Course: Introduction to Microeconomics (801)
Semester: Spring, 2022

ASSIGNMENT No. 1

Q.1 Discuss the scope and methodology of microeconomics.

The scope or the subject matter of microeconomics is concerned with:

Commodity pricing

The price of an individual commodity is determined by the market forces of demand and supply. Microeconomics is concerned with demand analysis i.e. individual consumer behavior, and supply analysis i.e. individual producer behavior.

Factor pricing theory

Microeconomics helps in determining the factor prices for land, labor, capital, and entrepreneurship in the form of rent, wage, interest, and profit respectively. Land, labor, capital, and entrepreneurship are the factors that contribute to the production process.

Significance of Microeconomics in Business Decision Making

Microeconomics plays a vital role in assisting the business firms and business decision makers. Some of the major functions of microeconomics in business decision making are listed below:

Optimum utilization of resources

The study of microeconomics helps the decision makers to analyze and determine how the productive resources are allocated for various goods and services. It also helps in solving the producers' dilemma of what to produce, how much to produce and for whom to produce.

Demand analysis

With the help of microeconomic analysis, business firms can forecast their level of demand within the certain time interval. The demand for a commodity fluctuates depending upon various factors affecting it. Thus, business firms and decision makers can determine the level of demand for the commodity.

Cost analysis

Microeconomic theories explain various conditions of cost like fixed cost, variable cost, average cost, and marginal cost. Along with this, it also provides an analysis of the short run and long run costs that help the business decision makers determine the cost of production and other related costs, so they can implement policies to cut down cost and increase their level of profit.

Free Market Economy

Microeconomics explains the operating of a free market economy where, an individual producer has the freedom to take economic decisions like what to produce, how to produce, or for whom to produce. Allocation of resources is determined by price or market mechanism i.e. interaction between demand and supply

Production decision optimization

Microeconomics deals with different production techniques that help to find out the optimal production decision which helps the decision makers to determine the factors needed in order to produce a certain product or a range of products.

Pricing policy

Microeconomic analysis provides business managers with a thorough knowledge of theories of production and pricing in order to ensure optimum profit for the firm in the long run.

Microeconomics helps in analyzing market mechanisms i.e. determinants of demand and supply which are responsible for the determining prices of commodities in the market. Along with this, it provides an insight on theories relating to prices of a factor of rent, wage, interest, and profit.

Basis of Managerial Economics

Microeconomics used for the study of a business unit, but not the economy as a whole is known as managerial economics. The various tools used in microeconomics like cost and price determination, at an individual level becomes the foundation of managerial economics.

Basis of Welfare Economics

Microeconomics is not only concerned with analyzing economic condition but also with the maximization of social welfare. It studies how given resources are utilized to gain maximum benefit under various market conditions like monopoly, oligopoly, etc. Analysis of production efficiency, consumption efficiency, and overall economic efficiency are conducted on the basis of microeconomics.

Formulation of Public Economic Policies

Microeconomics tools are useful for introducing policies relating to tax, tariff, debt, subsidy, etc. it helps the governmental bodies to fixate on the tax rate, types of tax, and the amount of tax to be charged to buyers and sellers.

Helpful in Foreign Trade

Microeconomics is useful in explaining and determining the rate of foreign exchange between currencies, fixing international trade and tariff rules, defining the cause of disequilibrium in the balance of payment (BOP), and formulating policies to minimize it.

Microeconomics is the study of what is likely to happen (tendencies) when individuals make choices in response to changes in incentives, prices, resources, and/or methods of production. Individual actors are often grouped into microeconomic subgroups, such as buyers, sellers, and business owners. These groups create the supply and demand for resources, using money and interest rates as a pricing mechanism for coordination. Microeconomics can be applied in a positive or normative sense. Positive microeconomics describes economic behavior and explains what to expect if certain conditions change. If a manufacturer raises the prices of cars, positive microeconomics says consumers will tend to buy fewer than before. If a major copper mine collapses in South America, the price of copper will tend to increase, because supply is restricted. Positive microeconomics could help an investor see why Apple Inc. stock prices might fall if consumers buy fewer iPhones. Microeconomics could also explain why a higher minimum wage might force The Wendy's Company to hire fewer workers.

Q.2 Explain the main characteristics of indifference curves and their justifications.

The indifference curves have a number of attributes and interesting properties which have come to be known as characteristic features or properties of indifference curves. The following are some of the important features.

1. Indifference curves slop downward to the right

This is an important and obvious feature of indifference curves. The sloping down indifference curve indicates that when the amount of one commodity in the combination is increased, the amount of the other commodity is reduced. This must be so if the level of satisfaction is to remain constant on the same indifference curve.

Let us consider the logical inferences or conclusions if the indifference curve does not slope downwards from left to right.

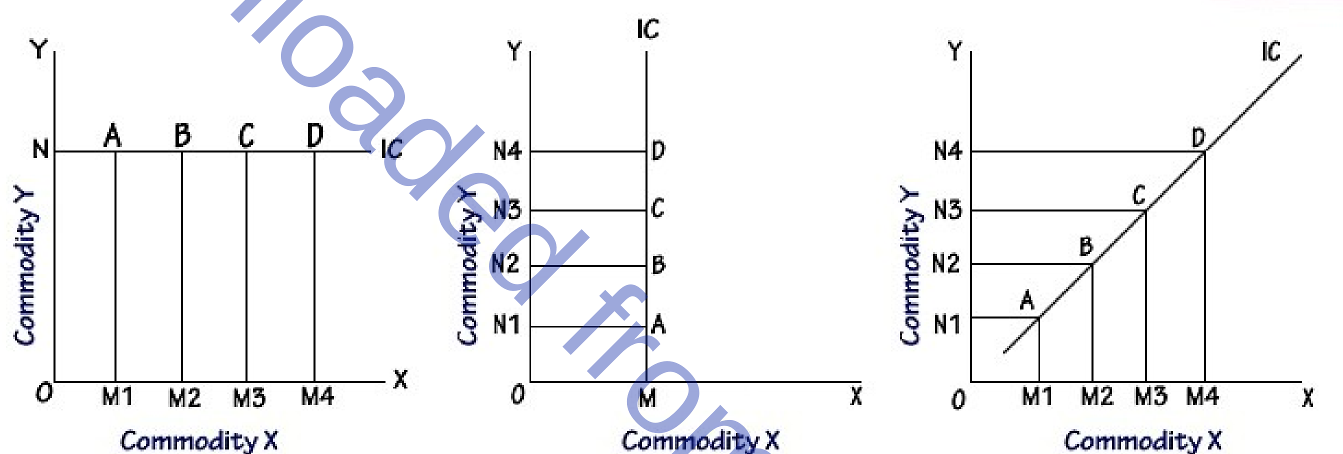

Figure 1

Characteristics of Indifference Curves (with diagram)

Characteristics of Indifference Curves

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Let us consider the logical inferences or conclusions if the indifference curve does not slope downwards from left to right. If it not like that, it should be either parallel to X axis or vertical or it should be an upward sloping curve as shown in the Figure 1.

If the indifference curve is horizontal to X axis, the various points on the curve A,B,C,D denoting various combinations of x commodity and y commodity may not have equal significance. At point B, the consumer gets more of x than at point A and at point C, the consumer gets still more of x while the quantity of y remains constant.

As the consumer moves along the indifference curve he is getting a fixed quantity of y but increasing quantities of x. So the consumer cannot be indifferent, as having rational behavior, he would prefer D more than C, C more than B and B more than A and the level of satisfaction is not the same. Each succeeding combination is better than the previous one. Therefore an indifference curve cannot be horizontal since different combinations on the curve differ in significance.

Similarly, an indifference curve cannot be vertical as shown in the figure, as in point D, the consumer gets more of y commodity than at point C, B or A while the x commodity remains constant; so the consumer cannot be indifferent to various combinations as they denote different satisfactions.

In the upward sloping curve too, the different points on the curve differ in significance because as he moves from point A to B, he gets more of x and more of y commodities. So, he cannot be indifferent to the combinations. Similarly point C is better than point B and D is better than point C as the combinations differ giving the consumer greater satisfaction.

Only in a downward sloping curve the loss in one is compensated by the gain in another commodity so that the different points on the curve will be of equal significance and satisfaction to the consumer and he may be indifferent to the various combinations. So, a horizontal or vertical or sloping up curve is not possible.

2. Every indifference curve to the right represents a higher level of satisfaction

Every indifference curve to the right of the preceding curve indicates higher level of satisfaction and the curve to the left shows lesser satisfaction. This means that the indifference curve at a higher level from the axes shows greater satisfaction than an indifference curve at a lower level. In the indifference curve IC1 at point P the consumer is having OM quantity of Bananas and ON quantity of Biscuits. At point Q in the IC2, the consumer though having the same quantity of Biscuits, the quantity of Bananas has increased from OM to OM1, i.e., at point Q the consumer gets larger quantities than at point P and naturally position Q is preferred by the consumer than position P as in the former he gets larger satisfaction due to larger commodities.

An indifference curve on the right is preferred than the indifference curve on the left. The consumer will always try to move up in the indifference map so that he can occupy as much as possible the topmost curve, as higher curves give larger satisfaction in the difference map.

3. Indifference curves cannot intersect each other

The indifference curves never cut each other as higher and lower curves show different levels of satisfaction. Suppose two indifferent curves cut each other at point K as shown in Figure 3. This means that points K and T which are on the same indifference curve IC2 show equal satisfaction; similarly points K and S which are on the same indifference curve IC1 show equal satisfaction.

K = T, K = S, therefore, S = T

Since K is common to both the curves, points S and T show equal satisfaction. But this is contrary to our earlier assumption that points on a higher indifference curve show greater satisfaction than points on lower indifference curves. In order, therefore, to be consistent with our assumptions; different indifference curves would not cut each other.

4. Indifference curve will not touch the axis

Another characteristic feature of indifference curve is that it will not touch the X axis or Y axis. This is born out of our assumption that the consumer is considering different combinations of two commodities.

If an indifference curve touches the Y axis at a point P as shown in the figure, it means that the consumer is satisfied with OP units of y commodity and zero units of x commodity. This is contrary to our assumption that the consumer wants both commodities although in a smaller or larger quantities. Therefore the indifference curve will not touch either the X axis or Y axis.

But as a special case it will touch the Y axis at point A if the combination is between Money and Commodity as shown in the Figure 4. It would then mean that the consumer either wants various combinations of money and commodity or only OA units of money which gives him command over commodity X. At point B in the figure the consumer has OM units of commodity X and OA1 units of money and this gives him the same satisfaction of having only OA units of money which means command over x and other commodities.

5. Indifference curves are convex to the origin

The very important feature of the indifference curves is that they are convex to the origin and they cannot be concave to the origin. A normal indifference curve will be convex to the origin and it cannot be concave. Only convex curves will lend to the principles of Diminishing Marginal Rate of substitution. In the case of concave curve, it will lead to increasing marginal rate of substitution which is impossible.

In order to understand this more clearly we have to study the exact purport and significance in passing from one point to another on an indifference curve which is convex to the origin.

In the Figure 5, the indifference curve is convex to the origin. The consumer passes from point A to B on the same curve to remain in the same level of satisfaction. While moving from A to B the consumer gives up YY1 or AC units of Y commodity in order to obtain XX1 units of X commodities, i.e., CB units of X.

Q.3 Differentiate between homogeneous and non-homogeneous production function. Also show graphically returns to scale for homogeneous production function.

A function is said to be homogeneous of degree n if the multiplication of all the independent variables by the same constant, say λ, results in the multiplication of the dependent variable by λ^n. Thus, the function

$Y = X^2 + Z^2$

is homogeneous of degree 2 since

$(\lambda X)^2 + (\lambda Z)^2 = \lambda^2 (X^2 + Y^2) = \lambda^2 Y$

A function which is homogeneous of degree 1 is said to be linearly homogeneous, or to display linear homogeneity. A production function which is homogeneous of degree 1 displays constant returns to scale since a doubling all inputs will lead to an exact doubling of output. So, this type of production function exhibits constant returns to scale over the entire range of output. In general, if the production function Q = f (K, L) is linearly homogeneous, then

$F(\lambda K, \lambda L) = \lambda f(K, L) = \lambda Q$

for any combination of labour and capital and for all values of λ. If λ equals 3, then a tripling of the inputs will lead to a tripling of output.

There are various examples of linearly homogeneous functions.

Two such examples are the following:

$Q = aK + bL$

and $Q = A K^{\alpha} L^{1-\alpha}$ $0 < \alpha < 1$

The second example is known as the Cobb-Douglas production function. To see that it is, indeed, homogeneous of degree one, suppose that the firm initially produces Q_0 with inputs K_0 and L_0 and then doubles its employment of capital and labour.

The resulting output would equal:

$$Q = A(2K_0)^{\alpha}(2L_0)^{1-\alpha}$$
$$= 2^{\alpha} 2^{\alpha-1} A K_0^{\alpha} L_0^{1-\alpha}$$
$$= 2Q_0 \text{ since } Q_0 = AK_0^{\alpha} L_0^{1-\alpha}$$

This shows that the Cobb-Douglas production function is linearly homogeneous.

Properties:

There are various interesting properties of linearly homogeneous production functions. First, we can express the function, Q = f (K,L) in either of two alternative forms.

(1) Q = Kg (L/K) or,

(2) Q = Lh (K/L)

This property is often used to show that marginal products of labour and capital are functions of only the capital-labour ratio.

$MP_k = g(L/K) - (L/K)\, g'(L/K)$

and $MP_L = g'(L/K)$

where g' (L, K) denotes the derivative of g (L/K). The significance of this is that the marginal products of the inputs do not change with proportionate increases in both inputs. Since the marginal rate of technical substitution equals the ratio of the marginal products, this means that the MRTS does not change along a ray through the origin, which has a constant capital- labour ratio. Since the MRTS is the slope of the isoquant, a linearly homogeneous production function generates isoquants that are parallel along a ray through the origin.

If a firm employs a linearly homogeneous production function, its expansion path will be a straight line. To verify this point, let us start from an initial point of cost minimisation in Fig.12, with an output of 10 units and an employment (usage) of 10 units of labour and 5 units of capital. Now, suppose, the firm wants to expand its output to 15 units. Since input prices do not change, the slope of the new isoquant must be equal to the slope of the original one. Production functions may take many specific forms. Typically economists and researchers work with homogeneous production function. A function is said to be homogeneous of degree n if the multiplication of all of the independent variables by the same constant, say λ, results in the multiplication of the independent variable by λ^n. Thus, the function:

$Q = K^2 + L^2$

is homogeneous of degree 2 since

$(\lambda K)^2 + (\lambda L)^2 = \lambda^2 (K^2 + L^2) = \lambda^2 Q$

A function which is homogeneous of degree 1 is said to be linearly homogeneous, or to display linear homogeneity. A production function which is homogeneous of degree 1 displays constant returns to scale since a doubling all inputs will lead to a doubling of output.

A production function is homogeneous of degree n if when inputs are multiplied by some constant, say, α, the resulting output is a multiple of a^2 times the original output.

$Q = f(K, L)$

then if and only if

$Q = f(\alpha K, \alpha L) = \alpha^n f(K, L)$

is the function homogeneous. The exponent, n, denotes the degree of homogeneity. If n=1 the production function is said to be homogeneous of degree one or linearly homogeneous (this does not mean that the equation is linear). A linearly homogeneous production function is of interest because it exhibits CRS.

This is easily seen since the expression α^n. f(K, L) when n=1 reduces to α. (K, L) so that multiplying inputs by a constant simply increases output by the same proportion. Examples of linearly homogeneous production functions are the Cobb-Douglas production function and the constant elasticity of substitution (CES) production function.

Q.4 There is a smooth isoquant and an isoquant with kinks, which one is better approximation to a real production function and why?

An isoquant curve is a concave-shaped line on a graph, used in the study of microeconomics, that charts all the factors, or inputs, that produce a specified level of output. This graph is used as a metric for the influence that the inputs—most commonly, capital and labor—have on the obtainable level of output or production.

The isoquant curve assists companies and businesses in making adjustments to inputs to maximize production, and thus profits.

The term "isoquant," broken down in Latin, means “equal quantity,” with “iso” meaning equal and “quant” meaning quantity. Essentially, the curve represents a consistent amount of output. The isoquant is known, alternatively, as an equal product curve or a production indifference curve. It may also be called an iso-product curve.

Most typically, an isoquant shows combinations of capital and labor, and the technological tradeoff between the two—how much capital would be required to replace a unit of labor at a certain production point to generate the same output. Labor is often placed along the X-axis of the isoquant graph, and capital along the Y-axis.

Due to the law of diminishing returns—the economic theory that predicts that after some optimal level of production capacity is reached, adding other factors will actually result in smaller increases in output—an isoquant curve usually has a concave shape. The exact slope of the isoquant curve on the graph shows the rate at which a given input, either labor or capital, can be substituted for the other while keeping the same output level.

For example, in the graph below, Factor K represents capital, and Factor L stands for labor. The curve shows that when a firm moves down from point (a) to point (b) and it uses one additional unit of labor, the firm can give up four units of capital (K) and yet remain on the same isoquant at point (b). If the firm hires another unit of labor and moves from point (b) to (c), the firm can reduce its use of capital (K) by three units but remain on the same isoquant.

The isoquant curve is in a sense the flip side of another microeconomic measure, the indifference curve. The mapping of the isoquant curve addresses cost-minimization problems for producers—the best way to manufacture goods. The indifference curve, on the other hand, measures the optimal ways consumers use goods. It attempts to analyze consumer behavior, and map out consumer demand.

When plotted on a graph, an indifference curve shows a combination of two goods (one on the Y-axis, the other on the X-axis) that give a consumer equal satisfaction and equal utility, or use. This makes the consumer "indifferent"—not in the sense of being bored by them, but in the sense of not having a preference between them.

The Properties of an Isoquant Curve

Property 1: An isoquant curve slopes downward, or is negatively sloped. This means that the same level of production only occurs when increasing units of input are offset with lesser units of another input factor. This property falls in line with the principle of the Marginal Rate of Technical Substitution (MRTS). As an example, the same level of output could be achieved by a company when capital inputs increase, but labor inputs decrease.

Property 2: An isoquant curve, because of the MRTS effect, is convex to its origin. This indicates that factors of production may be substituted with one another. The increase in one factor, however, must still be used in conjunction with the decrease of another input factor.

Property 3: Isoquant curves cannot be tangent or intersect one another. Curves that intersect are incorrect and produce results that are invalid, as a common factor combination on each of the curves will reveal the same level of output, which is not possible.

Property 4: Isoquant curves in the upper portions of the chart yield higher outputs. This is because, at a higher curve, factors of production are more heavily employed. Either more capital or more labor input factors result in a greater level of production.

Property 5: An isoquant curve should not touch the X or Y axis on the graph. If it does, the rate of technical substitution is void, as it will indicate that one factor is responsible for producing the given level of output without the involvement of any other input factors.

Property 6: Isoquant curves do not have to be parallel to one another; the rate of technical substitution between factors may have variations.

Property 7: Isoquant curves are oval-shaped, allowing firms to determine the most efficient factors of production.

Q.5 With the help of expansion path derive long run total cost curve.

The long run is different from the short run in the variability of factor inputs. Accordingly, long-run cost curves are different from short-run cost curves. This lesson introduces you to Long run Total, Marginal and Average costs.

The long run refers to that time period for a firm where it can vary all the factors of production. Thus, the long run consists of variable inputs only, and the concept of fixed inputs does not arise. The firm can increase the size of the plant in the long run. Thus, you can well imagine no difference between long-run variable cost and long-run total cost, since fixed costs do not exist in the long run.

Long Run Total Costs

Long run total cost refers to the minimum cost of production. It is the least cost of producing a given level of output. Thus, it can be less than or equal to the short run average costs at different levels of output but never greater.

In graphically deriving the LTC curve, the minimum points of the STC curves at different levels of output are joined. The locus of all these points gives us the LTC curve.

Long Run Average Cost Curve

Long run average cost (LAC) can be defined as the average of the LTC curve or the cost per unit of output in the long run. It can be calculated by the division of LTC by the quantity of output. Graphically, LAC can be derived from the Short run Average Cost (SAC) curves.

While the SAC curves correspond to a particular plant since the plant is fixed in the short-run, the LAC curve depicts the scope for expansion of plant by minimizing cost.

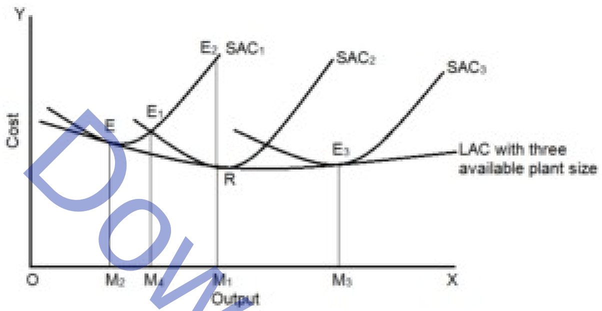
Derivation of the LAC Curve

Note in the figure, that each SAC curve corresponds to a particular plant size. This size is fixed but what can vary is the variable input in the short-run. In the long run, the firm will select that plant size which can minimize costs for a given level of output.

You can see that till the OM_1 level of output it is logical for the firm to operate at the plat size represented by SAC_2. If the firm operates at the cost represented by SAC_2 when producing an output level OM_2, the cost would be more.

So in the long run, the firm will produce till OM_1 on SAC_2. However, till an output level represented by OM_3, the firm can produce at SAC_2, after which it is profitable to produce at SAC_3 if the firm wishes to minimize costs.

Figure 1



(Source: test.blogspot)

Thus, the choice, in the long run, is to produce at that plant size that can minimize costs. Graphically, this gives us a LAC curve that joins the minimum points of all possible SAC curves, as shown in the figure. Thus, the LAC curve is also called an envelope curve or planning curve. The curve first falls, reaches a minimum and then rises, giving it a U-shape.

We can use returns to scale to explain the shape of the LAC curve. Returns to scale depict the change in output with respect to a change in inputs. During Increasing Returns to Scale (IRS), the output doubles by using less than double inputs. As a result, LTC increases less than the rise in output and LAC will fall.

- In Constant Returns to Scale (CRS), the output doubles by doubling the inputs and the LTC increases proportionately with the rise in output. Thus, LAC remains constant.
- In Decreasing Returns to Scale (DRS), the output doubles by using more than double the inputs so the LTC increases more than proportionately to the rise in output. Thus, LAC also rises. This gives LAC its U-shape.

Long Run Marginal Cost

Long run marginal cost is defined at the additional cost of producing an extra unit of the output in the long-run i.e. when all inputs are variable. The LMC curve is derived by the points of tangency between LAC and SAC.

Note an important relation between LMC and SAC here. When LMC lies below LAC, LAC is falling, while when LMC is above LAC, LAC is rising. At the point where LMC = LAC, LAC is constant and minimum.