

Producer's Equilibrium

The value of all assets used for production is limited. Hence, the producer has to use such a combination of inputs as would provide him with maximum output and profit. This optimum level of production, also called producer's equilibrium, is achieved when maximum output is derived from minimum costs.

In order to achieve this, producers first have to classify their resources into different combinations. Each combination would provide production in different quantities. The combination that provides the highest amount of produce at the least amount of costs is the optimum level of production.

In order to find out producer's equilibrium, we first need to understand isoquant curves and iso-cost lines. These two concepts help us calculate optimum production.

Isoquant Curves

These lines represent various input combinations which produce the same levels of output. The producer can choose any of these combinations available to him because their outputs are always the same. Thus, we can also call them equal-product curves or production indifference curves.

Just like indifference curves, isoquants are also negatively-sloping and convex in shape. They never intersect with each other. When there are more curves than one, the curve on the right represents greater output and curves on the left show less output.

Consider the table below. It shows four combinations, i.e. A, B, C and D, which produce varying levels of output.

Factor combinations	Units of Labour	Units of Capital
A	5	9
B	10	6
C	15	4
D	20	3

Plotting these figures on a graph provides us with this curve (Figure 1):

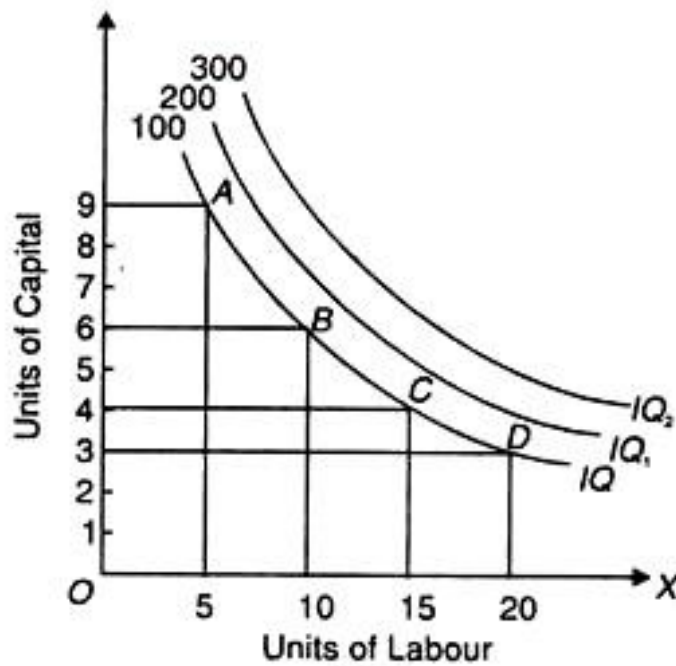


Fig. 1

The X-axis shows units of labour, while the Y-axis represents units of capital. Points A, B, C and D are combinations of factors on which IQ is the level of output, i.e. 100 units. IQ1 and IQ2 represent greater potential output.

Slope of Iso quant= MRTS(Marginal rate of technical substitution)

$$MRTS_{LK} = MP_L / MP_K$$

Isocost Lines

it shows how we can spend money on two different factors to produce maximum output. These lines are also called budget lines or budget constraint lines.

isocost line shows all combinations of inputs which cost the same total amount cost. Although similar to the budget constraint in consumer theory,

For example, a producer wants to spend Rs. 300 on the factors of production, namely X and Y. The price of X in the market is Rs. 3 per unit and price of Y is Rs. 5 per unit.

In such a case, the iso-cost line is shown in Figure below:

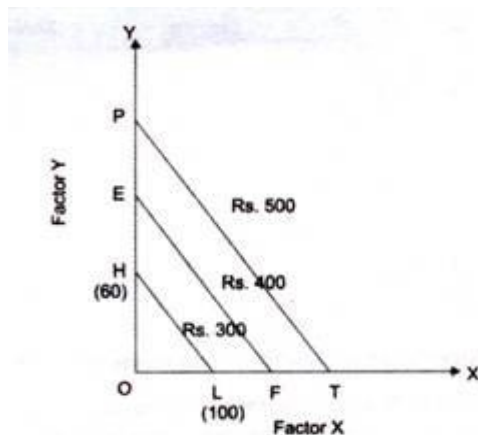


Figure-10: Iso-cost Line

As shown in Figure, if the producer spends the whole amount of money to hire X(Labour), then he/she can purchase 100 units of X, which is represented by OL. On the other hand, if the producer purchases Y(Capital) with the whole amount, then he/she would be able to get 60 units, which is represented by OH.:

If points H and L are joined on X and Y axes respectively, a straight line is obtained, which is called iso-cost line. All the combinations of X and Y that lie on this line, would have the same amount of cost that is Rs. 300. Similarly, other iso-cost lines can be plotted by taking cost more than Rs. 300, in case the producer is willing to spend more amount of money on production factors.

The equation of Isocost line: $C = w.L + r.K$, here $w.L$ total pay to labour and $r.K$ total pay to capital. C/r is Y intercept and C/w is the X intercept.

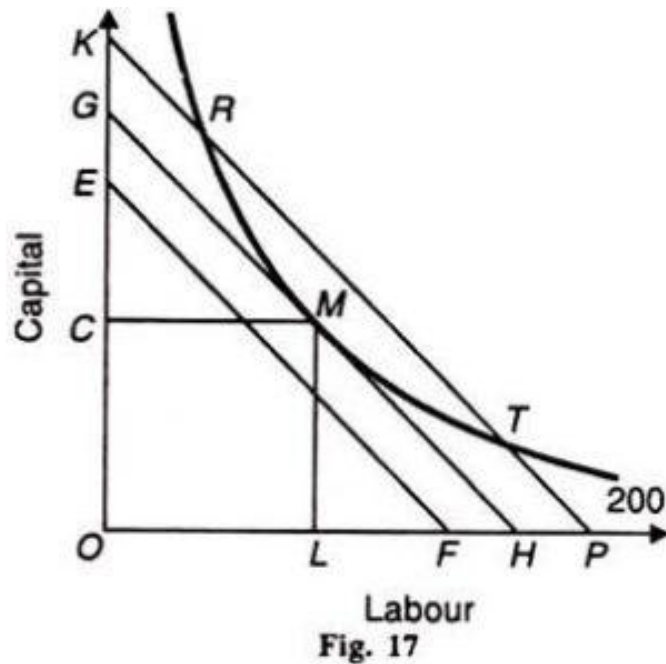
The slope of the iso-cost line is = the ratio of the price of labour (P_L or w) to the price of capital (P_K or r) i.e... P_L/P_K or W/r (factor price ratio)

Production Equilibrium

Using this equilibrium, the producer can determine different combinations to increase output. He can also use this information to find ways to cut costs using the same inputs and consequently generate more profit. We can find out the least expensive combinations of factors by superimposing isoquant curves on isoquant lines.

The graph below shows how we can use isoquant curve and isocost lines to determine optimum producer's equilibrium.

The point of least-cost combination of factors for a given level of output is where the isoquant curve is tangent to an iso-cost line. The iso-cost line GH is tangent to the isoquant 200 at point M.



In the figure shown above, the isoquant curve represents targeted output, i.e. 200 units. Isocost lines EF, GH and KP show three different combinations in which we can utilize the total outlay of inputs, i.e. capital and labour.

There are two essential or second order conditions for the equilibrium of the firm:

1. The first condition is that the slope of the isoquant line must equal the slope of the iso cost curve.

$$MP_L / MP_K = W/r$$

The slope of the isoquant curve is = to the marginal rate of technical substitution of labour and capital (MRTSLC) which is, in turn, equal to the ratio of the marginal product of labour to the marginal product of capital (MPL/MPC).

2. The second condition is that at the point of tangency, the isoquant curve must be convex to the origin. In other words, the marginal rate of technical substitution of labour for capital (MRTSLC) must be diminishing at the point of tangency for equilibrium to be stable.

Output-Maximisation for a given Cost:

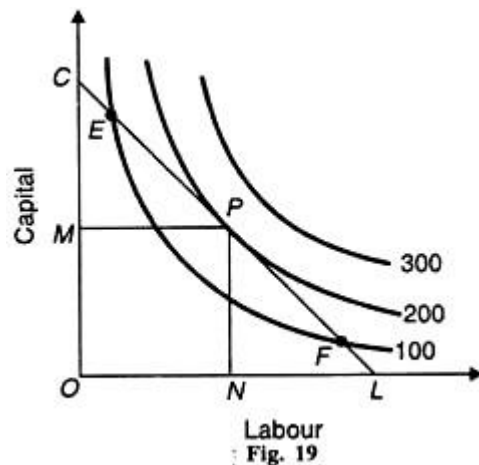
The firm also maximises its profits by maximising its output, given its cost outlay and the prices of the two factors. This analysis is based on the same assumptions, as given above.

The conditions for the equilibrium of the firm are the same, as discussed above.

ADVERTISEMENTS:

1. The firm is in equilibrium at point P where the isoquant curve 200 is tangent to the iso-cost line CL in given Figure below .

At this point, the firm is maximising its output level of 200 units by employing the optimal combination of OM of capital and ON of labour, given its cost outlay CL. But it cannot be at points E or F on the iso-cost line CL, since both points give a smaller quantity of output, being on the isoquant 100, than on the isoquant 200.



The firm can reach the optimal factor combination level of maximum output by moving along the iso-cost line CL from either point E or F to point P. This movement involves no extra cost because the firm remains on the same iso-cost line.

Note: Producer's equilibrium is same as in case of consumer's equilibrium

Producer's equilibrium	Consumer's equilibrium
Iso quant	Indifference curve
Iso cost line	Budget line
MRTS	MRS
P_L/P_K or w/r	P_x/P_y
MP_L/MP_K	MU_x/MU_y
$MP_L/MP_K = P_L/P_K$ or w/r	$MU_x/MU_y = P_x/P_y$

