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1. Learning Outcome

- Know the meaning of monopsony**.**
- Determination of wage when firm is monopsonist in the factor market and monopolist in the product market
- Know the concept of monopolistic and monopsonistic exploitation.

2. Introduction

An imperfectly competitive(e.g. monopolist) firm hires labour by offering wage rate equal to marginal revenue productivity of labour, when labour market is perfectly competitive. This wage rate is lower than the wage rate paid by the competitive firm. When the firm enters into the factor market as a single buyer, it will enjoy market power in the factor market in deciding factor price and this market situation is called monopsony. In this situation, firm will pay the factors lower than their marginal revenue productivity of labour.In this module we analyze the factor market situation in which firm is assumed to act as monopsonist while it is monopolist in product market. How equilibrium wage rate and employment are determined and how the firm exploits labour in terms of wage and employment at the equilibrium are illustrated in the following section.

3.1. Firm is monopolist in product market and monopsonist in factor market

A firm is said to have monopsonist power when it represents itself as single buyer in the factor market. A monopsonist firm hires more labour by offering higher wage and consequently faces upward rising supply curve. This labour supply curve is actually the average expenditure that the monopsonist must incur at different level of employment. This is shown in figure-3.1.1. Hence, in order to determine the equilibrium wage and employment we need to derive the marginal expenditure curve of firm($\square\ \square_{\square}$).The marginal expenditure of firm is defined as change in total expenditure of labour by the firm due to additional hiring of labour. Graphically the $\square\ \square_{\square}$is posited upward left to the average expenditure ($\square\square_{\square}$) curve as the firm pays higher price not only to the additional labour but also pays that new wage to all previous number of workers employed. The relations among number of labour, wage rate, total expenditure on labour and marginal expenditure on labour are shown hypothetically in table-3.1.1.The $\square\ \square$ curve is derived mathematically in the following way:

Let us consider the supply function of factor labour

$$\square = \square_{\square}\square\square\square \qquad (1)$$

The slope of this labour supply curve is positive. That is $\frac{dw}{dL} > 0$. Now the total expenditure on the labour is given as

$$TE = w.L$$

We define marginal expenditure on labour as the change in total expenditure due to per unit change labour. That is,

$$ME_L = \frac{\Delta TE}{\Delta L} = w\frac{\Delta w}{\Delta L} + L.\frac{\Delta w}{\Delta L}$$

Or

$$ME_L = w + L.\frac{dw}{dL} \qquad (2)$$

Since $\frac{dw}{dL} > 0$, $w > 0$ and $L > 0$ then it implies that $ME_L > w$ for any value of L.

We know the slope of the supply curve is positive i.e. $\frac{dw}{dL} > 0$

Hence, the slope of the ME_L curve is derived as

$$\frac{dME_L}{dL} = \frac{dw}{dL} + \left[\frac{dw}{dL}.\frac{dw}{dL} + L.\frac{d^2w}{dL^2}\right]$$

Or

$$\frac{dME_L}{dL} = 2\frac{dw}{dL} + L.\frac{d^2w}{dL^2}$$

Therefore, the slope of the marginal expenditure curve is higher than the slope the supply curve or average expenditure curve.

Table-3.1.1 Total and Marginal Expenditure on Labour

No. of labour	Wage(Rs.)	Total Expenditure on labour(Rs.)	Marginal Expenditure on Labour(Rs.)
1	10	10	-
2	11	22	12
3	12	36	14
4	13	52	16
5	14	70	18
6	15	90	20
7	16	112	22
8	17	136	24
9	18	162	26
10	19	190	28

Since the firm is monopolist in product market, the profit maximization condition implies that the firm will face □ □□□ curve as demand curve for labour shown in figure-3.1.1. Hence, the firm will be in equilibrium when its marginal expenditure on labour is equal to its marginal revenue productivity of labour. This is shown by the point □ in figure-3.1.1. Now we can determine the equilibrium level of employment by drawing a vertical straight line to the labour axis and obtain □□□ units of labour. The firm will pay wage according to its average expenditure curve. Therefore, for □□□ units of labour, the corresponding equilibrium wage rate is obtained as □□ by drawing a straight line from the intersection average expenditure curve or supply curve of labour and □□□ line.We can observe that the equilibrium wage rate paid by the monopsonist firm is less than the value of its marginal product of labour (□□ □□) as well as its marginal revenue product of labour (□ □□□). The gap between the wage set according to □□ □□ and wage determined by □ □□□ is known as monopolistic exploitation. Now the additional wage gap (i.e. difference between wages paid by monopolist firm and the monopsonist firm) arises due to the monopsony power of the firm leading to exploitation of labour in addition to monopolistic exploitation. This exploitation of labour is called monopsonistic exploitation. The monopolistic and monopsonistic exploitations are shown in figure-3.1.2.

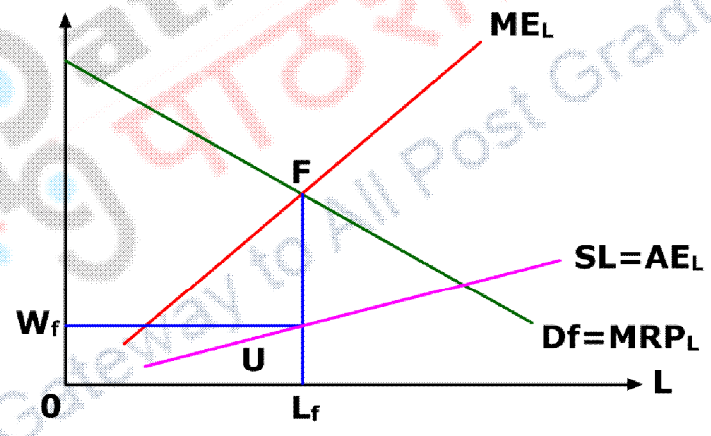

Figure-3.1.1

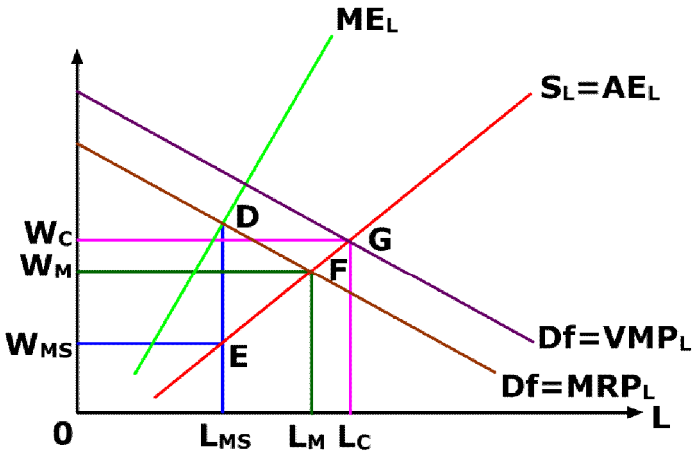

Figure-3.1.2

In figure-3.1.2 the wage rates W_C, W_M, and W_{MS} are set by competitive firm, monopolist firm and monopsonist firm respectively. The difference between W_C and W_M is known as monopolist exploitation, while, the gap between W_M and W_{MS} is called monopsonistic exploitation.

3.2. Equilibrium in monopsonistic factor market when several variable factors used in production

In a production process when both capital and labour are used as variable factors, the firm minimizes cost by choosing such combination of capital and labour for which the ratio of the marginal productivity of labour to capital will be equal to wage rental ratio provided that the factor market must be perfectly competitive. That is,

$$\frac{MP_L}{MP_K} = \frac{w}{r}$$

Or $\frac{MP_L}{w} = \frac{MP_K}{r}$

However, in the presence of monopsonist firm the changes in the prices of factors occurs due to changes in the factors employed. The factor prices w and r are no longer constant. Monopsonist employs capital and labour in such a combination at which the ratio of marginal productivity of labour to capital equals to the ratio of marginal expenditure of labour to capital. That is,

$$\frac{MP_L}{MP_K} = \frac{ME_L}{ME_K}$$

Or $\frac{MP_L}{ME_L} = \frac{MP_K}{ME_K}$

If the above equality is not satisfied, that is, say for instance, $\frac{MP_L}{ME_L} < \frac{MP_K}{ME_K}$, then the firm can obtaina larger increase in output by spending additional rupee cost on employment of capital rather than labour.Thus, the firm can maintain same level of output by substituting capital for labour at lower cost. Because of this substitution, marginal product of capital will decline and

maginal product of labour will increase and in the expenditure side the marginal expense of capital will fall while the marginal expense of labour will rise. These two effect will be continued until the equality is obtained.

This can be proved mathematically in the following way.

Assume that the firm is monopolist in the product market and faces demand function $P_x = P_x(X)$ in which the production function $X = f(L, K)$.

The supply functions of labour and capital faced by the monopsonist are gives as

$w = w(L)$ and $r = r(K)$

The profit function can be written as

$$\Pi = P_x . X - w . L - r . K$$

Now the first-order conditions for profit maximization with respect to labour and capital are given below:

$$\frac{\partial \Pi}{\partial L} = P_x . \frac{\partial X}{\partial L} + X . \frac{\partial P_x}{\partial X} . \frac{\partial X}{\partial L} - w - L . \frac{\partial w}{\partial L} = 0 \qquad (1)$$

$$\frac{\partial \Pi}{\partial K} = P_x . \frac{\partial X}{\partial K} + X . \frac{\partial P_x}{\partial X} . \frac{\partial X}{\partial K} - r - K . \frac{\partial r}{\partial K} = 0 \qquad (2)$$

From equation-(1) we get

$$\frac{\partial X}{\partial L} . MR + X . \frac{\partial P_x}{\partial X} = w + L . \frac{\partial w}{\partial L} \qquad (3)$$

Where $\frac{\partial X}{\partial L} = MP_L$, $P_x + X . \frac{\partial P_x}{\partial X} = MR$ and $w + L . \frac{\partial w}{\partial L} = MC_L$

Therefore equation-(3) can be written as

$$MP_L . MR = MC_L \qquad (4)$$

Similarly from equation-(2) we have

$$MP_K . MR = MC_K \qquad (5)$$

From (4) and (5) we find

$$\frac{MP_L}{MP_K} = \frac{MC_L}{MC_K} \qquad (6)$$

$$\frac{MP_L}{MP_K} = \frac{MC_L}{MC_K} \qquad (7)$$

The above relation reveals tha a monopsonist who uses both capital and labour as variable factors, will adjust the composition of both inputs in such a way so that the ratio of marginal product of labour to marginal expense of labour will be equal to marginal product of capital to marginal expense of capital. By generalizing the above concept, we can make a proposition that a monopsonist who employs several variable inputs in production will choose that input composition in equilibrium at which the ratio of marginal product to marginal expense of input is equal for all variable inputs used.

4. Summary

- A firm is said to be monopsonist when it represents itself as single buyer in the factor market.
- The labour supply curve represents average expenditure on labour by monopsonist. The labour supply curve is upward rising as the monopsonist firm hires more labour by offering higher wage.
- The marginal expenditure of firm is defined as change in total expenditure of labour by the firm due to additional hiring of labour.
- In the case of monopsony the firm will be in equilibrium when its marginal expenditure on labour is equal to its marginal revenue productivity of labour.
- The equilibrium wage rate paid by the monopsonist firm is less than the value of its marginal product of labour (VMP_L) as well as its marginal revenue product of labour (MRP_L).
- The gap between the wage set according to VMP_L and wage determined by MRP_L is known as monopolistic exploitation.
- Monopsonistic exploitation (i.e. difference between wages paid by monopolist firm and the monopsonist firm) arises due to the monopsony power of the firm leading to exploitation of labour in addition to monopolistic exploitation.
- When monopsonist firm uses several variable factors, the equilibrium condition is obtained by equating the ratio of marginal productivities with ratio of marginal expenditures on those factors.