curve, the monopolist will close down in the long run. In other words, *if lump-sum tax exceeds the super-normal profits earned by the monopolist before its imposition, the monopolist will not be able to earn even normal profits and will therefore stop production of the commodity.*

Another important point to note is that since lump-sum tax does not affect the equilibrium output and price, it does nothing to cure the economic inefficiency that prevails under monopoly. However, lump-sum tax has a distributional effect, it may be used as a means to improve income distribution.

INCIDENCE OF A COMMODITY TAX UNDER MONOPOLY

We now pass on to analyse the incidence of a commodity tax under monopoly. Excise duties and sales tax on commodities are important examples of commodity taxes. Commodity taxes are also called *indirect taxes*. A commodity tax is of two types : (1) unit or specific tax; and (2) ad valorem tax. A unit or specific tax on a commodity is fixed per unit of the commodity. A tax of 10 paise per cigarette is a unit or specific tax. Ad valorem tax is a certain percentage of the value or price of the commodity. For example, sales tax levied on many commodities in India is an ad valorem tax. For sake of simplicity we will explain the effect of commodity tax by taking specific or unit tax on a commodity.

Incidence of Unit or Specific Tax on the Commodity Produced by the Monopolist in Case of Constant Costs.

As in case of perfect competition, the monopolist can also shift at least a part of burden of the tax to the consumers. With the imposition of a unit tax (specific sales or excise duty) the marginal cost (*MC*) curve shifts upward and the new profit-maximising equilibrium is established at a lower output and a higher price. Thus a unit sales tax or excise duty on monopoly product leads to the rise in price of the commodity and thus some burden of the tax is shifted to the consumers. Consider Fig. 27.2 where marginal cost curve *MC* of the monopolist is a horizontal straight line. Initially, monopolist is in equilibrium at output level OQ_1 and charging price OP_1. With the imposition of unit tax, say equal to *NH*, marginal cost curve shifts upward by the full amount of the tax to the dotted position *MC'*. The new equality of marginal cost (*MC'*) with marginal revenue (*MR*) is reached at the lower

output level OQ_2 and the higher price OP_2. It will be seen from Fig. 27.2 that price rises by P_1P_2 which is less than the amount of the tax NH. *Thus a monopolist has been able to pass on to the consumer only a part of the tax and the remaining part is borne by him.*

Now an interesting question is why a monopolist has not shifted the full amount of the tax to the consumers. With the imposition of the tax marginal cost (MC) rises by the full amount of the tax. In the new equilibrium position, marginal revenue must also rise by the same amount so that profit maximizing condition is achieved in the new situation. But as output is reduced, price (or AR) rises more slowly than the marginal revenue which rises more rapidly than AR. Therefore, price rises by less than the amount of the tax and monopolist can shift only a part of the tax.

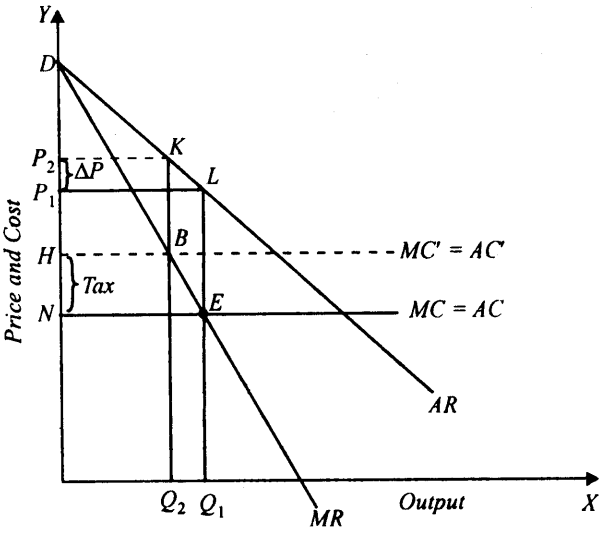

Fig. 27.2. *Incidence of Commodity Tax in a Monopolistic Industry under Constant Costs*

It is worth noting that profits of the monopolist has been sharply reduced by the imposition of unit or specific tax on the commodity produced by the monopolist. Prior to the tax, monopolist was producing output OQ_1 and charging price OP_1. It will be seen from Fig. 27.2 that with this price-output combination the monopolist was making profits equal to the area P_1LEN. After tax, he produces output OQ_2 and fixes price OP_2. His new profits after the imposition of unit tax are reduced to the area P_2KBH.

Comparing with Perfect Competition Case

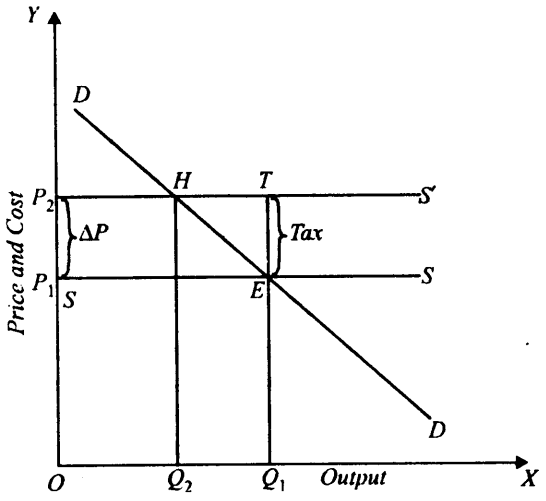

Fig. 27.3. *Incidence of Commodity Tax in a Perfectly Competitive Industry under Constant Costs*

When we compare the effect of unit tax under monopoly with that under perfect competition, we get a surprising result. It is generally believed that a monopolist controls the supply of a commodity and has the power to set a price. Therefore, it may seem that the monopolist will be able to fully shift the burden of the unit tax. However, actually it is not true. On the other hand, *under perfect competition in case of constant costs (that is, supply curve being horizontal straight line), the firms are able to shift the entire amount of unit tax to the consumers.* For sake of comparison, Fig. 27.3 illustrates incidence of a unit tax in case of a perfectly competitive industry under conditions of constant costs. Prior to unit tax, supply curve SS and demand curve DD intersects at point E. Equilibrium output is OQ_1 and price is OP_1. Suppose unit tax equal to ET is imposed on the commodity. A tax of ET per unit is added to cost per unit at every level of output.

As a result, supply curve shifts upward to S'S'. New equilibrium is reached at point *H*. Output falls to OQ_2 and price rises to OP_2. It will be seen from Fig. 27.3 that price rises by the full amount of the tax *ET* in this case of perfectly competitive industry under constant costs, while in case of monopoly we have seen that price rises by less than the unit tax. That is, *in case of constant costs while firms in a perfectly competitive industry are able to fully pass on the unit tax to the consumers, monopolist is able to pass only a part of it.* This is a surprising result but nevertheless true.

Incidence of a Unit Tax under Monopoly in Case of Increasing Costs

We now pass on to explain the incidence of a unit or specific tax in case of increasing costs under monopoly. Fig. 27.4 illustrates the shifting of the unit tax burden under monopoly when increasing costs prevail. Before the imposition of a unit tax monopolist is in equilibrium by producing output Q_1 and charging price P_1. With the imposition of a unit tax equal to *RT*, price rises from P_1 to P_2 and output is reduced from Q_1 to Q_2. As will be observed from this figure price rises by the amount P_1P_2 which will be the incidence of the tax on the buyers whereas tax imposed, which is equal to *RT*, is greater than the rise in price (tax > ΔP) competition when increasing costs occur. Thus, in sharp contrast to the case under perfect competition in this case of increasing costs also, the monopolist is able to pass only a part of the tax to the consumers, and the rest he has to bear. This means profits of the monopolist will fall because he has to bear a part of the unit tax. Further, since as a result of the imposition of a unit tax, output of the monopolist decreases, his total profits will fall much more.

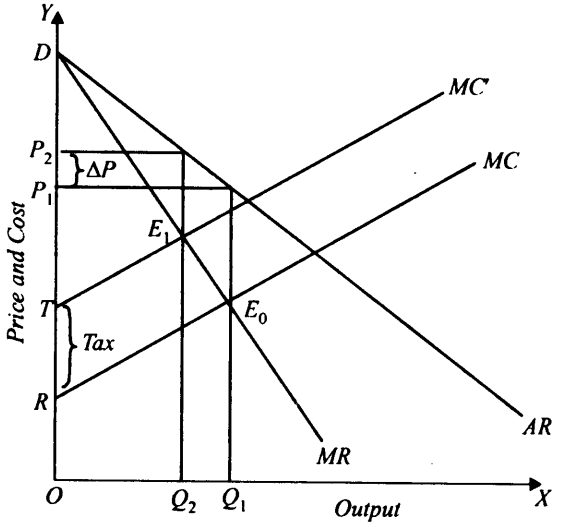

Fig. 27.4. *Incidence of Unit Tax on Commodity under Monopoly in case of Increasing Costs.*

From the foregoing analysis of the impact of unit tax under monopoly we find that it is bad from many viewpoints. First, monopolist's, profit's fall by more than the tax revenue collected by the Government by levying unit tax. Secondly, consumers suffer because they have to pay a higher price. Thirdly, under monopoly there is a lot of inefficiency or misallocation of resources and imposition of unit tax further increases the inefficiency under monopoly, that is, misallocation of resources is made worse by the imposition of unit tax as it leads to the reduction in output. Thus, a unit or specific tax is a very poor way of regulating monopoly.

REGULATION OF MONOPLY PRICE

It has been seen in the earlier chapters that monopolists restrict output and raise prices of their products. In this way they are not only generally able to make supernormal profits and thus increase inequalities in income distribution but also cause inefficiency in the allocation of resources of the society. It has therefore been felt to regulate monopoly with a view to achieving two objectives. First, it is regulated to improve income distribution and prevent exploitation of consumers by the monopolists. Secondly, monopoly is regulated so as to ensure economically efficient allocation of resources. Further, monopoly can be regulated either through suitable taxation or through fixation of the maximum price it can charge for its product. It is the price regulation of monopoly that we will discuss below.

Consider Fig. 27.5 which gives cost and demand condition faced by a monopolist. Without

regulation of price charged by him, he is in equilibrium by producing the level of output *OQ* at which his profits are maximum, and are equal to the area *PKLT*. He has been able to make these supernormal profits by producing a level of output less than what is socially desirable and also charging a price higher than what would be prevailing under perfect competition.

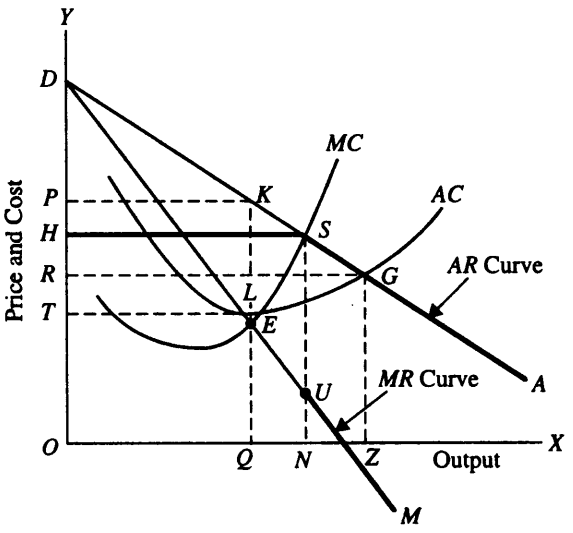

Fig. 27.5. *Regulation of Price Charged by a Monopoly*

Marginal Cost Pricing

Suppose in order to improve allocation of resources or distribution of income the Government decides to regulate the price charged by the monopoly. Obviously, the Government will fix the maximum price (*i.e.*, price ceiling) at the level below its profit maximizing price *OP*. There are two types of pricing rules which have often been proposed for price regulation of monopoly. First, since social welfare is maximum when price of a commodity is fixed at the level where it equals marginal cost of production of the commodity, it is proposed that the maximum price for the monopoly product be fixed at the level equal to the marginal cost. This is therefore known as *marginal cost pricing*. Consider Fig. 27.5 where *DA* represents the average revenue or demand curve of the commodity produced by the monopolist. It will be seen from the demand or average curve *DA* in Fig. 27.5 that when monopolist expands output to *ON*, price falls and becomes equal to the marginal cost at point *S*. Thus, if objective of regulation of monopoly is to ensure economic efficiency, that is, maximum social welfare, then maximum price to be charged by the monopolists should be fixed at the level *OH* corresponding to the level of output *ON*.

It is important to note that with the maximum price *OH* fixed by the Government the monopolist will sell all units of output upto *N* at the same price *OH*. Therefore, with *OH* as the maximum regulated price for the monopolist, the part of the average revenue curve *DS* now becomes irrelevant. This is because he can sell any amount up to point *N* at the given regulated price *OH*. Therefore, his new average revenue curve upto the level of output *ON* becomes the horizontal straight line *HS*. Since average revenue curve remains constant over the range *OH*, marginal revenue curve would now coincide with the average revenue curve *HS* which has been thickened. Therefore, with regulation of price at *OH*, part *DU* of the marginal revenue curve also becomes irrelevant. With regulated price at *OH*, the portion of demand or average revenue curve *SA* lying below the price *OH* would remain intact and unaffected and marginal revenue curve corresponding to this part of the average revenue curve is the thickened portion *UM*. Thus, with maximum regulated price *OH*, the average revenue curve for the monopolist becomes *HSA* and the marginal revenue curve is *HSUM* with the broken or discontinuous a portion *SU*.

It should be noted that with the given marginal cost curve *MC* and the new marginal revenue curve *HSUM* formed after the fixation of regulated price *OH*, the monopolist will be maximizing his profits by producing *ON*. This is because if with the regulated price *OH* the monopolist produces more than *ON*, its marginal revenue will fall below the marginal cost showing losses on the extra units produced. And if with the regulated price *OH*, he produces less than *ON* level of output, marginal revenue exceeds marginal cost indicating the possibility of increasing profits by expanding output to the level *ON*. Thus, with the regulated price *OH*, the monopolist is in equilibrium and maximizing profits by producing *ON* level of output.

It is interesting to observe that in case of monopoly when maximum regulated price *OH* is fixed below its free market profit-maximizing price *OP*, the monopolist expands his output from *OQ* to *ON* and buyers demand this much output at price *OH* and therefore no shortage of output is created as a result of the fixation of regulated price below the free-market profit maximizing price *OP* of the monopolist. This is in sharp contrast to the price regulation of an industry working under perfect competition in which case when maximum price is fixed below the free-market equilibrium price at which the quantity demanded equals the quantity supplied, shortage of the commodity is created because the quantity supplied falls at the lower regulated price and the quantity demanded exceeds the quantity supplied. However, in monopoly, fixation of a lower price can lead to a greater output up to the point of equality of price with marginal cost. This is because, if left free, a monopolist restricts output to raise the price of the commodity. Now, with the fixation of the maximum price which he can charge, the reason for restriction of output no longer exists. Indeed, at the maximum regulated price below his free-market price *OP*, if he continues to produce the same level of output *OQ*, his profits will decline. And further with regulated maximum price *OH*, he can increase his profits by raising output to the *ON* level.

Average Cost Pricing

Now, it will be seen from the Fig. 27.5 that even with the imposition of maximum price equal to the marginal cost and his producing *ON* level of output, he is making supernormal profits, as his average revenue exceeds average cost of production. Those who want to regulate monopoly to improve the distribution of income or to ensure that lowest possible price be charged from the consumers, they propose that monopolist should not be allowed to make more than *fair return* on his capital investment, especially when he is producing an essential commodity. Their proposal is to adopt the average-cost pricing principle for regulating the product price of the monopolist. Consider Fig. 27.6 According to the average-cost pricing principle, the maximum price should be fixed at the level *OR* corresponding to which at point *G* average revenue or demand curve *DA* cuts the average cost curve *AC* at output level *OZ*. Thus with price equal to *OR* and output *OZ*, the monopolist is just recovering his average cost of production. However, it may be noted that *his average cost includes normal profits or fair return on his capital investment.* The normal profits or fair return is the opportunity cost of his capital, that is, the earnings which he can make elsewhere if he invests his capital in some other industry. Of course, what exactly is the fair return on capital has been a subject of severe controversy and Governments which regulate monopoly often appoint committees to decide about the fair return on capital investment which then becomes a part of the cost of production. To conclude, when average cost pricing is followed, it actually ensures fair return on capital.

Price Regulation and Natural Monopoly

Price regulation in case of natural monopoly presents some problems. *A natural monopoly is said to exist when there occur economies of scale over a large expansion of output due to which average cost of production steadily declines and the extent of market demand for a commodity is such that it can support only one big optimum-size firm.* Under these circumstances a large-sized firm enjoying economies of scale and therefore having lower average cost of production can compete away the small-sized firms having higher average cost through setting a lower price. Thus, in case of occurrence of economies of scale upto quite a large output, one firm tends to dominate and succeed in establishing its monopoly.

Now, for regulation of natural monopoly through marginal cost pricing a difficult problem is faced. Fig. 27.6 illustrates the case of marginal cost pricing in case of natural monopoly. Owing to economies of scale average cost is steadily declining throughout and marginal cost curve lies below it. *AR* and *MR* are the average and marginal revenue curves representing the demand conditions. It will be seen that marginal cost curve intersects the average revenue curve at point *E*, that is, if marginal cost pricing is followed, then price will be fixed at the level

OP_m at which OQ_m quantity of the commodity will be sold. A glance at the Fig. 27.4 will reveal that price OP_m is less than the average cost of production OL at OQ_m level of output. This means that if marginal cost pricing is imposed on the monopolist he will have to incur losses equal to $LCEP_m$ and therefore will go out of business. In order that he continues to produce with price regulated at the marginal cost level, he will have to be provided subsides equal to the area $LCEP_m$. This amount of subsidy will ensure him fair return on his capital investment, while producing OQ_m level of output. However, if the Government does not want to give subsidies because of its financial constraint, then alternative is to adopt the principle of average cost pricing. It will be seen from Fig. 27.6 that average cost curve cuts the demand or average revenue curve at point S and therefore according to the rule of average cost pricing, price should be fixed at the level of OP_a at which the monopolist will produce OQ_a. With price equal to the average cost, the monopolist will get fair return on capital (included in average cost). It is worth noting that unregulated monopoly price will be equal to OP and if left free and unregulated, the monopolist will make profits equal to $PTKJ$. Thus, even regulation of monopoly through average cost pricing leads to the expansion in output by the monopolist to OQ_a level and thereby cause expansion of output towards economically more efficient output. Note that consumer's surplus or welfare will increase by expanding output from OQ to OQ_a. In other words, loss in welfare or economic efficiency sufferred in case of unregulated monopoly price and output will be reduced under average cost pricing due to the expansion in output and lowering of price. It should be further noted that with average cost pricing, the producer would not be making any monopoly profits; he will be earning only normal profits and fair return on his capital investment. Of course, as mentioned above, full economic efficiency or maximum social welfare is reached if marginal cost pricing is adopted. But, as seen above, in case of natural monopoly, marginal cost pricing requires provision of subsidy by the Government if he is to be induced to stay in business.

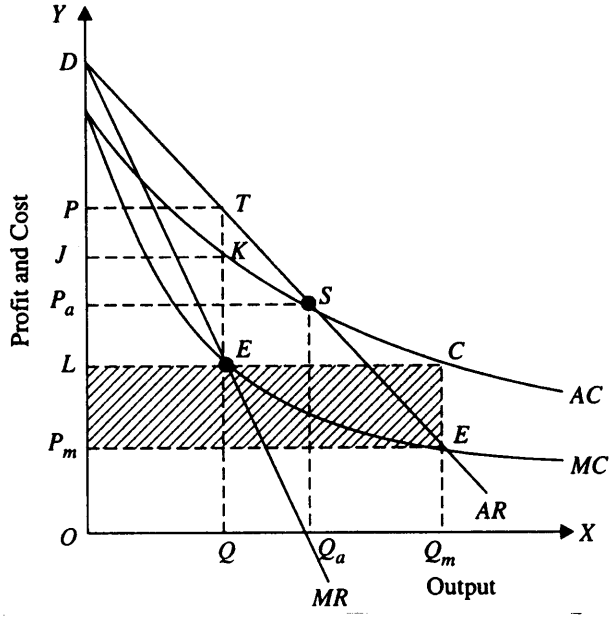

Fig. 27.6. *Regulating the Price of a Natural Monopoly*

PART V

Factor Pricing and Income Distribution

- Marginal Productivity Theory of Distribution
- Determination of Wages
- Theory of Rent
- Theories of Interest
- Theories of Profit
- National Income : Concepts and Measurement

28

Marginal Productivity Theory of Distribution

Functional vs. Personal Distribution

In the previous parts of the book, we have discussed how the prices of products are determined in different market structures. The pricing of factors of production is the subject-matter of the present part. The theory of factor prices is popularly known as the theory of distribution. The distribution may be functional or personal. The distribution theory with which we are concerned in this book is the theory of functional distribution. The concept of functional distribution should be carefully distinguished from that of personal distribution. *Personal distribution of national income or what is also known as size distribution of incomes means the distribution of national income among various individuals or persons in a society.* As is well known, national income in *a free market economy* is not equally distributed among various individuals. Some are rich, while others are poor. In fact, there are large inequalities of income between various individuals. Thus the theory of personal distribution studies how personal incomes of individuals are determined and how the inequalities of income emerge. On the other hand, *in the theory of functional distribution we study how the various factors of production are rewarded for their services performed by them in the production process.* Factors of production have been classified by economists under four major heads, *viz.*, land, labour, capital and enterprise. Thus, in theory of functional distribution we study how the prices of these factors of production are determined. The prices of land, labour, capital and enterprise are called rent, wages, interest and profits respectively. Thus, in the theory of functional distribution we discuss how the rent of land, wages of labour, interest on capital and profits of entrepreneur are determined. To be brief, theory of functional distribution means the theory of factor pricing.

The question that now arises is : Is it not the functional distribution that determines the personal distribution of national income. Personal distribution of income only partly depends upon functional distribution. *How much income an individual will be able to get depends not only on the price of a particular factor he has but also on the amount of that factor he owns as well as the prices and amounts of other productive factors which he may possess.*

Thus the personal income of a landlord depends not only on the rent but also on the amount of land he owns. Given the rent per acre, the greater quantity of land he owns, the greater will his income. Further, the landlord may have lent some money to others for which he may be earning interest. The total income from interest on money will also add to his personal income. Thus a person may be getting income from several sources, *i.e.*, from the earnings of various factors of production. The earnings from all the sources will constitute his personal income. Thus, if our landlord does not do any other work and owns no other factor of production, his personal income will depend on the rates of rent and interest and also on the amount of land he owns and has given it on rent and the amount of money he has lent out. Thus, "*personal distribution relates to individual persons and their incomes. The way in*

which that income was acquired often remains in the background. What matters is how much some one earns, not so much whether that income consists of wage, interest, profit, pension or whatever."[1]

Thus total income from rent, wages, interest and profits of any will make up the personal income of an individual. *Theory of personal distribution of income has therefore to explain not only that how prices or rewards of factors such as rent of land, interest on capital are determined but also how various people happen to own different quantities of these productive factors.* The theory of functional distribution, or the theory of factor prices, as it is often called, is thus only a part of the theory of personal distribution. In this book we are primarily concerned with functional distribution of income or the pricing of factors of production.

Theory of Distribution as a Special Case of the Theory of Price

It is worth mentioning here that *in modern economic theory, theory of distribution is only a special case of the theory of price.* As the prices of products are explained through interaction of the demand for and supply of them, similarly distribution is conceived as the determination of *prices of the factors* which are also explained through interaction of demand for and supply of them. According to the traditional or neo-classical theory of distribution, the income which a factor will obtain depends on the price determined by demand for and supply of it and the amount that will be used or employed of that factor. In other words, it is the forces of free market, that is, demand and supply that go to determine the incomes of various factors and not any institutional framework such as ownership of property. Further, the association of various factors with particular social classes, such as land with land-owning class, capital with capitalists, and labour with the working class is also not emphasised in this tradititional theory of distribution. In fact, the factors are conceived merely as productive agents and distribution of income among them as merely functional rewards for their contribution to production. In other words, neo-classical theory of distribution merely explain functional distribution of income and not personal distribution of income.

Derived Demand for a Factor

It is essential to understand the nature of demand for factors of production. Demand for a factor differs in certain respects from the demand for consumer goods or products. Products or consumer goods are demanded because they satisfy the wants of the people directly. People demand food to satisfy the pangs of their hunger, they demand clothes to satisfy their want of providing a cover to their bodies and so forth. These products possess utility which directly satisfy the desires of the people and who are therefore willing to pay the price for these products.

But, unlike the products, *the factors of production do not satisfy the wants of the people directly.* The factors of production are demanded not because they directly satisfy the wants of the people who wish to buy them. Instead, they are demanded because they can be used to produce goods which then directly or indirectly satisfy human wants. *Therefore, demand for factors of production is called derived demand.* It is derived from the demand for goods they help to make. Thus, the demand for a factor ultimately depends upon the demand for goods it helps to produce. The greater the demand for a good which a particular type of factor helps to make, the greater the demand for that type of factor. Just as demand for a good depends upon its utility, the demand for a factor depends upon the marginal productivity of factor. In fact, as will be presently explained, the marginal productivity curve of the factor is the demand curve of that factor. The *entrepreneur's demand for a factor of production is governed by the marginal productivity of the factor.*

CONCEPTS OF PRODUCTIVITY

Before turning to the detailed study of how prices of factors of production are determined under conditions of perfect and imperfect competitions, it will be helpful for the proper under-

1. Jan Pen, *Income Distribution*, Penguin Books, 1971, p. 15.

standing of the subject if we first explain the various concepts of productivity. The knowledge of these various concepts will greatly help in understanding the modern theory of factor prices. At the very outset it is desirable to make it clear why economists are interested at all in the productivity of a factor. *We are concerned with productivity since the price which a factor will be able to get depends upon the value of its marginal product.* Why? This is because the factors are demanded not because they directly satisfy the wants of the people. The factors are demanded to use them for the production of goods. The greater the productivity of a factor to produce goods, it will be worthwhile for the employer to pay it a higher price.

Average Physical Product (APP). The first concept to understand is average physical product of a factor. Average physical product of a factor is the total output divided by the number of units of the factor employed. That is, average physical product of a factor is the total physical output produced per unit of the factor. Thus average physical product of labour is given by

$$APP = \frac{Total\ Output}{No.\ of\ Units\ of\ Labour\ Used}$$

If average physical product of factor is multiplied by the price of output, we get what is called average revenue product (ARP) of the factors, Thus,

$$ARP \text{ of Labour} = APP \times \text{Price of Output}$$

Marginal Physical Product (MPP). Marginal physical product of a factor is the increase in total physical output when one extra unit of the factor is used for production, quantity of all other factors remaining unchanged. For example, if in a cotton textile factory when an additional worker is empoloyed per day, it yields extra 5 metres of cloth per day when no other factors are increased, the marginal physical product of a worker is 5 metres of cloth per day. Take another example. If an extra one acre of land is given to a farmer with the given quantity of the other factors and it yields extra 20 quintals of wheat, then marginal physical product of land will be 20 quintals of wheat per acre.

In symbolic terms we can write marginal physical product (*MPP*) of labour as under:

$$MPP \text{ of Labour} = \frac{\Delta Q}{\Delta N}$$

where $\Delta N = 1$

ΔQ stands for change in output

ΔN stands for increase in labour by one unit.

According to the law of variable proportions, as the quantity of a factor used is increased, all other factors remaining unchanged, its marginal physical product first rises and then after a point starts diminishing due to the operation of diminishing returns to a factor. We assume here that diminishing returns to a factor start from the very beginning. Consider Table 28.1 when one unit of labour is employed for production, the total physical output is 6 units, when 2 units of labour are used, keeping the capital equipment constant, the total output increases to 11 units. Thus the total output goes on increasing as more labour is employed with a given quantity of capital equipment. When 6 units of labour are employed, total output is 21 units.

Table 28.1. Total and Marginal Physical Product of a Factor

Quantity of Labour (N)	*Total Physical Product (TPP)*	*Marginal Physical Product (MPP)*
1	6	6
2	11	5
3	15	4
4	18	3
5	20	2
6	21	1

We can calculate the marginal physical product of labour by observing the increase in total physical that is obtained by using an extra unit of labour employed. That is, by obtaining the value of $\frac{\Delta Q}{\Delta N}$, where $\Delta N = 1$ and ΔQ stands for change in output.

Thus, marginal physical product of the first unit of labour is 6, and when the second unit of labour is employed the total output increases by 5 units (11 – 6 = 5). Therefore marginal physical product of the second unit of labour is 5 units. Similarly, the marginal physical product of the third unit of labour is 4 (15 – 11 = 4), of the fourth unit it is 3, of the fifth unit it is 2 and so on.

Marginal Revenue Product (MRP) and Value of Marginal Product (VMP)

To determine what quantity of a factor a firm will employ in order to maximise its profits depends not only on the marginal physical product of the factor but also on the revenue that the firm will earn from the sale of output produced by the factor. In this regard the following two concepts have been evolved.

(1) Marginal Revenue Product (MRP)

(2) Value of Marginal Product (VMP)

Marginal Revenue Product (MRP). Marginal revenue product is the increase in the total revenue product by employing an additional unit of a factor, the expenditure on other factors remaining unchanged. Thus the revenue earned from engaging an extra unit of labour, an extra unit of land, or an extra unit of capital is marginal revenue product of that factor. Marginal revenue product of a factor can be measured in two ways: (1) calculating the increase in total revenue by engaging an extra unit of a factor, and (2) by multiplying the marginal physical product with marginal revenue of the product. Thus

$$MRP = MPP \times MR$$

Table 28.2. Calculating MRP and VMP of a Factor Under Perfect Competition

Units of Labour	*Total Output (Q)*	*Price per Metre (Price = MR)*	*TR (P.Q.)*	*MPP* $= \frac{\Delta Q}{\Delta N}$ *where* $\Delta N = 1$	*MRP = MPP × MR* $\frac{\Delta TR}{\Delta N}$
1	6	5	30	6	30
2	11	5	55	5	25
3	15	5	75	4	20
4	18	5	90	3	15
5	20	5	100	2	10
6	21	5	105	1	5

Value of Marginal Product (VMP). Value of marginal product is the marginal physical product of a factor multiplied by the price of the product it helps to produce. Thus,

$$VMP = MPP \times Price\ of\ Output$$

When there prevails perfect competition in the product market, individual firms are price takers, that is, they take the price of a commodity as given and merely decides what amount of the commodity they should produce. With price as constant for an individual firm, marginal revenue (*MR*) equals price. Therefore, for an individual firm under perfect competition; marginal revenue product (*MRP*) of a factor which is equal of *MPP* × *MR* of output is equal to value of marginal product (*VMP*) of the factor which is equal to *MPP* × price of output. To conclude, *under perfect competition in the product market:*

$$MRP = VMP$$

The calculation of marginal revenue product and value of marginal product under perfect competition in the product market is illustrated in Table 28.2. It will be seen from this table

that price of the commodity is taken to be Rs. 5 per unit which remains constant when output increases by employing more units of labour. The total revenue can be obtained by multiplying total output (Q) with price (P). Thus $TR = P \times Q$. When one unit of labour is employed, total output is 6 and price is 5, the total revenue (TR) is therefore equal to $P.Q = 6 \times 5 = 30$, which is shown in column IV. When 4 units of labour are used, the total output increases to 18 and total revenue (TR) is $18 \times 5 = 90$ and similarly total revenue is obtained for other levels of employment of labour for the production of a commodity.

Now, from the column of total revenue we can calculate the *MRP* of labour by finding out increase in revenue when one extra unit of labour is employed, that is, by estimating $\frac{\Delta(TR)}{\Delta N}$ where ΔN is equal to one.

It will be seen from Table 28.2 that when one unit of labour is employed, total revenue (TR) earned from output produced is equal to Rs. 30. With an extra unit increase in labour employed, the total revenue increases to Rs. 55 from the sale of output produced, that is, *MRP* of labour is now equal to $55 - 30 = 25$. Similarly when one more unit of labour, that is, now 3 units of labour are employed, total revenue increases from 55 to 75 and marginal revenue product (*MRP*) of labour therefore falls to $75 - 55 = 20$. Likewise, we can calculate the *MRP* of labour for further units of labour employed by estimating $\frac{\Delta(TR)}{\Delta N}$ where $\Delta N = 1$.

We can also use second method of estimating marginal revenue produce of labour (*MRP*) by multiplying marginal physical product (*MPP*) of labour with marginal revenue. ($MRP = MPP \times MR$). As under perfect competition price of a product for individual is constant and marginal revenue is equal to it we can obtain *MRP* of labour from multiplying marginal physical product (*MPP*) of labour by price of the product. Thus, if we multiply the column 3 showing price or marginal revenue by column 5 showing *MPP* of labour work we will get marginal revenue product (*MRP*) which in the present case of perfect competition in the product market will equal value of marginal product. Thus, *MRP* of first unit of labour is $5 \times 6 = 30$, of the second unit of labour is $5 \times 5 = 25$, of the third unit of labour of $4 \times 5 = 20$ and so on. It will thus be noticed from Table 28.2 that *under conditions of perfect competition in the product market, MRP of labour is equal to VMP of labour.*

MRP and VMP of Factor under Monopoly or Imperfect Competition in the Product Market

When a firm is monopolist in the product market or is working under conditions of imperfect competition, the price at which it sells its product falls as it produces and sells more. In this case marginal revenue per unit of output is less than price at which output is sold. Therefore, in this case marginal revenue product (*MRP*) of a factor (which is equal to *MPP* of the factor multiplied by the marginal revenue) is less than value of marginal product (*VMP*) of the factor ($MRP < VMP$). This is shown in Table 28.3.

Table 26.3. MRP and VMP of Labour under Imperfect Competition

Units of Labour	*Total Output (Q)*	*MPP of Labour* $\frac{\Delta Q}{\Delta N}$	*Price of Output (Rs.)* P	*Total Revenue (TR)* $(P.Q)$	*MRP of Labour* $\frac{\Delta TR}{\Delta N}$	*VMP of Labour* $MPP \times P$ (3) × (4)
(1)	(2)	(3)	(4)	(5)	(6)	(7)
1	6	6	5	30	30.0	30
2	11	5	4.5	49.5	19.5	22.5
3	15	4	4	60	10.5	16
4	18	3	3.5	63	3.0	10.5
5	20	2	3	60	- 3.0	6.0
6	21	1	2.5	52.5	- 7.5	2.5

In column 2 of Table 26.3 we give the total output of cloth as more units of labour are employed. From this in column 3 we have obtained marginal physical product of labour by measuring $\frac{\Delta Q}{\Delta N}$ (where ΔN = one unit of labour). It will be seen that marginal physical product of labour diminishes as more units of labour are employed for production. A glance at column 4 reveals that as more output is produced and sold price falls from Rs. 5 per unit when 6 units of output are produced and sold to Rs. 2.5 when 21 units of output are sold. Multiplying total output by price ($P \times Q$) yields total revenue which is shown in column 5. Now, by using the first method we calculate *MRP* of labour, by estimating $\frac{\Delta TR}{\Delta N}$ (where ΔN = one unit of labour), that is, by measuring increase in total revenue caused by employing an extra of labour. This *MRP* of labour has been shown in column 6 of the table.

As regards value of marginal product (*VMP*) of labour, it is easy to measure it and can be obtained from multiplying marginal physical product by the price of the product which is falling as more is producted. Thus when 2 units of labour are used for production, marginal physical product of labour is 5 and price has fallen to Rs. 4.5 per unit. We therefore obtain 5 × 4.5 = Rs. 22.5 as value of marginal product of labour. Similarly, when 3 units of labour are employed for production marginal physical product of labour is 4 and price of output falls to Rs. 4 per unit. Therefore, with 3 units at labour employment, value of marginal product of labour is 4 × 4 = Rs. 16. In the same way *VMP* of further units of labour can be estimated.

It should be noted that we can also calculate *MR* per unit of output in this case and multiply it with *MPP* of labour to obtain the *MRP* of labour. Since calculating *MR* in this case is somewhat difficult, we have used a direct method of measuring *MRP* of labour by estimating change in the total revenue when an extra unit of labour is employed for production

MARGINAL PRODUCTIVITY THEORY OF DISTRIBUTION

We now turn to the question as to what determines the prices of factors of production. A theory which tries to answer this question is known as marginal productivity theory of distribution. The essence of this theory is that a factor of production is paid price or reward equal to its marginal product. Thus, labour is paid wages equal to the value of its marginal product. Rent of land equals the value of marginal product of land. It also seems to be very *fair* and *just* that a factor of production should get its reward according to the contribution it makes to the total output, *i.e.*, its marginal productivity.

Marginal productivity theory was first put forward to explain the determination of wages, *i.e.*, reward for labour but later on prices of other factors of production such as land, capital etc. also were explained through marginal productivity. J.B. Clark, an American, was the first economist who developed marginal productivity theory of distribution in a number of articles and later on presented it in a complete form in his book "*The Distribution of Wealth*". In order to bring out the fundamental factors at work in the mechanics of income distribution Clark assumed a completely static society, free from the disturbances caused by economic growth. In other words, he assumed a constant population, a constant amount of capital and unchanging techniques of production. Besides the assumption of a static economy, he also assumed perfect competition in the factor market and perfect mobility on the part of both labour and capital.

Besides, Clark also supposed that the form of capital could be varied at will. In other words, physical instruments of production can be adapted to varying quantities and abilities of available labour. Further, he treated labour as a homogeneous factor by taking identical labour units and explained how the wage rate of labour is determined. Later on Marshall and Hicks further developed marginal productivity theory of distribution and made important contributions to it. *While Clark assumed that supply curve of labour was fixed and inelastic, Marshall and Hicks considered supply curve of labour (and also other factors of production) as upward sloping.*

Every rational employer or entrepreneur will try to utilise his fixed amount of capital so as to maximise his profits. For this he will hire as many workers as can be profitably put to work with a given amount of capital. For an individual firm or industry, marginal productivity of labour will decline as more and more workers are added to the fixed quantity of capital. He will go on hiring more and more labour units as long as the addition made to the total product by an extra labour unit is greater than the wage rate he has to pay for it. *The employer will reach equilibrium position when the wage rate is just equal to the marginal product of labour.*

Just consider the Fig. 28.1 where units of labour are represented on the *X*-axis and the marginal product of labour on the *Y*-axis. The *MP* curve shows the diminishing marginal product of labour. If the prevailing wage rate which an employer must pay is equal to *OW*, then it will be profitable for the employer to go on employing additional workers until the marginal product of labour becomes equal to the prevailing wage rate *OW*. It will be evident from Fig. 28.1 that if the prevailing wage rate is *OW*, then the employer will employ *ON* units of labour since the marginal product of labour is equal to *OW* at *ON* employment of labour. He would not employ more than *ON* amount of labour as the marginal product of labour falls below the wage rate *OW* and he would therefore be incurring losses on the employment of additional workers beyond *ON*. Thus, *an employer would be maximising his profits by equalising the marginal product of labour with the wage rate OW.* Since perfect competition is assumed to be prevailing in the labour market, an individual firm or industry will have got no control over the wage rate. An individual firm or industry has, therefore, to determine only the number of factor units (labour in the present case) to which it has to give employment at the prevailing (existing) wage rate.

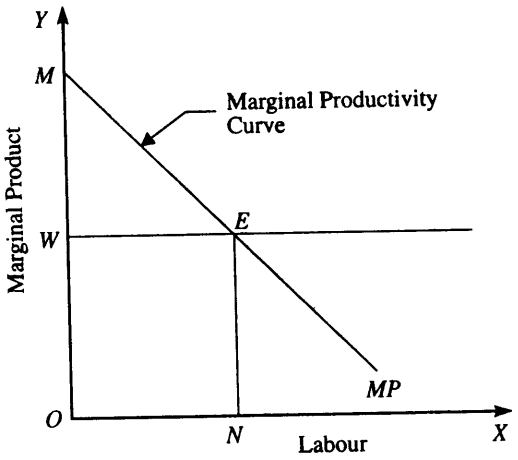

Fig. 28.1. *Wage rate is equalised with marginal product of labour.*

It follows from above that, given the wage rate, a rational employer will employ as many units of labour as will equalize the wage rate with the marginal product of labour. At different wage rates, the employer will employ different amounts of labour units depending upon the corresponding amounts of the value of the marginal product. Thus, *the relationship between the wage rate and the marginal product of labour provides us demand curve of labour.*

Demand curve of a factor (*e.g.*, labour) for the economy as a whole is obtained by summing up horizontally marginal product curves of the factor of all firms in the economy which employ that factor. Since marginal product curves of a factor slopes downward the demand curve of the factor of the economy as a whole will also slope downward. This is shown in Fig. 28.2 where *MP* curve of labour has been drawn by adding horizontally the marginal product curves of labour of all the individual firms which employ labour (Note that in Fig. 28.2, the scale on the *X*-axis has been very compressed as compared to that in Fig. 28.1 to accomodate large quantities of labour).

For the determination of wage rate of labour (*i.e.*, price of a factor) which individual firms take as given supply of labour has also to be brought into the analysis. As mentioned above, J.B. Clark considered supply curve of labour for the economy as perfectly inelastic which is shown in Fig. 28.2 by a vertical straight line curve *SS'* with *OS* as the available amount of

labour. It will be seen from Fig. 28.2 that the intersection of demand curve of labour *MP* and the supply curve of labour *SS'* determines equilibrium wage rate equal to *OW*. Now, if wage rate is higher than *OW*, quanity demanded of labour will be less than the available supply of labour. As a result, some workers would be unemployed. This surplus labour or unemployed workers will pull down the wage rate to *OW*.

On the other hand, if wage rate is lower than *OW*, the quantity demanded of labour will exceed the available supply of labour. Consequently, this excess demand for labour at a lower wage rate will push up the wage rate to the equilibrium wage rate *OW*. Note that the equilibrium real wage rate will be equal to the marginal product of labour. In this way wage rate is determined in Clark's marginal productivity theory of distribution.

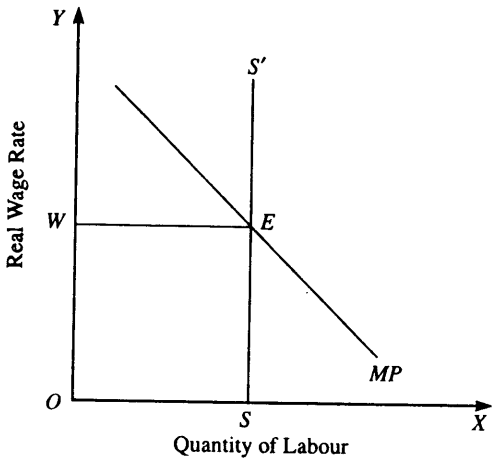

Fig. 28.2. *Clark's Marginal Productivity Theory: Determination of Wage Rage*

Marshall-Hicks Version

Marshall and Hicks did not regard supply curve of labour as perfectly inelastic. According to them, supply of labour varies directly with the wage rate as shown in Panel (*a*) of Fig. 28.3 by labour-supply curve *SS*. At a higher wage rate more quantity of labour is employed and vice versa. Thus, whereas demand curve for labour as derived from marginal productivity principle slopes downward, supply curve of labour slopes upward. At the wage rate where quantity demanded of labour is equal to the quantity supplied of it, equilibrium is reached and therefore that particular wage rate ultimately tends to prevail in the market.

Consider Fig. 28.3 where *DD* represents the demand curve for labour and *SS* represents its supply curve. The two curves intersect at point *E*. This means that at wage rate *OW* quantity demanded of labour is equal to quantity supplied of it. Thus, given the demand for and supply of labour, wage rate *OW* is determined and at this wage rate labour market is cleared. All those

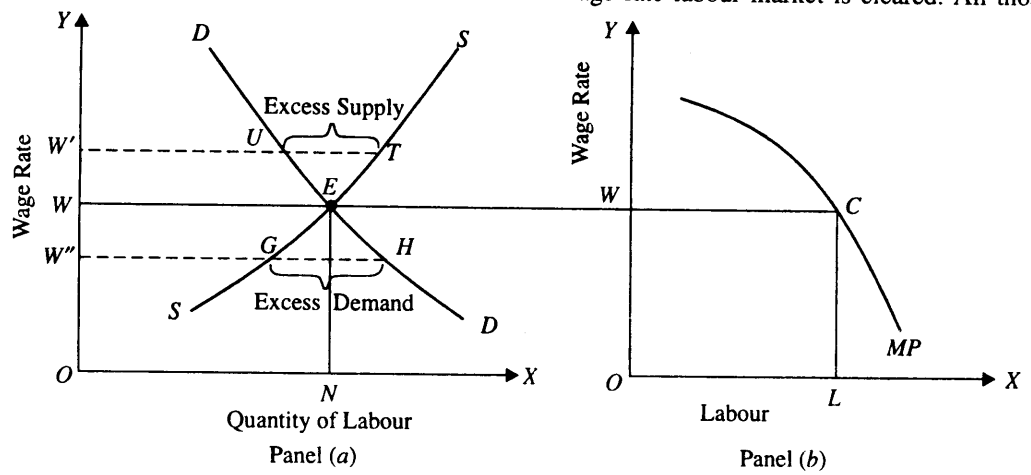

Fig. 28.3. *Marginal Productivity Theory of Distribution : Price of a factor is determined by demand and supply of a factor and is equal to marginal product of the factor.*

who are willing to work at the wage rate *OW* will get employment. This implies *that there is no involuntary unemployment and full employment of labour previls.* It is important to note that there will be no equilibrium at any wage rate higher or lower than *OW*. For example, at a higher wage *OW'*, supply of labour exceeds quantity demanded of it and as a result involuntary unemployment equal to *UT* emerges. Given the competition among labourers this unemployment would push down the wage rate to *OW*. On the other hand, at a lower wage rate *OW''*, the quantity demanded of labour exceeds the amount of labour which people are willing to supply. In view of the excess demand of labour, wage rate will go up to *OW* where the demand for labour equals the amount supplied of it. Thus wage rate *OW* will finally settle in the labour market.

It is important to note that since the individual employer is unable to influence the market wage rate, he will take the wage rate *OW* as a given and constant and employ the amount of labour so as the equate the marginal product of labour with this wage rate *OW*. In this way individual employer will be maximizing his profits. this is shown in panel (*b*) of Fig. 28.3. It would be observed from panel (*b*) of Fig. 28.3 that at the wage rate *OW*, the firm will employ *OL* amount of labour at which wage rate *OW* is equal to marginal product of labour.

It follows from above that *wage rate of labour is determined by demand for and supply of labour and is equal to the value of marginal product of labour.* This applies to the prices of other factors, such as rent of land, interest on capital which are also determined by the demand for the supply of these factors and are equal to their marginal revenue products.

To conclude, according to marginal productivity theory, the wage rate (or any other factor price) is determined by demand for and supply of labour (factor) and is equal to the value of the marginal product of labour. The details of this theroy as applied to the determination of wages, rent and interest will be explained in the following chapters.

SHORTCOMINGS OF MARGINAL PRODUCTIVITY THEORY

Marginal productivity theory has been a pillar in the traditional theory of distribution and till today it continues to be widely believed as correct explanation of what determines prices of factors of production. However, it is not free from shortcomings. It has been criticised on several grounds. The following important criticisms have been levelled against the marginal productivity theory.

1. It has been often been argued that marginal productivity theroy *takes too many assumptions which are quite unrealistic.* Therefore, it is concluded that theory has no validity. The marginal productivity theory assumes a stationary state, perfect competition, perfect mobility of factors, equal bargaining power of buyers and sellers, and perfect knowledge which are all far away from the actual conditions of the real world. World is not static. Instead, developments are continually taking place making the actual world a dynamic one. Competition is not perfect; instead there are large imperfections in the factor markets which make any analysis of factor pricing based on the assumption of perfect competition not fully correct. Bargaining powers of buyers and sellers of factor services, for instance, of employers and workers are not equal and thus make the exploitation of the weaker party possible.

2. Another significant criticism levelled against marginal productivity theroy is that being based upon the assumption of perfect competition both in product and factor markets, *it is unable to explain the determination of factor proces under conditions of imperfect competition in the factor and product markets.* Following the developments of imperfect and monopolistic competition theories by Joan Robinson and Chamberlin, there emerged two concepts of marginal product, namely, marginal revenue product (*MRP*) and value of the marginal product (*VMP*). Thus, when there prevails imperfect competition in the product market (assuming perfect competition in the factor market) a factor of production would not get remuneration equal to the value of the marginal product as is asserted in marginal productivity theory. Under imperfect competition in the product market, a factor of production is remunerated according to a different

principle, namely, marginal revenue product (*MRP*) which is less that the value of marginal product (*VMP*). According to Joan Robinson, *a factor is exploited if it is paid less than value of its marginal product*, whereas in marginal productivity theory, as it is presented in neoclassical economic thought, there is *just and fair distribution of total product*; every factor getting equal to its contribution to the total production.

3. *If imperfect competition or monopsony prevails in the factor market, a factor will not get its reward even equal to its marginal revenue product.* Under imperfect competition or monopsony or oligopsony in the labour market, the firm to be in equilibrium, will equate marginal wage of labour with the marginal revenue product of labour and this marginal wage is greater than the average wage rate which is paid to labour. Wage rate determined under conditions of monopsony is less than even the marginal revenue product (*MRP*) of labour. When a factor is paid less than its marginal revenue product, Joan Robinson calls it *monoposnistic exploitation*. We thus see that under monopsony or imperfect competition in the product or factor market, factors do not get rewards equal to their marginal revenue products. Marginal productivity theory did not visualise the possibility of exploitation of labour or any other factor of production.

4. Marginal productivity theory also *ignores the positive interrelation between rewards of the factors and their productivity*, especially between wages and the efficiency or productivity of labour. It has been pointed out that rise in wages has a favourable effect on the efficiency and productivity of labour. With higher wages workers can afford to have better standards of living and better health which will raise their productivity and efficiency. The positive relationship between wages and labour efficiency especially holds good in case of the developing countries like India where wage rates in many industries are even below the minimum subsistence level. With wages even below the subsistence level, workers remain underfed and undernourished and, as a result, unhealthy and inefficient. If, following the rise in wages, efficiency and productivity of workers improve, then it may be worthwhile from the viewpoint of employers to raise wages. It has therefore sometimes been asserted that "*higher wages are economical*". But, as mentioned above, marginal productivity theory completely ignores this favourable effect of higher wages on productivity of labour.

Now, if the favourable effect of higher wages on labour productivity is recognised, then the unique level of wage-equilibrium arrived at in the marginal productivity theory is not valid. With evey rise in the wage rate there will be a different curve of marginal productivity of labour and a different wage-employment equilibrium. Thus, there are various possible positions of wage-employment equilibrium depending upon the productivity and efficiency and there is choice for a firm or the industry to select among them. That there is a *unique wage equilibrium*, as has been asserted by the strict and rigid version of marginal productivity theory, is therefore not acceptable.

5. Another important criticism of marginal productivity theory of distribution is that it *does not explain the remuneration of entrepreneurs, that is, profits*. Marginal productivity of a factor can be known if it can be varied by keeping other factors fixed. But the entrepreneur in a firm is only one and a fixed factor and variation in it is not possible. Therefore, marginal productivity of intrepreneur from the viewpoint of a firm is meaningless. If the single entrepreneur is withdrawn from the firm, keeping all other factors constant, the whole production process of the firm will collapse. And there is no meaning of adding one entreprenur to a firm. The new entrepreneur will mean the establishment of altogether a new firm. It is because of this that in the neo-classical theory of distribution *profits are shown as surplus or residual income and not as determined by marginal productivity*.

6. Finally, the marginal productivity theory of distribution does not give any importance to the power structure, social conventions, social status, and prestige of a group of workers in the determination of remuneration of various groups or classes of labour force. Professor Pen

rightly writes that marginal productivity theory based on perfect competition "does not explain discrimination between men and women, between races and between social classes; it does not make it clear why top executives earn as much as they do and why unions can push up wages." According to Pen, the high salaries drawn by the top executives of the firm cannot be explained by marginal productivity theory, since the concept of marginal productivity in their case is utterly vague and further that their remunerations can be explained only by the power structure.

Conclusion

We have discussed above the various criticisms levelled against marginal productivity theory of distribution. Marginal productivity theory of distribution does not explain fully the determination of all factor prices. But *marginal productivity of a factor is the most important economic factor governing the prices of factors in a capitalist economy.* Other factors such as power structure, social conventions, status and prestige do play a part in fixation of remunerations but the economic factor of marginal productivity does exercise an important influence on the determination of factor rewards.

DETERMINANTS OF THE DEMAND FOR FACTORS

We shall now explain those causes which bring about changes in the factor demand. In other words, we are to discuss those factors which cause shifts in the whole *MRP* curve or demand curve of the factor. These shifts or changes in factor demand are caused not by the change in the price at the factor itself but by other influneces which work upon the factor demand. These changes or shifts in *MRP* curve or demand curve for a factor are affected by the changes in the basic determinants of factor demand. Just as the demand curve of a product changes or shifts as a result of changes in income or changes in tastes or preferences of the consumers, similarly the demand curve for the factor (*MRP* curve) will shift following the changes in the basic determinants of the factor demand curve (or *MRP* curve). These basic determinants of factor demand, the variations in which will bring about shifts in factor demand curve, are explained below:

1. **Demand for the Product.** As explained above, factor demand is a derived demand; derived from the demand for the product. The demand for a factor, therefore, depends upon demand for the product it helps to produce. As already explained, the *MRP* curve is the demand curve for the factor. Any changes in the demand for the product will cause a shift in the whole marginal revenue productivity and the demand curve for the factor used in its production. An increase in the product demand, given the supply of the product, will raise price and marginal revenue (*MR*). Hence the entire *MRP* curve which is obtained by multiplying marginal physical product by marginal revenue (*MR*) will shift outward to the right when marginal revenue (*MR*) rises following the increase in the demand for the product. On the other hand, decrease in the demand for the product, given the product supply, will lower price and *MR*. As a result, the *MRP* or demand curve of the factor will shift to the left (*i.e.*, downward).

2. **Productivity of the Factor.** Another determinant of the demand for a factor is its productivity. Like the changes in price or *MR*, changes in marginal physical productivity will also cause a shift in the entire *MRP* or factor demand curve. For instance, increase in marginal physical productivity of labour will shift the *MRP* or demand curve for labour to the right (*i.e.*, outward). It may also be pointed out that historically we have experienced only *increase* in the physical productivity of the factors. *Decrease* in physical productivity, except under exceptional circumstances, has not been noticed. There are mainly three ways in which the marginal physical productivity of the factor can be increased. First, the quality of the factor my be improved. For instance, the labour productivity can be increased by making labour more educated and more skilful. Thus any improvement in the quality of the factor by enhancing its marginal productivity will cause outward shift in the factor demand curve..

Secondly, the marginal physical productivity of any factor depends upon the *quantity of the fixed co-operating factors used* with it. For example, the position of *MPP* curve of labour

is dependent on the quantity of capital used with it. The greater the quantity of fixed capital used with labour, the higher the level of marginal physical productivity curve. Thus increase in the marginal physical productivity as a result of increase in the quantity of capital (likewise, other fixed factors) will raise the *MRP* or factor demand curve outward to the right.

Thirdly, the marginal physical productivity is increased by the *advancement in technology*. The technological progress raises productivity by bringing about improvement in techniques of production. Hence as a result of advances in technology, *MRP* curve or the demand curve of the factor will shift upward.

3. **Prices of Other Factors.** Just as the demand for a commodity depends upon the prices of other related commodities, demand for a factor also depends upon the prices of other related factors. But the effect of the changes in the price of related factors on the demand for a given factor would have different effects depending upon whether these related factors are substitutes or complements for the given factor. We first take the case of substitutes.

Suppose two factors, labour and machinery, are used in production of a commodity. Now, labour and machinery, are largly substitutes. We want to consider the effect on the demand for labour as a result of change in the price of machinery. If the price of machinery falls so that machinery becomes relatively cheaper than labour, there would be large substitution of machinery for labour. Since machinery is now relatively cheaper than labour, it will pay the employer to use more machinery and less labour. Therefore, as a result of fall in the price of machinery, demand for labour will decrease and machinery would be used in place of labour. Thus the change in the price of machinery will have, what is called, *substitution effect* on the demand for labour. As a result of substitution effect of the fall in the price of machinery, the demand curve for labour will shift to the left. The extent to which demand for labour will fall depends upon the extent to which it is possible to substitute machinery for labour. Since machinery and labour are close substitutes, such substitution will take place on a large scale.

But the change in the price of factor has not only a substitution effect but also *expansion or output effect*. The prices of factors govern the cost of production of a product. When, in our above example, the price of machinery falls, cost of production of the product will decline and hence there would be fall in the price of the product. With the fall in the price of the product, more of it will be demanded. In response to greater demand, more quantity of the product would be produced. The fall in the price of the machinery will thus lead to greater output of the product. To produce more output, more of labour as well as more of other factors including machinery will be required. This expansion in output due to the fall in the price of machinery, that is, output effect, would tend to increase the demand for labour. Thus the fall in price of machinery has two opposite effects: first, substitution effect which tends to reduce the demand for labour; and second, output effect (expansion effect) which tends to increase the demand for labour.

The net effect on the demand for labour would depend upon the relative strengths of these two opposite effects. But in the present case, substitution effect would outweigh the output effect and, therefore, there would be a net decrease in the demand for labour as a consequence of fall in the price of machinery. But in some exceptional cases, fall in the price of a substitute factor may cause such a large expansion in output that the output effect may more than offset the substitution effect. In that case the net effect would be the increase in the demand for the given factor, even though the price of a substitute factor has fallen. Thus, *when the output effect is very strong, the fall in the price of a substitute factor may cause an increase in the demand for a factor in question, even though the two are to some extent substitutes of each other.*

To sum up, when factors are substitutes, the substitution and output effects tend to shift the demand curve for a factor in opposite directions. Normally, the substitution effect is stronger than output effect, the demand for a given factor therefore changes in the same direction as the price of the substitute factor. But the output effect in some cases may be so strong that it

outweighs the substitution effect with the result that the demand for a given factor changes in the opposite direction to the price of the substitute factor. As a matter of fact, when as a result of a fall in price of a factor, the demand for the other factor also increases due to the large output effect, the two factors are said to be complementary, although some substitution effect is present.

But the change in the price of a complementary factor would have a different effect on the demand for a given factor. Suppose two factors *A* and *B* are being used in the production of a commodity. Further suppose that *A* and *B* bear complementary relation with each other. We are interested to know what happens to the demand for factor *A*, when the price of factor *B* changes. If the price of factor *B* falls, its quantity demanded will rise. Since *B* is complementary to *A*, when *B* will be used more due to fall in its price, it will neccessitate more employment of factor *A* also. Thus the demand for factor *A* will rise as a consequence of the fall in the price of its complementary factor *B*. But this is not all. *Output effect will also exercise its influence.* When the price of *B* falls, cost of production will decline. As a result, the price of the product will fall which will bring about an increase in the quantity demanded of the product. Consequently, otuput of the product would be expanded. This increase in output will require more of both factors *A* and *B*. Thus the demand for factor *A* will rise not only due to complementary effect but also due to output effect in the case of complementary factors which work in the same direction, thereby reinforcing each other.

QUESTIONS AND PROBLEMS FOR REVIEW

1. What is meant by derived demand ? Explain the factors which determine demand for a factor or input.
2. Briefly explain the Marginal Productivity Theory of factor pricing (*i.e.*, distribution). What are its main shortcomings? *D.U. B.A (Hons), 1984*
3. Distinguish between Value of Marginal Product (*VMP*) and Marginal Revenue Product (*MRP*) of an input. How are they related to each other when there prevails (*a*) perfect competition in the product market, (*b*) monopolistic competition or monopoly in the product market ?
4. How is reward of a factor (say labour) is determined when both the factor market and product market are perfectly competitive ? Explain. *D.U. B.Com (Hons) 2002*
5. Explain the determination of optimal use of a variable input (*e.g.*, labour) by a firm when there prevails perfect competition in the input market.
6. Under conditions of perfect competition in the labour market value of marginal product (*VMP*) curve of labour is firm's demand curve for it. Explain.
7. What factors determine the demand for a factor input ? Explain.
8. The economy-wide demand curve for a factor will be more elastic, the greater the elasticity of the consumer demand for goods in the production of which the factor is employed. Explain
9. A Theory of factor pricing is only a special case of general theory of pricing. Discuss.
10. A perfectly competitive firm can hire labour at Rs. 50 per day. The firm's production function is given below :

Number of days/labour	*Number of units of output*
0	0
1	16
2	30
3	42
4	52
5	60

If the output is sold at price Rs. 5 per unit, how many labour days should the firm hire ? [**Hints:** From the production data, we have to find out marginal physical product of labour days (MPP_P). We then multiply marginal physical products by price of output (= Rs. 5) to obtain VMP_L at different levels of labour use. The firm will hire number of labour days at which $VMP_L = 50$.]

11. Wages under perfect competition in labour market are equal to the marginal revenue product; but under imperfect competition (*e.g.* monopsony) in labour market wages are not equal to the marginal revenue product of labour. Explain with the help of diagrams.
12. Derive graphically the competitive firm's demand curve for a variable factor when several variable factors are used.
13. How is market demand for a variable factor of production derived from the demand of individual firms ? Explain

29

Determination of Wages

In the previous chapter we have explained marginal productivity theory of distribution in general. In the present chapter we shall explain in the detail how wages are determined under conditions of perfect competition. It is here worth noting some *special characteristics of labour* First, unlike land and capital, labour (that is, workers) are usually found to be combining together to form trade unions for demanding higher wages and better working conditions from the entrepreneurs. Second, labour cannot be separated from labourer himself, whereas land and capital are distinct from their owners (*i.e.*, landlords and capitalists). Thirdly, workers are, within certain limits, free to choose whether or not they willl work on a particular day as they can take leave or abstain from work. Fourthly, unlike other factors, workers decide whether or not to increase their supply bearing more children.

Nominal and Real Wages

While nominal wage is wage in terms of money, the real wage is measured in terms of goods and services it will purchase. When prices in the economy rise, the same money wage will buy less goods and services. Therefore, the rise in prices, money wage remaining constant, will lead to the fall in real wages. Thus, *real wages are obtained after adjusting for inflation, that is, for rise in prices in the economy.* Thus real wage is equal to money wage divided by the price level, that is, $W_r = \frac{W}{P}$ where W_r stands for real wage rate, W for money wage rate and P for the price index number.

The term real wage is also sometimes used to mean the *money wages plus the non-monetary benefits* which workers receive in some jobs. Thus college professors with equal qualifications and skill may prefer lower money wage rates as compared to the persons employed as business executives in private firms because the teaching in a university or college offers some *non-monetary benefits* such as flexible working hours, pleasant surroundings, opportunities for advancement etc. Thus real wages of a college professor will be his money salary plus the above mentioned non-monetary benefits which he gets in the teaching profession.

WAGE DETERMINATION UNDER PERFECT COMPETITION

Like the prices of other factors of production, wage rate under conditions of perfect competition is determined by demand for and supply of labour. For explanation of wage determination it is therefore essential to understand first the nature of demand for labour. Demand for labour like other factor prices differs in certain respects from the demand for consumer goods. Consumer goods are demanded because they satisfy the wants of the people directly. People demand food to satisfy the pangs of their hunger, they demand clothes to satisfy their want of providing a cover to their bodies and so forth. These products possess utility which directly satisfies the wants of the people who are therefore willing to pay price for these products.

Demand of labour is derived demand. But, unlike the goods, the labour does not satisfy the wants of the people directly. The labour is demanded not because it directly satisfies the wants of the people who wish to buy them. Instead, labour is demanded because it can be used

to produce consumer goods which then satisfy human wants. Therefore, demand for labour, like that of other factors of production, is called derived demand. It is derived from the demand for the product it helps to produce. Thus, the *demand for labour ultimately depends upon the demand for goods it helps to produce.* The greater the demand for goods which a particular type of labour helps to make, the greater the demand for that type of labour. Just as demand for goods depend upon their utility, the *demand for labour depends upon marignal revenue product of labour.* In fact, as we shall explain below, the marginal revenue productivity curve of labour is the demand curve for labour. The entreprenur's demand for labour like those of other factors of production is thus governed by the marginal product of labour.

Conditions of perfect labour market. We shall first explain firm's equilibrium with regard to the employment of labour under conditions of perfect competition. This analysis will show how much quantity of labour will be demanded by a firm.

Perfect competition prevails in the labour market when:

(1) the number of buyers (*i.e.*, employers) and sellers (*i.e.*, workers) is very large.

(2) the labour is homogeneous and mobile.

(3) both the employers and workers possess perfect information regarding the current wage rate in the market.

(4) labourers are not organised in the form of their trade unions, that is, labourers bargain with the employers individually.

(5) both the buyers and sellers of labour are free to enter or leave the market.

Demand for labour by an individual firm. When a firm is facing perfect competition in the labour market, it cannot affect the wage rate by varying its level of employment. A single firm's demand for labour will be so small as compared with the total demand for labour that any change in its demand for it will not affect the wage rate. It has to take the wage rate as given and constant for it. The firm can employ as many number of workers as it wishes at the prevailing wage rate. Therefore, the supply curve of labour [or in other words, here the average wage (*AW*) curve] under perfect competition in the labour market will be perfectly elastic (*i.e.*, a horizontal straight line) at the level of the prevailing wage rate. As a result, for a firm working under perfect competition in the labour market, the *extra cost of hiring an extra unit of labour which is called marginal factor cost* (*MFC*) will be equal to the wage rate which for a firm is given and constant. The *marginal factor cost* (*MFC*) of labour is also called *marginal wage* (*MW*). It follows therefore that the supply curve of labour (or *AW* curve) of a single firm working under perfect competition is a horizontal straight line and the marginal factor cost (*MFC*) curve or marginal wage (*MW*) curve coincides with it. This is shown in Fig. 29.1 by *MFC* curve.

Now, a firm which aims to maximize profits, will go on employing more units of labour as long as the marginal revenue product of labour is greater that the wage rate.

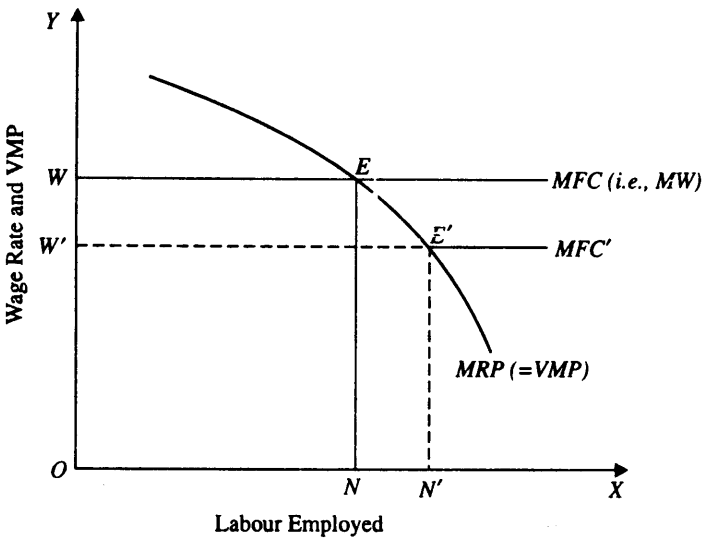

Fig. 29.1. *Equilibrium of the Firm : Employment of Labour*

It will maximize profits or achieve equilibrium position where marginal revenue product of labour is equal to the given wage rate. As in the present case when perfect competition prevails in both the labour and product markets, marginal revenue product of labour (*MRP*) is equal to the value of marginal product of labour (*VMP*) and also marginal factor cost of labour (*MFC*) is equal to wage rate *AW*. We can state that a firm which is working under conditions of perfect competition in both the product and labour markets will attain equilibrium at the level of labour employment where value of marginal product (*VMP*) is equal to the wage rate. In our Fig. 29.1 the firm is in equilibrium at *ON* level of employment (or at point *E*) at which *MRP* (or *VMP*) of labour is equal to the given wage rate *OW*. At point *E*, the second order condition is also satisfied since the *VMP* (or *MRP*) curve is cutting *MW* curve from above. Thus, *E* is the point of equilibrium where *MRP* = *MW*, or *VMP* = the wage rate. To sum up, if perfect competition prevails in both the labour and product market.

Wage Rate = *MFC* (or *MW*) = *MRP*

Since *MRP* and *VMP* of labour are equal when there is perfect competition in the product market, therefore;

Wage rate = *MFC* (or *MW*) = *MRP* = *VMP*

We thus conclude that when perfect competition prevails in both the labour and product markets, workers will get wage rate equal to the value of the marginal product (*VMP*).

Derivation of Demand Curve for Labour

We have explained above how much amount of labour a firm, under conditions of perfect competition in the labour market, will employ and demand. We are now in a position to derive the *demand curve* for labour under conditions of perfect competition, which with the intersection of supply curve of labour will determine its wage rate. The derivation of demand curve for labour is illustrated in Fig. 29.1. As explained above, a perfectly competitive entrepreneur or buyer in the labour market will employ labour to a point where its marginal revenue product equals its wage rate. In doing so, he will be maximising his profits and will thus be in the equilibrium posititon. Thus in Fig. 29.1, if the wage rate of labour falls to *OW'*, then the employer will hire or employ *ON'* units of labour since at *ON'* units *MRP* of labour is equal to the new wage rate *OW'*. Thus at a lower wage rate, a firm employs or demands more labour. Two things follow from this. First, from the marginal revenue product cure we can read the quantity of labour demanded by a firm at different wage rates. This marginal revenue product curve of labour is the demand curve for labour of a firm. Secondly, the demand curve for labour is downward sloping, that is, at a lower wage rate more labour will be demanded and employed. It should be carefully noted that demand curve for labour slopes downward because marginal physical product of labour is downward sloping due to the of the operation of deminishing returns to labour as more of it is employed.

We thus conclude that, *under perfect competition in the labour market, the marginal revenue product curve of labour is the demand curve for labour.*

What is true of the demand curve for labour of an individual firm is also true of the demand curve of labour for the whole industry. We assume that the price of the product does not change as the industry employs more of labour and expands its output. With this assumption the *demand curve for labour of a competitive industry can be obtained by the lateral summation of the MRP curves of the firms* (*i.e.*, demand curves of the firms). Since *MRP* curves of individual firms slope downward, the industry's demand curve for labour will also slope downward to the right.

Supply of Labour

As regards the supply of labour is concerned, it may be pointed out that supply of labour to the whole economy depends upon the size of population, the number of workers available for work out of a given population, the number of hours worked, the intensity of work, the skills of workers and their willingness to work. The size of population is not influenced in any

significant manner by the changes in the current wage rates. The advocates of the subsistance theory of wages believed that the size of population rises or falls with a rise or fall respectively in the wage rate, and from this they deduced a law called "*Iron Law of Wages*". But the history has shown that rise in the wage rate may have just opposite effect on the size of population from what the substistence theory of wages conceived.

Moreover, the historical experiences have revealed that the size of population is dependent upon the great variety of social, cultural, religious and economic factors among which wage rate plays only a minor determining role. Among the factors determining the supply of labour as enumerated above, the ability to work and the skills of the workers are also largely independent of the changes in the wage rate. However, the willingness to work may be influenced greatly by the changes in the wage rate. On the one hand, as wages rise, some persons will be induced to work more hours and others who do not work at lower wages may now be willing to supply their labour. But, on the other hand as wages rise, some persons may be willing to work fewer hours and others like women may withdraw themselves from the labour force, since the wages of their husbands have increased. Thus, these are two conflicting responses to the rise in wages and therefore the exact nature of supply curve of labour is difficult to ascertain. *It is, however, generally believed that the total supply curve of labour rises up to a certain wage level and after that it slopes backward.* This is shown in Fig. 29.2. As the wage rate rises up to *OW*, the total quantity supplied of labour rises, but beyond *OW*, the quantity supplied of labour diminishes as wage rate is increased.

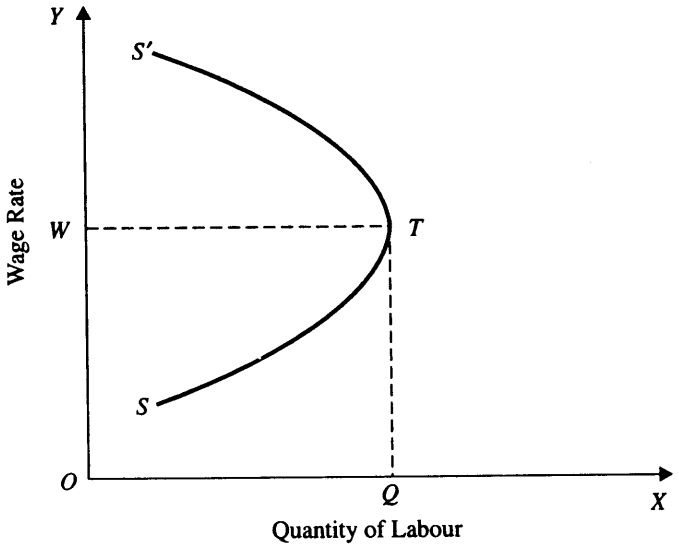

Fig. 29.2. *After a certain rate, supply curve of labour is backward sloping.*

But so far as supply of labour to a particular industry is concerned it is elastic. As the wages in an industry are increased, workers from other industries will shift to this industry. The elasticity of the supply curve of labour to an industry will depend upon the *transfer earnings* of labourers. Similar is the case of supply of workers to a particular occupation. If wages in one occupation go up, some persons from other similar occupations would be attracted to it and thus the supply of labour to that occupation will increase. Thus because of occupational shifts, the supply curve of labour to a particular occupation is elastic and rises upward. The long-run supply curve of labour is more elastic than the short-run supply curve since, in the long-run, besides the occupational shifts in the present labour force, new entrants to the labour market (who are now children) can also adopt that occupation by getting training for it in the very first instance.

Determination of Wages under Perfect Competition : Equilibrium between Demand and Supply

Like the price of products, the prices of factors of production are also determined by demand and supply. As mentioned above, wage rate is determined by both the demand for and supply of labour, and would be *equal* to the marginal product of labour. We have seen above

how the demand for labour depends upon its marginal revenue product. The supply curve of labour is given by the curve showing the amount of labour offered by the workers at various wage rates. The supply curve of labour for an industry, as explained above, depends upon the

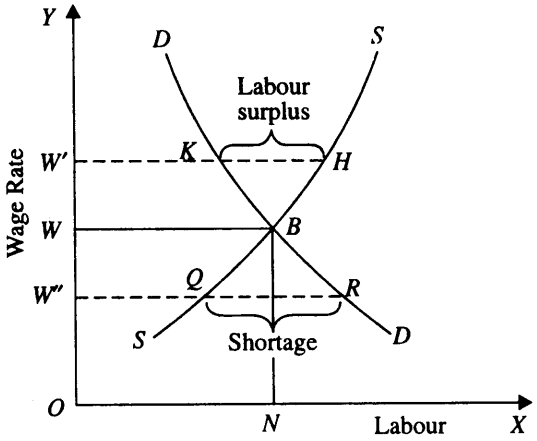

Fig. 29.3. *Labour Market Equilibrium : Equilibrium between Demand and Supply of Labour Detrmines Wage Rate.*

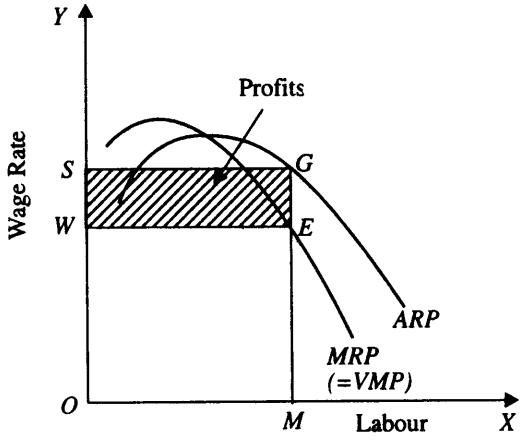

Fig. 29.4. *In Equilibrium, Wage Rate is Equal to MRP or VMP?*

workers' preference between leisure and income and also the transfer earnings of the various workers. *The wage rate of labour is determined by the intersection of these demand and supply curves of labour.* In other words, given the demand and supply curves of labour, the wage rate will adjust to the level at which the amount of labour supplied is equal to the amount demanded. This is shown in Fig. 29.3, where *DD* is the demand curve and *SS* is the supply curve of workers. Only at wage rate *OW*, quantity demanded of labour is equal to the qunatity supplied. The wage rate *OW* is thus determined. The wage rate cannot be determined at a level higher than or lower than *OW i.e.*, other than wage rate where amount demanded of labour is equal to the amound supplied of it. For example, wage rate cannot be established at the level *OW'*, since at wage rate *OW'* the quantity offered to supply (*W'H*) of labour is greater than the quantity demanded (*W'K*) of it. As a result, the *surplus labour* will emerge at this higher wage rate. In other words, at the higher wage rate *OW'*, *KH* amount of labour will be unemployed. The competition between the unemployed workers will force down the wage rate to the level *OW* where the quantity supplied is equal to the quantity demanded. Likewise, wage rate cannot be determined at the level *OW''*, since at ware rate *OW''* the quantity demanded of labour is greater than the quantity offered to be supplied at it. Consequently, the competition among the producers or entrepreneurs demanding labour will push up the wage rate to the level *OW*.

The wage rate determined by demand for and supply of labour is equal to the value of marginal product of labour. This is so because in order to maximise its profits, the firm will equate the wage rate with the value of the marginal product (*VMP*) of labour. If the firm stops short of this equality, the value of the marginal product (*VMP*) is greater than the wage rate which would imply that there is still scope for earning more profits by increasing the employment of labour. On the other hand, if the firm goes beyond and employs more labour than the equality point, value of marginal product of labour will become smaller than the wage rate. As a result, the firm will incur losses on workers employed beyond the equality point and it will therefore be to the advantage of the firm to reduce the employment of labour. Thus in order to maximise profits and be in equilibrium the firm working under conditions of perfect competition will employ so much labour that the wage rate is equal to the value of marginal product (or marginal revenue product) of labour. To sum up, *the wage rate as deter-*

mined by demand for and supply of labour, is equal to the value of marginal product (or marginal revenue product) of labour.

It is worth mentioning that when the firms are in equilibrium by equating value of marginal product of labour to the wage rate, they may be making profits in the short-run. Consider Fig. 29.4 which depicts the equilibrium position of the firm in the short run. It will be seen from Fig. 29.4 that at the wage rate *OW*, the firm is in equilibrium when it is employing *OM* amount of labour. It will be further seen that the firm is making super-normal profits since in equilibrium employment *OM*, average revenue product of labour (*ARP*) which is equal to *MG* is greater than the wage rate *OW*, (=*ME*). This can happen in the short run, but not in the long-run. When firms are earning super-normal profits in the short-run, more entrepreneurs will enter the market in the long-run to purchase labour to produce the products made by it. Entry of more entrepreneurs to the labour market will compete away the super-normal profits. As a result, the demand for labour will increase and the demand curve for labour will shift outward to the right which will raise the *equilibrium* wage rate and eliminate the super-profits. Thus in the long-run, under perfect competition in both labour and product markets, wage rate of labour is equal to both *MRP* and *ARP* labour. Thus, in the long-run.

$$Wage = VMP = ARP$$

This long-run equilibrium of a firm under perfect competition in labour market is shown in Fig. 29.5. Where long-run equilibrium is established at point *T* with wage rate *OW'* and employment *ON*. At point *T* wage rate *OW'* = *MRP* (or *VMP*) = *ARP* and firm is making only normal profits.

To sum up under perfect competition in the labour and product markets, in the long-run, the equilibrium between demand for and supply of labour is established at the level where the wage rate of labour is equal to both the VMP (MRP) and ARP of labour and thus the firms earn only normal profits.

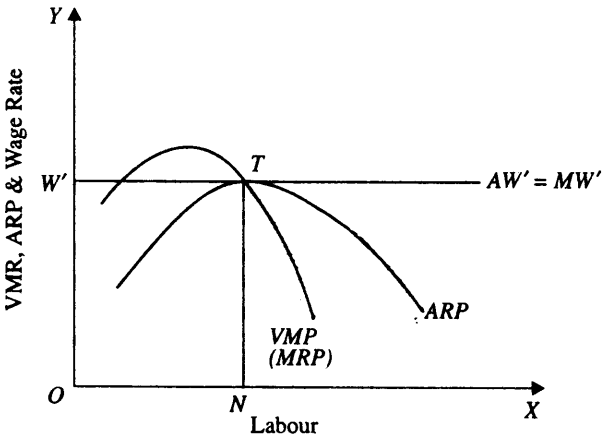

Fig. 29.5 *Long-Run Equilibrium of the Firm*

Changes in Equilibrium Wage Rate

We have explained above now through interaction of demand for and supply of labour determines the market wage rate. Now, if any of the factor causes a shift either in demand curve or in supply curve of labour, the equilibrium will be disturbed causing a change in the wage rate. Both demand for and supply of labour can shift.

Shift in Demand Curve for Labour. Demand for labour increases if its productivity increases, say through technological improvement. This will cause a rightward shift in the demand curve for labour and as shall be seen from Fig. 29.6 this will bring about a rise in the wage rate. Similarly, if the demand for a product, say of a textile cloth, increases, the demand for textile workers being a derived demand will also go up. This too will cause an upward shift in the demand for textile workers causing a rise in their wage rate. Further, if the price of a textile cloth rises, it will increase the value of marginal product, (*VMP* = *Price* × *MPP*) of textile workers. With this higher value of marginal product, it will become profitable for the producer to hire more workers. As a result, demand for textile workers will increase causing a rise in their wage rate.

Conversely, if the demand for a product decreases or its price falls it will induce a reduction in the demand for labour. Given the supply curve, decrease in demand for labour will bring about reduction in wage rate.

Shift in Labour Supply Curve. If the factors determining labour supply undergo a change, the supply curve of labour will shift causing a change in the equilibrium wage rate. The supply

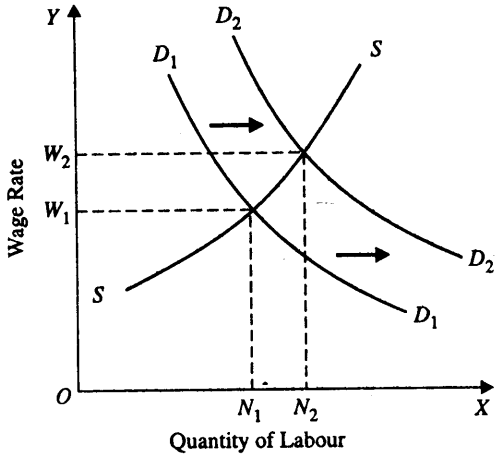

Fig. 29.6. *Effect of Increase in Labour Demand on the Wage Rate*

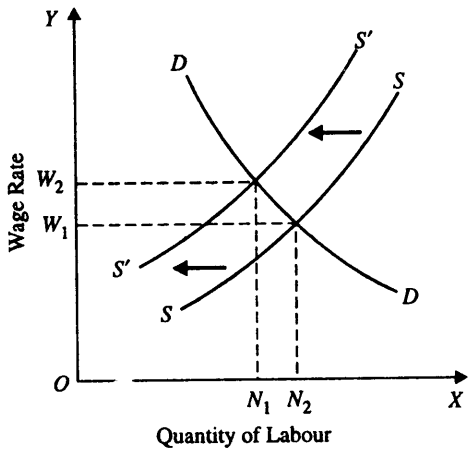

Fig. 29.7. *Effect of Decrease in Labour Sypply on Wage Rate*

of labour to a given occupation or industry will decrease *if the wages in alternative occupations or industries go up.* In this case at every wage rate less labour will be offered to a given occupation or industry. This will cause a shift in the supply curve of labour to the left and, given the demand curve for labour, result in rise in the wage rate. This is shown in Figure 29.7.

Similarly, if workers valuation of their leisure time changes, the supply curve of labour will shift. If most workers start attaching a higher value to their leisure time spent with their families, the less labour will be supplied to an occupation or industry. This will cause shift in the labour supply curve to the left resulting in higher wage rate as is illustrated in Fig. 29.7.

Conversely, if for any reason, the wage rate in alternative occupation fall or workers' preferences for leisure declines, supply of labour to a given occupation or industry will increase at every wage rate. This will cause a shift in the supply curve of labour to the right and result in fall in the wage rate.

WAGE DETERMINATION UNDER MONOPSONY

Monopsony in the labour market is said to exist when there is a single buyer of labour. Under monopsony in the labour market, a single buyer faces a large number of workers who are unorganised and whose geographical mobility of labour is very much limited. Monopsony may prevail when a big employer hires a proportionately very large number of a given type of labour so that he is in a position to influence the wage rate or it may prevail when various big employers have an understanding not to compete for hiring labour and thus act as one in hiring labour. Thus, in the actual world, monopsony exists in the labour market when there is a large single employer, or when various employers acting as one confronts a large number of workers who are unorganised (*i.e.*, non-unionized) and who lack geographical mobility.

It should be noted that non-organisation of labourers into unions is an essential condition for the existence of monopsony, for when the labourers organise themselves into trade union, then the supply of labour is channelled through the trade union and the trade union therefore becomes a sole seller of labour. When a single buyer—the employer, faces a single seller—the trade union, the market situation is one of bilateral monopoly and not of monopsony. Thus monopsony will prevail when the workers are not organised into trade unions. Likewise, immobility of labour is also an essential condition for the existence of monopsony in the labour market. If the workers are suffi-

ciently mobile so that they will move to places or industries where wages are higher, then the single employer in a local market will not possess a determining influence in hiring labour.

It is clear from above that non-organisation of workers and lack of mobility on their part are the essential conditions on the side of the workers for the existence of monopsony in the labour market. We shall now explain how wage rate is determined in a monopsonistic market situation. In a proper analysis of the same, we must know what type of market situation is confronted by the monopsonist in selling his product produced by the labour employed by him. We shall first explain the wage determination in the case where monopsony in the labour market is found along with perfect competition in the product market. After this we shall explain wage determination when monopsony in the labour market is found along with monopoly in the product market, that is, where the monopsonist in the labour market is also the monopolist in the product market.

Wage Determination when there is Monopsony in the Labour Market but Perfect Competition in the Product Market

The demand curve of labour of the monopsonist, as of perfect competition, is given by the curve of marginal revenue productivity. It should be noted that when perfect competition prevails in the product market, marginal revenue product will be equal to the value of the marginal product. Therefore, in this case, the curve of marginal revenue productivity will coincide with the curve of value of the marginal product.

What will be the nature of supply curve of the monopsonist. The supply curve of labour to a monopsonist is usually drawn as a rising curve, as *AW* curve in Fig. 29.8 which indicates that to get more labour the monopsonist must pay higher wages. It should be noted that the supply curve of labour in Fig. 29.8 is the same as the average wage curve *AW*. Therefore, supply curve of labour may also be descirbed here as average wage curve. The curve *MW* is marginal wage curve corresponding to the curve *AW*. The curve *MW* is the same thing as the marginal factor-cost curve (*MFC*) of labour.

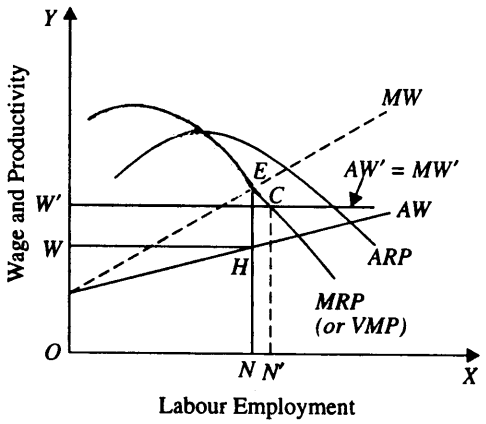

Fig. 29.8 *Wage Determination under Monopsony*

Now the monopsonist will be in equilibrium where the marginal wage is equal to the marginal revenue product. It will be seen from Fig. 29.8 that the marginal revenue productivity curve cuts the marginal wage curve at point *E* and thus the marginal wage is equal to the marginal revenue product at the level of labour employment *ON*. Further, it is evident from the figure that *ON* amount of labour is forthcoming at *NH* or *OW* wage rate. Thus the monopsonist, in equilibrium, will employ *ON* amount of labour and will pay *OW* or *NH* wage rate to the labourers. It is clear from the figure that wage rate *NH* (=*OW*) determined under monopsony is smaller than marginal revenue product of labour which is equal to the *NE*. Thus each worker gets *EH* less than his marginal revenue product. According to Joan Robinson, to pay a worker less than his marginal revenue product or value of marginal product is to exploit him. Therefore, in Fig. 29.8 exploitation at each worker done by the monopsonist is equal to *EH*. Because this exploitation is due to the existence of monopsony in the labour market, Joan Robinson calls it as '*monopsonistic exploitation*'.

Trade Union and Wages under Monopsony

A very important conclusion can be derived from the above analysis of wage-employment equilibrium under monopsony in the labour market. It is that under conditions of monopsony

in the labour market, trade unions can raise the ware rate without creating unemployment. In fact, it can be shown that a wage increase secured by trade unions under such circumstances will result in greater employment. Thus, in Fig. 29.8 if the wage rate is raised to *OW'* as a result of trade union's bargaining with the monopsonist, the employment offered by the monopsonist will increase from *ON* to *ON'*. This is because when the agreement is reached between the trade union and the monopsonist at wage *OW'*, the average wage curve facing the monopolist will become a horizontal straight line at the level of *OW'* and the marginal wage curve will coincide with it. With this change, equilibrium of the monoponist will be at point *C* correspoinding to *ON'* level of employment. However, there is a limit to such increases in both wages and employment.

Wage Determination when there is Monopsony in the Labour Market but Monopoly in the Product Market

Where there is monopoly in the product market, then the curve of marginal revenue product of labour will differ from the curve of the value of marginal product of labour. The marginal revenue product curve (*MRP*) will lie below the curve of the value of marginal product (*VMP*), because the marginal revenue is less than the average revenue when there is monopoly in the product market. The supply curve of laour (average wage curve *AW*), as in the above case, slopes upward and the marginal wage (*MW*) curve lies above it. The equilibrium of the monopsonist will be where the marginal revenue product equals marginal wage. In Fig. 29.9, the equilibrium of the monopsonist is at point *E* according to which wage *NH* or *OW* is determined and labour *ON* is employed. It will be seen from Fig. 29.9 that wage rate *NH* is not only less than marginal revenue product (*NE*) but is also less than the value of the marginal product (*NF*). The difference *EH* between marginal revenue product *NE* and the wage rate *NH* is due to the existence of monopsony in the labour market and has, therefore, been called by Mrs. Joan Robinson as monopsonistic exploitation. But the difference *FE* between the value of the marginal product *NF* and the marginal revenue product *NE* is due to the existence of monopoly in the product market. The worker gets *FE* amount less than his vale of the marginal product because of the fact of monopoly in the product market and has, therefore, been designated as '*monopolistic exploitation*' by Mrs. Joan Robinson. Thus under monopsony-monopoly market situation, the worker is subjected to double exploitation; because of monopoly he gets less than the value of his marginal physical product and because of monopsony he gets less than his marginal revenue product.

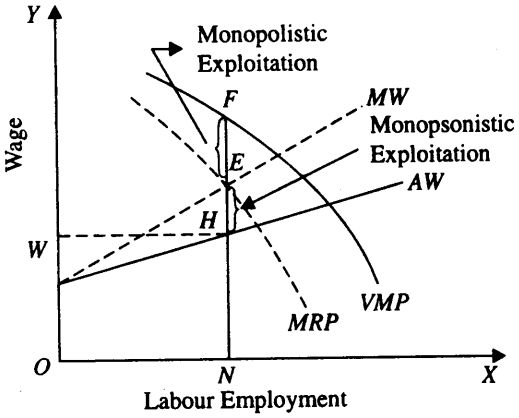

Fig. 29.9. *Wage Determination under Monopsony*

EXPLOITATION OF LABOUR

We have explained above that labour is exploited when there prevails imprefect competition in the product market as well as when there is imperfect competition or monopsony in the labour market. In the former case it is called *monopolistic exploitation* and in the latter it is called *monopsonistic exploitation.*

It should be noted that Pigou-Robinson concept of exploitation of labour, namely, *labour being paid less that the value of its marginal product* (*VMP*) assumes perfect competition as the 'ideal' and the wage rate determined under it as just, fair and proper. Any deviation from this perfectly competitive wage is regarded as exploitation. Thus, according to Rothschild, "Professor Pigou, and following him Joan Robinson have made the *ideal of perfect competition* their

starting point. Under the system the worker would get, as we saw, a wage equal to the value of the marginal physical product. Every deviation from this regarded as exploitation."[1]

The above concept of exploitation can be looked at from two viewpoints. First, it can be viewed as a *purely technical way* of describing the wage payments which are less than those which would have prevailed under conditions of perfect competition. In this purely technical viewpoint of exploitation, no evil design or sinister motive of the entrepreneur is implied. Secondly, the Pigou-Robinson's concept of exploitation can be viewed as the *concept which regards perfect competition wages as the just, fair or right wages which ought to be paid by the entrepreneur to the labour.* In this second sense emotional colouring has been given to the concept of exploitation and sinister motive on the part of the entrepreneur is implied. Further, it is also implied in this second sense of exploitation that market price of a product reflects its social value. Pigou and Robinson regarded exploitation in the second sense, that is, from the view point of emotional colouring and ethical standard. However, in the opinion of present author to regard "deivations from perfect competition" as unethical is unjustified and unwarranted. We, therefore, agree with Rothschild who writes: "this usage of exploitation....may be regarded as an implicit assumption that perfect competition wages are the 'right' or 'proper' wages of labour. There can be no doubt that such a moral undertone is part of Professor Pigou's definition who stood under the influence of the newly developed marginal productivity theory; and to a lesser extent this is probably also true of Joan Robinson. It should be clear, however, that *there is no any scientific reason to warrant such an assumption.*"[2]

How can Labour Exploitation be Removed

We have discussed above the two concepts of exploitation and also highlighted the conditions under which labour exploitation arises. Now, an important question is how this labour exploitation can be removed. That is, whether trade unions or Government can remove exploitation by raising the wages of workers or some other steps have to be taken to remove exploitation.

As far as *monopolistic exploitation* depicted in Fig. 29.9 by *EF* which has arisen due to the imperfect competition in the product market, is concerned, it cannot be removed by raising wages by the trade unions. This is because, in this situation, if the trade unions succeed in raising wages, the employer will employ smaller amount of labour so as to equate the new high wage rate with marginal revenue product of labour. But the important point to note is that with lower employment and higher wage rate, labour would still be exploited, for in this new wage position also, value of the marginal revenue product (*VMP*) will be greater than the marginal revenue product (*MRP*) with which new higher wage will be equated by the employer. We thus see that *monopolistic exploitation of labour* as conceived by Joan Robinson cannot be removed through raising wages by trade unions or government. Monopolistic exploitation can only be removed by *creating the conditions of perfect competition in the product market.* State can take measures for removing monopolistic conditions or imperfections from the product market.

But so far as monopsonistic exploitation of labour is concerned it can be removed by raising wages through trade unions or state. We have already explained this in this chapter.

MARGINAL PRODUCTIVITY THEORY AND ROLE OF TRADE UNIONS IN RAISING WAGES

For a long time economists believed that trade unions and collective bargaining could not play an important role in raising the wages of workers or effecting improvements in their economic conditions. In other words, they thought that trade unions an an instrument to raise wages

1. K.W. Rothschild, *The Theory of Wages*, Augustus M. Kelley, New York, 1996.
2. *Op. cit.*, p.103.