
UNIT 11 MARGINAL PRODUCTIVITY

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11.1 OBJECTIVES

This unit gives you an overview of marginal productivity theory of distribution. It is explained with reference to determination of reward for labour. After going through this unit, you will be able to understand and explain:

- 1 marginal product of a factor;
- 1 factor price determination as a special case of general theory of pricing;
- 1 'complete' distribution of output (or product exhaustion) under perfectly competitive market system;
- 1 influences and actions of trade unions and intervention of the state in labour market; and
- 1 differential earnings.

11.1 INTRODUCTION

We know that social output is a result of combined efforts of its members. Different members of the community participate in process of production in some way or other. They all expect to receive some reward for the efforts put in. What should be the basis for determining individual's share in total output? This question has engaged the attention of economists, social scientists and philosophers over the ages. Various views have been put forward. Marginal productivity theory of distribution is an operational version of functional approach to the problem of distribution of social product. Under this theory we try to equate marginal product of a factor with the rewards for that factor. Operation of various markets for us ensures that in the long run, each factor receives reward equals to and commensurate with its productivity. Moreover, if perfect competition prevails in product as well as factor market, theory of marginal productivity ensures that total output is completely distributed leaving no residuals. Though we have developed the concept of marginal productivity theory of distribution with reference to labour, determination of wage is discussed separately (Sections 11.7 – 11.11) to highlight some special features of labour market.

11.2 FACTORS OF PRODUCTION

Production needs cooperation of different people. Some of them work together at the work place. Others may not be physically present in the work place (factory) but make it possible for those in the work place to initiate the process of production in the first instance. Some contribute capital that buys plant and machinery and buildings, which house them. Still others make it possible for workers and machines to come together. Somewhere, some arrangements are made to procure raw materials, which are to be used to produce output in the factory. This way, we can say that production in today's world is possible when someone organises labour, land and capital to come together and produce. The organiser (entrepreneur) decides what those essential things are to start production. We in economics call them, "Factors of Production" by defining them, broadly, along the following lines:

i) **Land**

It is sum total of what physical resources have been endowed upon us by the nature. It includes all minerals, forestry, soil and water resources of the economy.

ii) **Labour**

The foremost factor of production is defined to include all human endeavour, both physical as well as mental, which transforms things given to us by nature into commodities that satisfy some human want.

iii) **Capital**

During the process of transformation of free gifts of nature into commodities, human labour modifies materials in such a manner that it becomes easier to produce commodities. All such modified materials are given the common name, capital. We customarily regard capital as a separate factor of production.

iv) **Entrepreneurship**

Broadly speaking, this is the special human ability to organise the production and bear all the attendant risks.

We shall have an opportunity to discuss more about these factors production later on. We pay more attention to labour in Section 11.7.1, while land, capital and entrepreneurship are discussed in Unit12.

11.3 CONCEPTS OF MARGINAL PRODUCT

Marginal product of factor is the increment in output, which realised as one more unit of the factor in question, is used (added) while amounts of all other factors remain unchanged. In other words, in an establishment with given number of workers and machines one more worker is added, the change in output because of the additional worker will be called marginal product of labour.

We can similarly define marginal product of any of the factors of production. The factor whose amount is varied is called the variable factor. Table 11.1 shows what happens to total output in a hypothetical factory with given plant and machinery etc., as the number of workers is engaged one by one.

Table 11.1 : Production in a Factory

Units of Variable factor Labour	Total Product	Marginal Product
0	0	0
1	10	10
2	18	8
3	24	6
4	28	4
5	30	2

11.3.1 Marginal Physical Product

Col. 3 of Table 11.1 above shows that as the first worker is engaged, 10 units are produced. The second worker adds 8 units to output and so on. Finally, the 5th worker adds just 2 units. These units of output are in physical terms. Therefore, we can call the Col. 3 as the Marginal Physical Product (MPP) of labour.

11.3.2 Marginal Value Product

When marginal physical product of a factor is sold in the market at going market price the money thus realised is called value of marginal product or marginal value product (VMP). Thus, it is

$$\text{VMP} = \text{MPP} \times \text{Price (of the commodity).}$$

11.3.3 Marginal Revenue Product

Firm's interest may not be centred on units of physical output. Firm could be more interested in what happens to total revenue it earns. Thus we come to the notice of marginal revenue product (MRP), which is defined as addition to total revenue as an additional worker is engaged. Thus,

$$\text{Marginal Revenue Product} = \text{Marginal Revenue} \times \text{Marginal Physical Product},$$

or, $\text{MRP} = \text{MR} \times \text{MPP}$

It can also be defined as rate of change of total revenue as the utilisation variable factor changes, i.e.,

$$\text{MRP} = (\text{change in total revenue}) \div (\text{change in variable factor})$$

When perfect completion prevails in product market, firm can sell any number of units of a commodity it decides to produce at the going market price. The demand curve for its output is horizontal. Therefore, average revenue and marginal revenue are constant and equal to the price. This fact leads us to Table 11.2, which is a further development of Table 11.1. The market information about the price of a commodity helps us to calculate total revenue, VMP and MRP.

Table 11.2 : Various Magnitudes of Marginal Product

Units of Labour	Total Product	MPP	Product Price	Total Revenue	VMP	MRP
0	0	0	20	0	0	0
1	10	10	20	200	200	200
2	18	8	20	360	160	160
3	24	6	20	480	120	120
4	28	4	20	560	80	80
5	30	2	20	600	40	40

Note: Notice that $\text{VMP} = \text{MRP}$ (compare Co.6 and Col.7). However, this is a result of our assumption of perfect competition only as will be shown in Section 11.5.3.

Check Your Progress 1

1) Explain the following concepts in about 50 words each.

- a) Marginal physical product
- b) Marginal value product
- c) Marginal revenue product

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2) By employing 5 workers a firm produces 10 chairs a day and sells each chair at Rs. 50. If the firm employs one more worker, total production goes up to 12 chairs a day but it has to sell them at Rs. 45 each.

- a) What is MPP of labour?
- b) What is VMP of labour?
- c) What is MRP of labour?

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11.4 DEMAND FOR A FACTOR OF PRODUCTION: THE DERIVED DEMAND

A firm demands factors of production to produce commodities, which it hopes to sell in the market. Therefore, one can say that firm’s demand for a factor of production will depend upon the demand for what that factor can produce. When the firm is hiring, say, labour from the market, it always takes into account the implication of its action on total revenue as well as total cost. The second worker also adds a net surplus of Rs. 120 (Rs. 160 – Rs. 40) to the firm’s accounts. The firm still goes on to hire more and more workers. The 5th worker too costs the firm Rs. 40. However, her MPP = 2 and firms revenue also rises by Rs. 40 only. Clearly the firm has no incentive to hire more workers. Why? Change in cost equals change in revenue. Hence the firm attains ‘equilibrium’. If the wage rate had been higher, the firm would not have engaged even the 5th worker. We can draw a diagram showing MRP = VMP curve of the firm (Fig. 11.1)

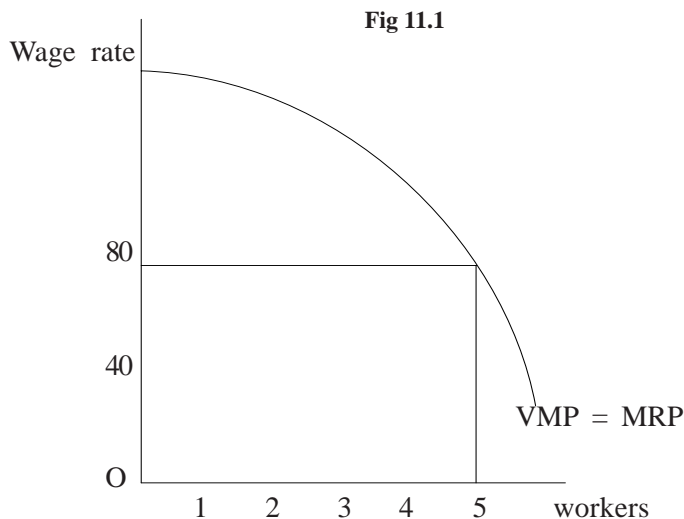


Fig 11.1: At wage rate of Rs. 40 per worker firm hires 5 workers. But if the wage rate were to rise to Rs. 80 the firm will have to stop at 4th worker. Why? Because at this wage rate, 5th worker will add Rs. 80 to the cost while her MPP of 2 units are worth only Rs. 40 in the market. The producer does not like to bear the ‘loss’ of Rs. 40.

We can gain an additional insight into producer’s behaviour through MRP curve. The rectangular region under the curve represents wage cost to the firm. But the total area under the curve is the total revenue that has been earned by employing different units of labour. Therefore, triangular area (area between rectangle and the curve) can be called producer’s surplus. Such profit maximising behaviour is another name for maximising this surplus. We can also say that when factor prices are brought into picture, VMP curve gives us the maximum number of units of the

factor that a firm will hire. Thus, MRP becomes the firm's demand curve for the factor.

We can say, in general, the firm continues to hire a factor till its MRP drops down to the price of the factor in the market. In the example above, so long as MRP exceeds the wage rate (i.e., Rs. 40), the firm will continue to hire more and more workers as every worker adds to its producer's surplus. However, it will not expand employment beyond the point $MRP = W$, i.e., 5 workers in our example above. Such a choice is because of sixth worker's MRP, which falls short of the wage rate. Employing the 6th worker will mean that the firm has to pay out of producer's surplus accumulated upto 5th worker. Thus, its net producer's surplus with six workers will be less than what it was when only 5 workers were employed. So firm earns maximum producer's surplus (at wage rate of Rs. 40) when it employs 5 workers.

We know that MRP curve becomes demand curve for a factor of production. Therefore, factors that affect MRP will also affect the demand curve for the factor. These factors are:

- i) substitutability of a factor by some other factors;
- ii) change in demand for the finished product. We know that the price of a product and hence its marginal revenue determines its MRP. Therefore, if demand for a product rises, so will its price. An upward shift of demand for product curve will raise marginal revenue curve. Given the marginal physical product of a factor, its MRP curve will shift to the right. This indicates a rise in demand for the factor;
- iii) percentage of total cost incurred on the factor in question also affects price elasticity of its demand.

11.4.1 Market Demand for a Factor

We know that factors of production possess the virtue of being able to put to various alternative uses in the economic system. Labour is employed in all kinds of industrial activities. So what is the market demand for labour?

We can approach market demand in two steps: First, all the firms producing a commodity X, have their demand curves for, say, labour, determined by their respective MRP curves. We can aggregate MRP curves of all the firms to arrive at industry demand curve.

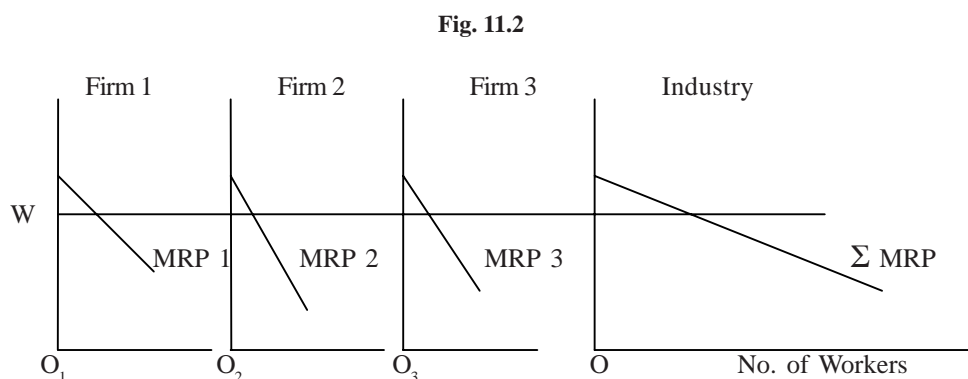


Fig. 11.2 Shows the derivation of one industry's demand curve for a factor. This is arrived at by horizontally adding up MRP curves of all the firms, at every wage rate, such as W. This industry MRP demand curve appears to be much flatter than MRP_s of its constituent firms.

Second, we aggregate, in similar manner, demand curves of various industries, in the economy to arrive at aggregate market demand curve for labour (or, for that matter, any other factor of production). This is shown Fig. 11.3 below.

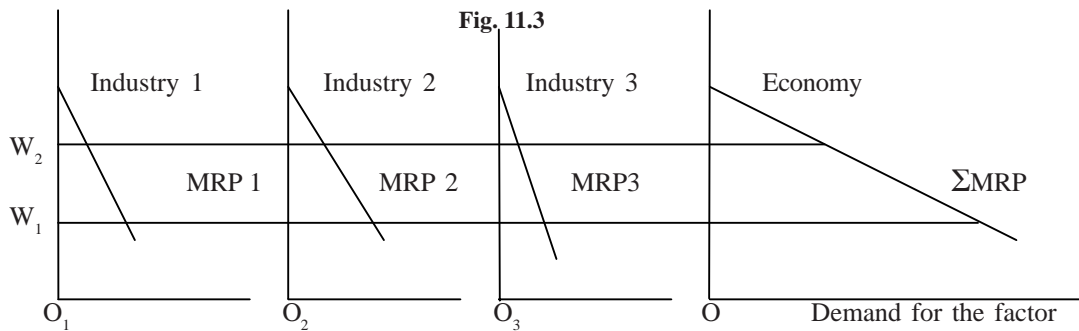


Fig. 11.3: Shows derivation of market demand curve by horizontally summing up demand curves of different industries.

11.5 FACTOR SUPPLY

Prices in factor market are determined by interaction of demand and supply. In Sections 11.1 to 11.4 we have outlined the demand curve for a factor of production. Now we turn to considerations that determine the supply of a factor of production. We can find out the equilibrium rate of remuneration for the factor. Some special features of factor supply curves must be pinpointed right in the beginning. We have divided the factors of production into four categories, viz., labour, land, capital and entrepreneurship. Their intrinsic nature is quite different. We cannot say that supply of labour and supply of land will be akin to, say, supply of sugar and supply wheat. In case of commodities, a buyer takes the quantity with her. But a buyer of land's productive services will have to come to the land and work on it. Similarly, when one buys labour, she pays for the work, be done by the labour. Here, the labourer comes and works at the place decided upon by the employer, completes the work and goes back. So, buying a commodity may imply an absolute transfer of ownership whereas hiring of factor services may not involve any such happening. Land, after raising of a crop by hirer, reverts back to the owner. Similarly, owner of labour himself has to work to make the supply of labour effective. Still, we can define the notion of supply curve of a factor of production.

11.5.1 Remuneration / Reward for a Factor and its Supply

Given the physical occurrence of a factor in the society, its supply will depend on what reward or remuneration can be earned. So higher the reward, higher the supply of a factor. Fig. 11.4 shows the supply curve for a factor of production.

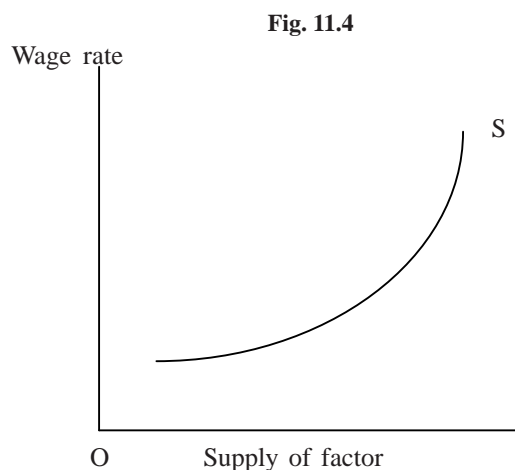


Fig. 11.4: Shows a supply curve for factor of production. Higher remuneration induces the owner of the factor to supply larger quantities, which amounts to letting some one make greater use of that factor's productive powers.

Reward or remuneration offers inducement to the owner of a factor to let some one use the productive power/ capacities under its possession. Higher the inducement, larger the quantity the owner will be willing to offer.

We give different names to rewards for different factors. Remuneration for labour is called wage. The reward for use of land is called rent. Interest is received for letting someone use capital, while entrepreneurs get profits.

11.5.2 Product Exhaustion Theorem

Marginal productivity theory of distribution shows that each unit of a factor of production receives remuneration equal to its marginal product. This prescription implies that each unit receives equal rewards. Reconsider our Fig. 11.1. The market wage rate is Rs. 40. Here, reward is equal to MRP of the last worker employed. We know that value of marginal product of the first worker was Rs. 200. Similarly, 2nd workers' efforts produced output valued as Rs. 160 and so on. Reward equals to marginal revenue product does not mean that each unit is rewarded its own marginal revenue product. It has to accept reward equal to MRP of the last unit of its kind that is employed. We have defined the difference between wage bill and total product as "Producers' Surplus". This amount is not gobbled up by producers. They arrange for compensation of other factors of production out of this surplus.

In the present section, we examine the implication of marginal productivity theory of distribution. One way to assess the implication is through assumption of constant returns to scale. You are familiar with Cobb–Douglas production function. Remember, for example,

$$Q = AL^\alpha K^\beta, \text{ where } \alpha + \beta = 1 \text{ and}$$

- L : Labour
- K : Capital
- A : Technical Constant
- Q : Output

Here, let us take marginal product of labour and capital as MP_L and MP_K respectively. We can derive these magnitudes by differentiating the above production function with respect to labour (L) and capital (K). Thus,

$$MP_L = \frac{\partial Q}{\partial L} = \alpha AL^{\alpha-1} K^\beta \text{ and}$$

$$MP_K = \frac{\partial Q}{\partial K} = \beta AL^\alpha K^{\beta-1}$$

The wage rate (W) is equal to MP_L and the rate of reward for capital (r) is equal to MP_K . Therefore, the total wage bill will be $MP_L \times L$, and total reward for capital will be $MP_K \times K$.

Hence we can say,

$$\text{share of labour} = L \times \alpha AL^{\alpha-1} K^\beta = \alpha AL^\alpha K^\beta$$

$$\text{share of capital} = K \times \beta AL^\alpha K^{\beta-1} = \beta AL^\alpha K^\beta$$

We know that only two factors labour and capital have been used here. Now add up their shares:

$$\begin{aligned} \text{Share of L} + \text{share of K} &= \alpha AL^\alpha K^\beta + \beta AL^\alpha K^\beta \\ &= AL^\alpha K^\beta (\alpha + \beta) \end{aligned}$$

$$= AL^\alpha K^\beta = Q$$

(We know that $\alpha + \beta = 1$)

We find that share of two factors add upto total output. Hence the name, ‘Product Exhaustion Theorem’, that is, if each unit of a factor is given rewards equal to its marginal product, the total output is exactly divided between the participating factors of production. Nothing is left over!

11.5.3 Factor Remuneration and Employment under Imperfect Commodity Market

So far we have assumed perfect competition in both factor and commodity markets. Let us relax this assumption in respect of commodity market and examine the consequence. We know that under perfect competition, each producer is a price taker in commodity market. The demand curve for the commodity is horizontal and the price, or average revenue equals marginal revenue (i.e., AR and MR curves overlap). Therefore, MRP and VMP curves coincide as we have shown in Fig. 11.1. However, if commodity market was not perfectly competitive, the demand curve will be sloping downwards to the right and the corresponding marginal revenue curve will be completely under it, half way between AR curve and vertical axis. What happens to marginal revenue productivity now? Engaging one more worker means producing larger output. Increase in output means selling total output (not only additional output) at a smaller price. So the total revenue does increase, but at a smaller rate. Hence MRP, and not VMP, determines where the employment will stop. Fig. 11.5 shows this situation.

Fig. 11.5

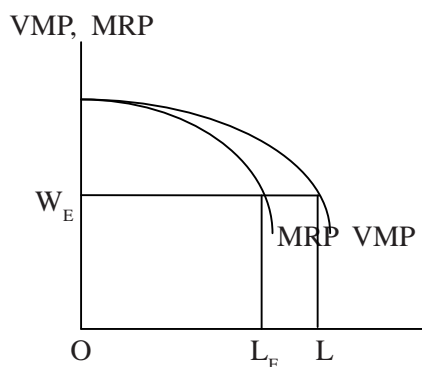


Fig. 11.5: Re-emphasises the fact that under imperfections in product market MRP will no longer coincide with VMP. It shall be wholly inside VMP. Therefore, at any wage rate W_E employment of labour will be OL_E , which is substantially less, then OL , and the employment under perfect competition.

Had perfect competition prevailed, MRP would have coincided with VMP and employment at wage rate OW_E would have been OL_E . But imperfection of the commodity market forces MRP to depart from VMP. Hence the equilibrium level of employment is OL_E , which is substantially lower than the perfect competition employment. Therefore, it can be said that imperfection in commodity market affects the employment level adversely.

We now turn to impact on wage rate in the market with imperfect competition. Had the perfect competition been there, OL_E number of workers would have been entitled to receive a wage rate equal to OW_1 and not OW_E .

So, we can say that as a result of commodity market imperfection, labour has to remain satisfied with a smaller wage rate and contend with lesser employment as

well. This points to exploitation of labour. Such an argument applies equally to remuneration and employment of all other factors.

We shall examine the effect of factor market imperfections when we discuss individual factor price determination. For labour, these aspects are examined in Section 11.10.

11.6 LIMITATIONS OF MARGINAL PRODUCTIVITY THEORY OF DISTRIBUTION

Sometimes, on the strength of product exhaustion theorem, an impression is sought to be created that since marginal productivity theory leaves no ‘remainder’ after rewarding the factors of production, it must be inherently fair as well. However, fairness of a theory cannot depend upon accounting calculation. The rewards do not go to factors. These are received by the owners.

Marginal productivity theory does not tell us whether the person getting reward on the basis of MRP actually deserved the same or not. For instance, MRP of an acre of land may be Rs. 2000, whosoever controls that acre gets the rent equal to Rs. 2000. But does that person really deserve that amount? The landlord might have acquired control over the land through fraudulent means, or through sheer brute force of hired goons, or may simply have occupied public land in the riverbed.

Again note that MRP does not depend upon how hard, say, different workers work on the land. As $MRP = MPP \times MR$, it depends on how many workers are employed. More the employment, lower the marginal physical product and lower the MRP. Thus, MRP does not reflect the efforts of workers who are given remuneration on its basis. As we pointed out in Section 11.5, employment and remuneration are also adversely affected by happenings in product market. Suppose a firm grows very large on the basis of hard work put in by its employees. It tends to acquire some ‘power’ in the market. Its AR and thus MR tend to slope downwards. As a result, MRP deviates from VMP. The firm tends to employ fewer persons at lower wage than it would have under perfect competition. Like any other theory, this one too derives its strength from the assumptions of constant returns to scale and perfect competition, with no externalities. But all the three assumptions are to be suspected in the present day world.

In any case, this theory treats human recipients of remuneration as inputs in the productive system. What happens to, say, aged and infirms? Their marginal revenue productivity drops to zero and hence their earnings too should be nil. Such mechanical approach to the problem of distributing output among the members of society cannot be justified and need not be regarded desirable on social considerations.

So, by way of conclusion, we can say, marginal productivity theory provides us with some insights into working of system and policy matters. Though it suffers form several shortcomings, yet it’s a better model to explain the working of economy.

Check Your Progress 2

- 1) Which concept of marginal productivity is taken into consideration by firm while employing a factor? (Answer in one sentence)

- 2) When $MRP > W$, expansion of employment leads to increase / decrease in firms point of view.

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 3) State whether the following statements are true or false:

- a) Product exhaustion theorem holds good under increasing returns to scale.
- b) Product exhaustion theorem holds well when externalities are present.

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 4) The firms' VMP can become its (demand /supply) curve for labours and is based on (marginal/average) product of labour and the (cost/price) of firms output. (Retain the correct phrase).

11.7 DETERMINATION OF WAGES

In the present section, we examine the determination of wages rate. Before we touch upon specifics of demand for and supply of labour, let us define some notions and general concepts:

- i) Wage is the general name for price paid for services of labour.
- ii) Salary: Wages paid to white collar workers are called salary. Generally it is shown on monthly basis. Sometimes, even annual salary may be mentioned.
- iii) Cash and Kind: Generally wages are paid in cash. However, under certain situations, some categories of workers may be paid wages in the form of, say, food or cloth. For example, draught relief workers receive food grain for the work done by them. Persons employed for the household work, often get food, shelter and clothes as part of payment for their services.
- iv) Piece wages are payment according to work done by a worker or a group of workers.
- v) Time rate is paid where quality matters but generally it is not possible to measure the work done by each worker. Supervision is a must in this kind of payment considerations.
- vi) Nominal wages are monetary wages received by the workers.
- vii) Real wages refer to purchasing power of the wages – after all their real worth is in terms of goods and commodities, which can be acquired with the money received.

11.7.1 Labour and Supply of Labour

The term labour denotes human endeavour to transform raw inputs into commodities. The transformation may be physical, say, making cloth out of cotton; spatial, say, making apples grown in Kashmir available to consumers in Kerala; or in time, say, making available in winter the produces of summer harvests. All the three

transformations add utility to things and are known as production (includes making/manufacturing, storing and transporting). Human efforts involved in these activities are called labour. Some of the labour may be paid for while others may not be paid at all. For instance, if members of family help in family business, wages are not even calculated.

Overall supply of labour in society depends upon:

- i) Size and age composition of population,
- ii) Norms of and participation in work force.

This way, supply of labour undetermined by a set of complex economic-social-biological and even legal forces.

11.7.2 Supply of Labour by an Individual

Generally, one would expect that an offer of higher wage rate should induce a worker to put in longer hours of work. However, such a view ignores the fact that a worker has to remain physically present and active while supplying her labour. She needs relaxation and time to regenerate her ability to work. Therefore, it is unrealistic to expect a person to keep working all the twenty four hour a day continuously. Thus, while a person gets very low hourly wages, she tends to work longer at a higher wage rate. However, once higher wage rate is fixed, she may prefer to have longer hours of leisure so that she can enjoy fruits of her labour. So her supply curve tends to have a backward bending at a some sufficiently high wage rate. The wage rate at which such a feature is encountered will differ from worker to worker, depending upon her won circumstances and needs.

Fig. 11.6

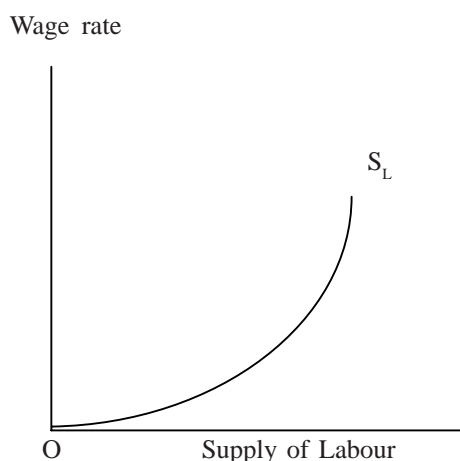


Fig. 11.6: Shows backward bending supply curve of labour. The ben occurs at a sufficiently high level of hourly wage rates, as the worker want time to enjoy the fruits of their labour. In other words, as they are able to meet certain requirements they tend to place a higher vluation of the leisure.

11.7.3 Market – Supply of Labour

We can derive the market supply curve of labour as we do with supply curve of any commodity. This is nothing but horizontal summation of individuals supply curves. Fig. 11.7 shows supply curves of 3 workers, marked S_1 , S_2 , and S_3 respectively. These are added up to obtain the market supply of labour.

Fig. 11.7

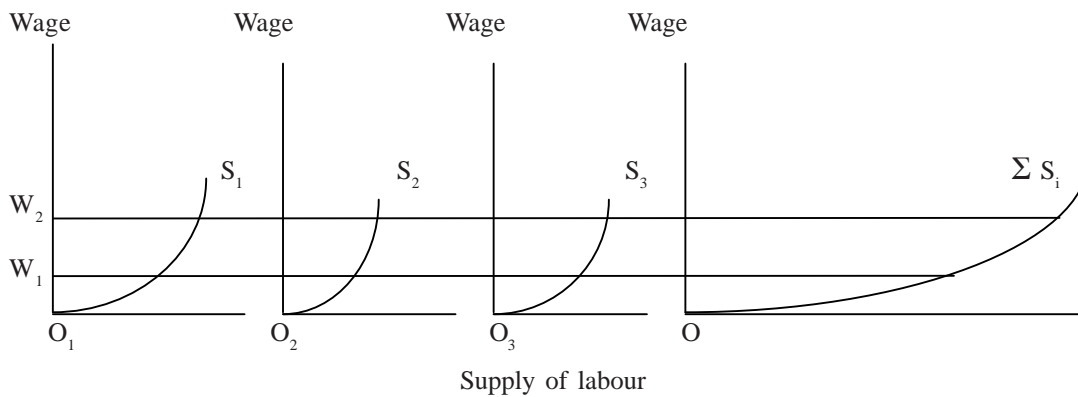


Fig. 11.7: We have shown three individual workers' supply curves of labour in the first panel. The market supply curve shown in the second panel is horizontal summation of this individual supply curve.

11.8 SHORT RUN DEMAND FOR LABOUR

Producers of various goods and services need labour to produce these for consumers. If consumers demand larger quantities of commodity X, manufacturers of such a commodity sense the opportunity to earn more profit through expansion of output. Therefore, they demand larger quantities of labour. In short run, they may engage the existing workers to work for extra hours over and above the normal schedule so that production can help them meet additional market demand. They may set up new factories, expand capacities in their existing ones only where rise in market demand becomes permanent. If, on the other hand, in industry Y the demand for commodity declines, some temporary or casual workers may be discharged. Alternatively, overtime production may stop. In both the cases, demand for labour undergoes a change in response to changes in demand for commodities, which are manufactured by labour. For this reason that we say demand for labour is derived demand.

An employer will keep employing more workers as long as marginal revenue exceeds marginal costs. We know that addition to revenue that results from employment of one more worker is called marginal revenue product (MRP). Addition to cost, in similar manner, is called marginal wage cost (MWC). Marginal productivity theory says that a producer goes on employing more and more workers so long as MRP exceeds MWC. When MRP is just equal to MWC, i.e.,

$$\text{MRP} = \text{MWC}, \text{ equilibrium is attained.}$$

We know that MRP depends on marginal physical product of labour and marginal revenue in the product market, which have been discussed in Section 11.4. When labour market is in perfect competition, the producer in question can hire as many workers as she needs at the going market wage rate. Thus, MWC will be equal to wage (W). Hence, we can say that producer's equilibrium occurs when

$$\text{MRP} = W.$$

If $\text{MRP} > W$, the producer can increase her profit by expanding employment. If $\text{MRP} < W$ she can contain her losses by reducing employment. When $\text{MRP} = W$, it is not in her interest to move away from that level of employment. Thus, downwards-sloping portion of MRP becomes demand curve for labour. It shows that higher the wage rate, lower will be the employment of labour. Conversely, if the wage rate declines, the producer will hire larger number of workers.

MRP tends to slope downwards as MPP declines due to employment of larger number of workers. This happens because of law of diminishing returns to the variable factor. Hence,

as $MRP = MPP \times MR$, it tends to decline as the MPP declines.

We also know that under perfect competition in product market $MR = AR$

Therefore,

$MRP = MPP \times MR = MPP \times P = VMP$. Though $MR = P$ is constant for the firm,

$MRP = VMP$ still tends to fall as a result of fall in MPP.

If, however, there exists some imperfection in the product market, MR tends to lie under AR . Hence, $MRP = MPP \times MR$ tends to fall rather sharply.

11.8.1 Labour Market: From Individual Firm to Market Demand for Labour

We can obtain demand curve for labour, as discussed in Section 11.4.3 above, by adding together individual firms' demand curves. However, we have to make allowance for one fact, i.e., as the wage rate falls, all the firms employ more workers. This increased employment of labour and leads to production of much larger output. Though, under perfect competition, a single producer could have sold any amount of the product at its going market price, yet, when all of them want to sell larger quantities, market supply of the commodity shifts to the right. This lowers the market price. Hence, the increased output forces producers to sell their products at a lower price. As a result $MRP = MPP \times MR$ tends to fall sharply. So the industry demand for labour curve will appear to be far steeper than what would simple horizontal summation of individual firms' demand curves suggest.

11.8.2 Elasticity of Demand for Labour

Responsiveness of demand for labour to changes in wage is called elasticity of demand for labour. Thus,

$$E = (\text{Per cent change in labour demanded}) \div (\text{per cent change in wage rate})$$

Just like consumers' demand for a commodity, we say demand for labour is elastic if $E > 1$. It will be called inelastic if $E < 1$.

When elasticity of demand for labour is unity, the total wage bill remains unchanged. When $E > 1$, a fall in W will lead to increase in wage bill. However, when $E < 1$, a fall in wage rate does lead to a fall in wage bill as well.

11.9 SUPPLY AND DEMAND BROUGHT TOGETHER: THE MARKET EQUILIBRIUM

11.9.1 Perfect Competition in both Product and Labour Market

Buyers and sellers of labour constitute the labour market and intersection of demand for and supply of labour gives the point of equilibrium. We have already derived the supply curve of labour in Section 11.7.3 above. The considerations outlined above in Section 11.8.1 give us a downward sloping market demand curve for labour. We

can put them together in Fig. 11.8. The two curves intersect at point E. The market wage rate is OW and OL quantity of labour is bought and sold.

Fig. 11.8

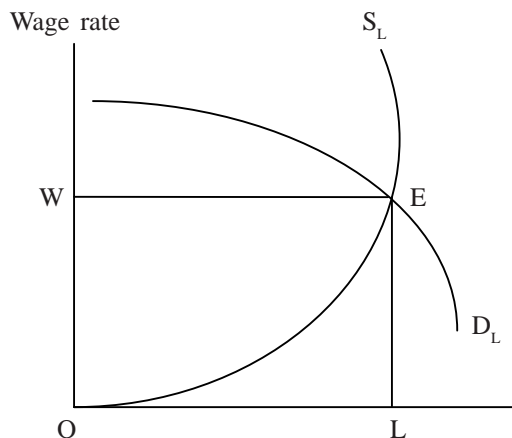


Fig. 11.8: Shows equilibrium of labour market with intersection of demand and supply curves for labour. The wage rate thus determined is OW and the level of employment is OL.

Individual producers of different commodities can make adjustments in their production plans, given the market wage rate, using the principle of equating their MRP to the MWC as discussed in Section 11.8 above.

Please note that so far we have not deviated from our standard assumption of perfect competition in labour market. What happens when labour market fails to meet the tests of perfect competition? What causes the labour market to move away from perfect competition? We discuss these and related queries in Section 11.10 below.

Check Your Progress 3

1) Individual supply curve may be backward bending. Why? Explain in about 50 words.

.....

2) Explain Marginal Wage Cost in one sentence.

.....

3) What will happen to wage bill when wage rises and

- i) demand for labour is inelastic?
- ii) demand for labour is elastic?
- iii) demand for labour is unitary elastic?

.....

11.10 IMPERFECTIONS IN MARKET AND THE WAGE RATE

We can consider several types of imperfections in the market.

- 1) The product market may be imperfect, that is, the producer may not be just one of the numerous perfectly competitive players.
- 2) There may be imperfection in the labour market. This can result from several sources: we know that today, an industrialist is not just like any small employer of the nineteenth century. Control over massive amounts of financial resources and a very large scale of operation imply that in any area that employer may be the only employer, or at the best one of the few employers. Thus, her market power will be disproportionately large compared to any single job seeker.

Attempts to counter the 'market power' of employers have led to organisation of trade unions. These organisations of workers create their own imperfections in labour market.

In the present section, we discuss all these possibilities and their implications for employment and wage rate.

11.10.1 Product Market Imperfections

When the producer has some market power in the product market, she cannot sell any quantity that she desires to produce at going market price. She can sell larger quantities at smaller prices only. Thus, demand curve for her output slopes downwards. She gets lower prices if she produces more. In the process, VMP is no longer the important decision factor. She is more affected by MRP. Hence, her demand for labour curve is not VMP but MRP curve. Therefore, at the given market wage rate, she will employ fewer workers as shown in Fig. 11.5 above. Recall that, at WE , the wage rate under perfect competition, firms demand for labour would have been OL . But as MRP tends to drift down VMP, firm's demand at this wage rate is down to OLE .

Thus, the monopolistic employer in product market will employ fewer workers compared to a perfectly competitive market.

11.10.2 Labour Market Imperfections

- a) **Trade Union:** The organisation of workers tries to better the working condition of workers. It may try to extract higher nominal wages and other benefits from an employer. In fact, trade unions attempt to raise earnings would be more successful when demand curve cuts supply of labour curve near the backward bending portion and the leaders would bargain accordingly to reap the maximum benefit. Further, the union may try to restrict supply of labour to employers. Sometimes they are able enforce 'closed shop' recruitment policy, that is, vacancies in the establishment will be filled up from amongst the members of the trade union, or, their families only.
- b) **Monopolistic Employer:** When only one firm is there in the market, which can employ workers, it tends to have tremendous clout. The poor workers have no option but to accept what the firm offers. In such situation wage rate and employment both suffer.
- c) **Bilateral Monopoly:** In this situation a monopolist employer has to negotiate with a powerful trade union. The employer tries to keep wage rate and employment as low as possible. But the union tries to attain the highest possible

level of wages. The ultimate outcome will depend upon relative bargaining powers and skills of the firm and the union. In such situation, we say, wage rate is indeterminate. It can be anywhere between the lowest, the minimum which workers may accept, and the highest, beyond which employer will never pay.

11.10.3 State Intervention

Sometimes, the government intervenes in the labour market. It may fix a certain minimum wage level and ultimately employers are forced to pay at least that much to labour. This minimum wage can benefit workers only if it is higher than the equilibrium wage rate and if large-scale displacement of labour does not follow such wage level fixation.

The state may alternatively act as a model employer. The wages and other facilities offered by public sector tend to become benchmark levels all across the economy.

11.11 WHY DO SO MANY KINDS OF WAGE RATES PREVAIL IN THE MARKET?

We have been trying to determine the wage rate in our analysis so far. But any observer of the market will immediately point it out that there are any number of wage rates, which exist in the market. Such wage rates differ not by insignificant amounts. How do we explain these differentials? We can say that wage rates differ because:

- 1) jobs are heterogeneous
- 2) workers are heterogenous
- 3) information is imperfect and costly
- 4) labour mobility is restricted and involves huge establishment costs.

Sometimes we try to explain away the wage differences in terms of differences in quality of human capital. For example,

- i) abilities of workers differ. Therefore, they receive different levels of earning;
- ii) family background ensures that some people are able to acquire abilities to earn more. For example, a rich person's sole daughter can afford to pay for higher/technical education, while a poor, yet brighter, child may have to help increase family's meagre income and in the process discontinues studies;
- iii) some people take chances or risks and are in some of the cases, duly rewarded for that.

We may emphasis again that to some extent, trade unions are able to raise the wage levels. Yet, those increases may remain confined to their members and organised sector of the economy. The unorganised sector, which is much larger than the organised portion and where unionisation of labour may not be feasible, remains outside the trade union negotiated wage increases.

Check Your Progress 4

- 1) When a producer has monopolistic power in product market, she employs fewer worker. Why? (Explain in about 50 words.)

-
-
-
- 2) When a monopolistic producer bargains with monopolistic trade union, wage rate becomes indeterminate. Why? (Explain in about 50 words.)

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- 3) What are the factors that explain differentials in earnings of labour? (Write in about 100 words.)

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11.12 LET US SUM UP

The present unit has introduced you to factor pricing. It deals with marginal productivity theory, which has been one of the most dominant theories in economics. It asserts that if competitive condition prevails in both product and factor markets, then rewards earned by different factors will be equal to their respective marginal products. The theory is further strengthened by product exhaustion theorem which asserts that if all the factors are rewarded according to their marginal products, the total product will be so divided among the various participating factors of production that there remains no left over.

However, marginal productivity theory is not above criticisms. It tends to concentrate only on the demand side of factor market ignoring supply side influences, where the determination of market price must take into consideration both demand and supply. Further, excessive dependence on perfect competition also leads to inherent shortcomings in the theory, as this type of market conditions may fail to exist in real life.

Even the equilibrium wage rate determined through demand and supply interaction is subject to modification by institutional factors like state intervention and actions of trade unions.

11.13 KEY WORDS

Backward Bending Supply Curve of Labour : Relationship between supply of labour and wage rate may reverse after a certain wage level. It may happen due to domination of income effect over substitution effect.

Competitive Market : A market with large number of buyers and sellers operating freely and no one is able to control the market price.

- Income Effect** : A wage rise increases income of workers and they tend to consume more of every good including labour (in the form of leisure). Thus, labour supply in terms of hours of work tends to decline.
- Institutional Factors** : The social, political and organisational factors, which affect economic decision-making.
- Marginal Physical Product** : Change in quantity produced as one additional unit of the variable factor is engaged, all other factors remaining constant.
- Marginal Revenue Product** : Marginal physical product multiplied by marginal revenue.
- Marginal Value Product**: Marginal physical product multiplied by price of the commodity.
- Minimum Wage Act** : Government passing a law fixing minimum level of wages payable.
- Mobility of labour** : Willingness of workers to take up employment at places far off from their normal residence.
- Non-Competitive Markets** : A market where some condition or other of perfect competition is not satisfied.
- Nominal Wage Rate** : Wage rate in term of current prices.
- Product Exhaustion Theorem** : If each unit of a factor is given a reward equal to marginal product of that factor, total output will be completely divided among the factor of production.
- Substitution Effect** : An increase in wage rate makes leisure costlier in terms of income foregone. This induces worker to work more.
- Trade Union** : A recognised organisation of workers that seeks to protect their rights.
- Wage Differentiations** : Differences in average earnings of different groups of workers.

11.14 SOME USEFUL BOOKS

Baumol, W.I. and Blinder, A.S., 1988, *Economics: Principles and Policy*, Harcourt Brace Jovanovich, Chicago

Stonier, A.W. and Hague, D.C., *A Text Book of Economics*, Macmillan and ELBS, London

11.15 ANSWERS/HINTS TO CHECK YOUR PROGRESS EXERCISES

Check Your Progress 1

- 1) Read Section 11.3 and answer

- 2) (a) 2, (b) Rs. 90 (c) Rs. 40

Check Your Progress 2

- 1) MRP
- 2) increase, decrease
- 3) (a) False, (b) False
- 4) demand, marginal, price

Check Your Progress 3

- 1) Read Sub-section 11.7.1 and answer
- 2) Read Section 11.8 and answer
- 3) i) increases
ii) decreases
iii) remain the same

Check Your Progress 4

- 1) Read Sub-section 11.10.1 and answer
- 2) Read Sub-section 11.10.2 and answer
- 3) Read Sub-section 11.11 and answer