ADVANCED MICRO ECONOMICS

UNIT - III

Factor pricing in Perfectly Competitive Market - Factor pricing in Imperfectly Competitive Market – Elasticity of Substitution – Euler's Theorem of Product Exhaustion.

THEORY OF FACTOR PRICING

Meaning and Definitions of Factor Pricing:

The theory of factor pricing is also called theory of distribution. The distribution may be either functional or personal. The personal distribution is concerned with the distribution of national income among various factors of production which is unequally distributed. On the other hand, the functional distribution is concerned with the remuneration paid to various factors of production in an act of production.

The factors of production, viz., land, labour, capital, entrepreneur and organisation are paid in the form of rent, wages, interest, profit and salary. Thus, the theory of functional distribution is called the theory of factor pricing.

Definition

(1) Professor Chapman has defined, "The economics of distribution accounts for the sharing of wealth produced by a community among the agents or the owners of the agents which have been active in its production."

(2) According to Professor Seligman, "All wealth that is created in society finds its way to the final disposition of the individuals through certain channels or sources of income. This process is known as distribution."

FACTOR PRICING UNDER PERFECT COMPETITION

The firm will be making profit, earning normal profit and incurring losses. These three situations are discussed under perfect competition with the help of the diagrams. We assume that labour as a variable factor is employed with keeping other factors constant.

The diagram shows that the factor price (wages) is determined by the industry keeping in view the total demand for and supply of labour by the industry. DD and SS are demand curve and supply curve of labour and E is the point of intersection where OW wage rate is fixed or determined and OQ is the demand and supply of labour as shown on the left

portion of the diagram. On the right portion of the diagram the firm employs OQ of labour with given wage rate OW.

Wages and marginal revenue productivity (MRP) and average revenue productivity (ARP) are shown on OY-axis while units of labour on OX-axis. The AW=MW is the demand curve for the labour which is perfectly horizontal to OX-axis. ARP and MRP are average revenue productivity curve and marginal revenue productivity curve.

They are opposite to U- shaped curve. The point of equilibrium of a firm will be at the point E where marginal factor cost or marginal wage (MFC or MW) is equal to its marginal revenue productivity (MRP=MFC or MW) and the MRP curve must cut the MFC or MW from the above.

The average profit of the firm is (ARP-AW) SE and the total profit is equal to TWES. The firm is earning profit because the wages are less than the marginal revenue productivity of labour. In other words, workers are being exploited equivalent to the volume of profit TWES. Karl Marx has propounded the surplus theory of value on this ground and wrote a famous book Das Capital in 1869.

The wage rate is OW and demand for and supply of labour is OQ in the industry while on the same wage rate firm employs OQ units of labour. The point of equilibrium of the firm is at E where the MW is equal to its MRP. The wage rate OW is higher than the ARP (AW>ARP) and the firm is incurring losses. Average loss to firm is (AW-ARP) LE and the total loss to firm is WTEL. In other words, labour is getting more than what he contributes to the productivity (AW>ARP).

The firm employs OQ units of labour at given wage rate of OW and the point of equilibrium of the firm is at point E where the AW=ARP=MW=MRP. The firm is earning normal profit and it is the optimum firm that the optimum utilisation of resources is attained.

In the long run the firm will earn normal profit only because there is perfect competition in both the markets.

The point of equilibrium of the firm will be at that point where the AW=ARP=MW=MRP in the long run as shown in the diagram:

Thus, we can say that the wage rate will always be equal to marginal revenue productivity (AW=ARP=MW=MRP) in the long run but during short period there may be variations and it may result into profit, loss and normal profit.

FACTOR PRICING UNDER IMPERFECT COMPETITION

The theory of marginal productivity is based on the assumption of perfect competition. But perfect competition is a market structure which is unrealistic and imaginary. In imperfect competition the reward paid to a factor of production will be less than its marginal revenue productivity (W<MRP).

The equilibrium of a firm under imperfect competition can be explained with the help of the following diagram:

The diagram shows wage rate and productivity on OY-axis while units of labour on OX-axis. ARP and MRP are average revenue productivity curve and marginal revenue productivity while AW and MW are average wages and marginal wages of workers. The point of equilibrium is E where the MW equals to MRP (MW=MRP). The average profit (ARP-AW) is LT and the total profit is SWTL. The firm is earning profit. But workers are exploited by the firm because they are paid reward less than their marginal revenue productivity.

5. Criticism of Factors Pricing:

The marginal productivity theory of distribution has been criticised on the following grounds:

(i) All Units of a Factor are not Homogeneous:

The theory assumes that all the units of a factor of production are homogeneous or identical. But in actual practice we see that all the units are not identical in efficiency. For example, labour can be categorised into skilled, semi-skilled and unskilled. Hence, they are not perfect substitutes.

(ii) Perfect Competition is Unrealistic:

The theory is based on the assumption that there is perfect competition in factor market and commodity market. But in actual practice we find imperfect competition. Hence, perfect competition is an unrealistic and imaginary market.

(iii) Unrealistic Assumption of Full Employment:

The theory is based on the assumption that there is full employment and no single factor of production is unemployed. But in actual practice there is less than full employment situation whether the country is developed one because a certain percentage of people are found unemployed.

(iv) Marginal Productivity is not Measurable:

The theory assumes that the marginal productivity of a factor can be measured by knowing the addition to the total production by employing an additional unit of the factor keeping other factors of production constant. The marginal productivity of entrepreneur cannot be measured because it is not divisible.

(v) Imperfect Mobility of Factors of Production:

The theory is based on the assumption that all the factors of production have perfect mobility. They will move from low rate of reward to high rate of reward industry and there will be regional and occupational mobility of labour. But in practice we see that factors of production are not only affected by the economic factors but they are also affected by the non-economic factors as well.

Labour, entrepreneur and organisation are human factors. They are affected by the non-economic factors, namely, environment, language, caste, religion, distance, etc. Hence, perfect mobility of factors is a mismanage.

(vi) Maximisation of Profit is not the Sole Object:

The theory assumes that each producer or firm aims at maximisation of profit. It is not correct because there is a cut-throat competition in the market and non-price competition is the practice prevailing in domestic and international markets. Firm tries to earn satisfactory level of profit and maintain its existence in the market.

(vii) One Sided Theory:

The theory deals with the demand side of factors of production while determining the factor prices. Professor Milton Friedmann and Samuelson have criticised the theory on the ground that it has not taken into consideration the supply side which is equally important for the determination of price of factors of production.

(viii) Long Run Explanation:

The theory explains the factor price determination during long run and it has failed to explain the short run determination of factor pricing. Professor J.M. Keynes has rightly pointed out that in the long run we all are dead and there is no economic problem. In such a situation the theory does not have utility and applicability.

(ix) Not Applicable to Entrepreneur:

The remuneration of entrepreneur cannot be determined because he is the only factor of production whose number neither can be increased nor can be reduced. In such a situation marginal productivity cannot be measured and consequently his remuneration cannot be determined.

(x) Neglects Technological Progress:

The theory of distribution has ignored the role of technological progress increasing the productivity and production. The use of latest technology and innovation have also influenced the productivity of labour and capital as pointed out by Professor J.R. Hicks and consequently the relative share of factors in national income has increased.

(xi) No Explanation of Inequalities of Income:

The theory does not explain the inequalities of incomes prevailing in various countries. If the marginal productivity of various factors of production is taken into consideration then we will see that the causes of such inequalities cannot be justified on the ground that there are several factors leading to such inequalities of income and wealth. The theory is based on the static phenomenon and fails to explain the dynamic aspect of economy which is more important and realistic.

SUBSTITUTION EFFECT

The substitution effect is the decrease in sales for a product that can be attributed to consumers switching to cheaper alternatives when its price rises. A product may lose market share for many reasons, but the substitution effect is purely a reflection of frugality. If a brand raises its price, some consumers will select a cheaper alternative. If beef prices rise, many consumers will eat more chicken.

Key Takeaways

- The substitution effect is the decrease in sales for a product that can be attributed to consumers switching to cheaper alternatives when its price rises.
- When the price of a product or service increases but the buyer's income stays the same, the substitution effect generally kicks in.
- The substitution effect is strongest for products that are close substitutes.
- An increase in consumer spending power can offset the substitution effect.

Understanding the Substitution Effect

In general, when the price of a product or service increases but the buyer's income stays the same, the substitution effect kicks in. This is not only evident in consumer behavior. For example, a manufacturer faced with a price hike for an essential component from a domestic supplier may switch to a cheaper version produced by a foreign competitor.

How, then, does any company get away with increasing its price? In addition to the substitution effect, there's the income effect—some of its customers may be enjoying an increase in spending power and be willing to buy a pricier product. A company's success in repricing its product is determined in part by how much of the substitution effect is offset by the income effect.

Special Considerations

Price Fluctuations

As noted, when a product price increases consumers tend to drop it for a cheaper alternative. This can turn into an endless game of supply and demand. Steak prices rise, so consumers substitute pork. This leads to a decline in the demand for steak, so its price drops and consumers return to buying steak.

This does not mean only that consumers chase a bargain. Consumers make their choices based on their overall spending power and make constant adjustments based on price changes. They strive to maintain their living standards despite price fluctuations.

The substitution effect kicks in when a product's price increases but the consumer's spending power stays the same.

Close Substitutes

The substitution effect is strongest for products that are close substitutes. For instance, a shopper might pick a synthetic shirt when the pure cotton brand seems too pricey. Eventually, enough shoppers may follow suit to make a measurable effect on the sales of both shirt makers.

Elsewhere, if a golf club hikes its fees, some members might quit. However, if there is no comparable choice for them to turn to then they may just have to pay up to avoid quitting the sport completely.

Inferior Goods

As illogical as it seems, the substitution effect may not occur when the products that increase in price are inferior in quality. In fact, an inferior product that rises in price may actually enjoy a sales increase.

Products that display this phenomenon are called Giffen goods, after a Victorian economist who first observed it. Sir Robert Giffen noted that cheap staples such as potatoes will be purchased in greater quantities if their prices rise. He concluded that people on extremely limited budgets are forced to buy even more potatoes because their increasing price places other higher-quality staples altogether out of their reach.

Substitute goods may be adequate replacements or inferior goods. Demand for an inferior good will increase when overall consumer spending power falls.

THE EULER'S PRODUCT EXHAUSTION THEOREM

As soon as it was propounded that the factors of production are paid equal to their marginal products, a difficult problem cropped up over which there has been a serious debate among the famous economists. The difficult problem which has been posed is that if all factors were paid rewards equal to their marginal products, would the total product be just exactly exhausted?

In other words, if each factor is rewarded equal to its marginal product, the total product should be disposed of without any surplus or deficit. The problem of proving that the total production will be just exhausted if all factors are paid rewards equal to their marginal products has been called "Adding- up Problem" or Product Exhaustion Problem.

The two solutions to the problem of product exhaustion have been put forward. First, important solution was put forward by P.H. Wicksteed who assumed the operation of constant returns to scale in production (that is, the first degree homogenous production function) and applied Euler theory to prove the product exhaustion problem.

The second important solution has been provided by J.R. Hicks and RA. Samuleson who used perfect competition model of determination of product and factor prices to prove the product exhaustion problem. We discuss below these solutions of product exhaustion problem.

Wicksteed's Solution of Product Exhaustion Problem with Euler's Theorem:

Philip Wicksteed was one of the first economists who posed this problem and provided a solution for it. Wicksteed applied a mathematical proposition called Euler's Theorem to prove that the total product will be just exhausted if all the factors are paid equal to their marginal products.

Let Q stand for the total output of the product, a stands for the factor labour and b stands for the factor capital and c stands for land. Assuming that there are only three factors employed for production. Then, the adding up problem implies that,

$$Q = MP_a \times a + MP_a \times b + MP_c \times c$$

That is, the marginal product of factor a multiplied by the amount of factor a plus the marginal product of factor b multiplied by the amount of factor b plus the marginal product of factor c multiplied by the amount of factor c equals the total product of the firm. Marginal products of various factors can be expressed as partial derivatives. Thus, the marginal product of labour (i.e. factor a) can be expressed as $\partial W/\partial a$, and the marginal product of capital (factor b) as $\partial W/\partial b$, and the marginal product of land (factor c) as $\partial W/\partial c$, then for the adding-up problem (i.e. product exhaustion problem) to be fulfilled, the following equation must hold good:

Now, Euler's Theorem states that if production function is a homogenous function of the first degree, that is, if in Q =f (a, b, c) for any increase in the variables a, b and c by the amount n, the output Q also increases by n, then Q will be equal to the total sum of the partial derivatives of production function with respect to various factors multiplied by the amounts of the factors respectively.

The homogeneous function of the first degree or linear homogeneous function is written in the following form:

nQ = f(na, nb, nc)

Now, according to Euler's theorem, for this linear homogeneous function:

Thus, if production function is homogeneous of the first degree, then according to Euler's theorem the total product is:

Where Q represents the total product and ∂W/∂a, ∂W/∂b, ∂W/∂c are partial derivatives of the production function and therefore represent the marginal products of labour, capital, and land respectively. It follows therefore that if production function is homogeneous of the first degree (that is, where there are constant returns to scale), then, according to Euler's Theorem, if the various factors a, b and c are paid rewards equal to their marginal products, the total product will be just exhausted, with no surplus or deficit.

We thus see that Euler's Theorem is able to explain product exhaustion when production function is homogenous of the first degree. In this way, Wicksteed assuming constant returns to scale and applying Euler's Theorem, proved the adding-up problem, that is, demonstrated that if all factors are paid equal to their marginal products, the total product will be just exactly exhausted.

A Critique of Euler's Theorem and Wicksteed's Solution:

Wicksteed's solution was critcized by Walras, Barone, Edgeworth and Pareto. It was asserted by these writers that production function was not homogeneous of the first degree, that is; returns to scale are not constant in the actual world. Thus Edgeworth satirically commented on Wicksteed's solution, "There is magnificence in this generalisation which recalls the youth of philosophy. Justice is a perfect cube, said the ancient sage; and rational conduct is a homogeneous function, adds the modern savant".

Critics pointed out that production function is such that it yields a U- shaped long-run average cost curve. The U-shape of the long-run average cost curve implies that up to a point increasing returns to scale occur and after it diminishing returns to scale are obtained.

In case a firm is still working under increasing returns to scale, then if all factors are paid equal to their marginal products, the total factor rewards would exceed the total product. On the other hand, if a firm is working under diminishing returns to scale, and if all factors are paid equal to their marginal products the total factor rewards would not fully exhaust the total product and will therefore leave a surplus. It follows that Euler's Theorem does not apply and therefore the adding-up problem does not hold good when either there is increasing returns to scale or decreasing returns to scale.

Another drawback pointed out in Wicksteed's solution is that when there are constant returns to scale, the long -run average cost curve of the firm is a horizontal straight line which is incompatible with perfect competition. (Under horizontal long-run average cost curve, the firm cannot have a determinate equilibrium position). But perfect competition

was essential to the marginal productivity theory and therefore to Wicksteed's solution. Thus Wicksteed solution leads us to two contradictory things.

Wicksell, Walras and Barone's Solution of Production Exhaustion Problem:

After Wicksteed, Wicksell, Walras and Barone, each independently, advanced more satisfactory solution to the problem that marginally determined factor rewards would just exhaust the total product. These authors assumed that the typical production function was not homogeneous of the first degree, but was such that yielded U-shaped long-run average cost curve.

They pointed out that in the long-run under perfect competition the firm was in equilibrium at the minimum point of the long-run average cost curve. At the minimum point of the long-run average cost curve, the returns to sc ale are momentarily constant, that is, returns to scale are constant within the range of small variations of output.

Thus the condition required for the marginally determined rewards to exhaust the total product, that is the operation of constant returns to scale, was fulfilled at the minimum point of the long-run average cost curve, where a perfectly competitive firm is in long-run equilibrium. Thus in the case of perfectly long-run equilibrium, Euler Theorem can be applied and if the factors are paid rewards equal to their marginal products, the total product would be just exactly exhausted.

Hicks-Samuelson's Solution to the Product Exhaustion Problem:

After Wicksell, Walras and Barone, J.R. Hicks and P. A. Samuelson provided more satisfactory- solution to the problem of product exhaustion problem. The basic point to note in their solution is that it is the market conditions of perfect competition with its important feature of zero economic profits in the long run and not the first degree-homogeneous production function that ensures that if factors are paid rewards equal to their marginal products, total value product would be just exhausted.

In a perfectly competitive market structure, firms make neither economic profit nor make losses. Thus the solution of product exhaustion problem in case of the firms working in competitive factor markets where factors are paid equal to their marginal products, the existence of perfect competition in the product markets will ensure zero economic profits in the long run. Consider Figure 32.15 where a perfectly competitive firm is in long- run equilibrium at the minimum point of the long-run average cost curve LAC producing level of output OQ at price OP.

The total value product produced by the firm in this long-run equilibrium is equal to the area OPEQ. Since price OP is equal to average cost (AC) at this long-run equilibrium output with zero pure profits, total value product (PQ) will be equal to the total cost (TC). Thus

In long-run competitive equilibrium:

Total Value Product (P.Q.) = w.L+K.r. …(1)

Now marginal productivity theory of distribution requires that

$w = VMP_L = P.MPP_L$ …(2)

$r = VMP_K = P. MPP_K$ …(3)

Where w and r are prices of labour and capital respectively and MPP_L and MPP_K are marginal physical products of labour and capital respectively and P is the price of the product.

Substituting the values of w and r into equation (1) we have

$P.Q = L. (P. MPP_L) + K. (P. MPP_K)$

Dividing both sides by P we have

$Q = L.MPP_L + K. MPP_K$

That is, if labour and capital are paid equal to their marginal physical products, total output will be just exhausted.

It is important to note that in contrast to the solutions of Wicksteed and of Wicksell, Walras and Barone, the solution furnished by Hicks and Samuelson proves the product exhaustion theorem without assuming constant returns to scale (i.e. first-degree-homogeneous production function) and without using Euler theorem. They prove it by just assuming conditions of perfect market structure.

The merit of the Hicks-Samuleson solution is that it highlights when conditions of perfect competitive market do not hold, that is, when there is either monopoly or imperfect competition in the product market or monopsony or imperfect competition in the factor market, the hired factors do not get rewards equal to the value of their marginal products and are therefore exploited by the entrepreneurs who may enjoy large economic profits.