GOVERNMENT COLLEGE FOR WOMEN

(AUTONOMOUS)

KUMBAKONAM

DEPARTMENT OF ECONOMICS

M.A. ECONOMICS – Ist Year

MICRO ECONOMIC ANALYSIS - 1

Sub Code : P18ECC101

Course Teacher : **Dr. A.Jayakodi**

Assistant Professor of Economics

Mail Id : jayakodi1973@gmail.com

Cell : 9486564189

Semester – I

Hours – 6

Dr. A.JAYAKODI, Assistant Professor of Economics
GCWK

Core Course – I Credit – 5

MICRO ECONOMIC ANALYSIS -1

Objectives

1. To equip the students with micro economic theories with graphic illustrations.
2. To develop the skills of analysis and application of the principles to real world problems.

Module-I Modern Utility Analysis

Introduction — The Bernoulli Hypothesis —The Nell-Mann-Morgenstern methods of Measuring Utility- The Friedman — Savage Hypothesis - Markowitz Hypothesis —Critical appraisal of Modern Utility analysis.

Module-II Demand Analysis

Theory of Demand —Revealed Preference Theory of Demand-Superiority of Revealed Preference Theory-defects of the revealed preference theory-Hicks revision of demand theory Bandwagon, Snob and Veblen effects in demand theory.

Module-Ill Theory of Production and Cost

Production function —Traditional and modem theory of costs; production function, the Cob-Douglass production function, the CES production function Vs production process, ISO Quant —ISO cost Curves —Least Cost Combination of factors or producer equilibrium.

Module-IV Market Structure

Perfect and Imperfect competition-Price and Output determination under Perfect Competition-Monopoly- Behavioral Theories of Firm: Oligopoly, Duopoly, Monopsony and Bi-lateral Monopoly.

Module-V Profit Maximization and Pricing Theories

Introduction —Profit Maximization Theory- Baumol's Sales maximization model, Williamson's model of managerial discretion, Marris model of growth maximization; Theories of Cost: Full Cost Pricing — Marginal Cost Pricing.

MICRO ECONOMIC ANALYSIS- 1

Module- I

Modern Utility Analysis

DEFINITION OF 'MICROECONOMICS'

Definition: Microeconomics is the study of individuals, households and firms' behavior in decision making and allocation of resources. It generally applies to markets of goods and services and deals with individual and economic issues.

Description: Microeconomic study deals with what choices people make, what factors influence their choices and how their decisions affect the goods markets by affecting the price, the supply and demand.

Microeconomics involves several key principles including (but not limited to):

- Demand, Supply, and Equilibrium: Prices are determined by the theory of supply and demand. Under this theory, suppliers offer the same price demanded by consumers in a perfectly competitive market. This creates economic equilibrium.
- Production Theory: This principle is the study of how goods and services are created or manufactured.
- Costs of Production: According to this theory, the price of goods or services is determined by the cost of the resources used during production.
- Incentives and behaviors: How people, as individuals or in firms, react to the situations with which they are confronted.
- Utility theory: Consumers will choose to purchase and consume a combination of goods that will maximize their happiness or "utility," subject to the constraint of how much income they have available to spend.
- Price theory: Utility and production theory interact to produce the theory of supply and demand, which determine prices in a competitive market. In a perfectly competitive market, it concludes that the price demanded by consumers is the same supplied by producers. That results in economic equilibrium.

Understanding Microeconomics

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.

Theory of Consumer Choice under Risk in Economics | Managerial Economics

Contents:

1. The Bernoulli Hypothesis
2. The Neumann-Morgenstern Method of Measuring Utility
3. The Friedman-Savage Hypothesis
4. The Markowitz Hypothesis
5. Critical Appraisal of Modern Utility Analysis

The modern utility analysis is the outcome of the failure of the indifference curve technique to explain consumer behaviour among risky or uncertain choices. The traditional utility analysis is also concerned with consumer behaviour among riskless choices. Such choices are certain, based as they are on the principle of diminishing marginal utility and on the proportionality rule.

The consumer is certain about his income, tastes and the goods he purchases and maximizes his satisfaction by choosing that combination which gives him the highest total utility. But in reality, many goods and services involve risk or uncertainty, such as investments in shares of stock, insurance and gambling.

It was Neumann and Morgenstem who in their Theory of Games and Economic Behaviour studied the behaviour of an individual in risky situations. Their theory was refined by Friedman and Savage and by Markowitz. The solution to the problem of risky situations was

provided by Daniel Bernoulli who tried to solve St. Petersburg Paradox. We explain these different views on choices involving risk or uncertainty.

THE BERNOULLI HYPOTHESIS:

The neo-classical theory assumes that the consumer is a rational being who does not indulge in gambling or even in fair bet with 50-50 odds. The reason why people were unwilling to stake even at fair bets was provided by Daniel Bernoulli, the 18th century Swiss mathematician.

Staying in St. Petersburg in 1732 for some time, Bernoulli found that Russians were unwilling to make bets even at better than 50- 50 odds knowing fully that their mathematical expectations of winning money in a particular kind of gamble were greater the more money they bet. This contradiction is known as St. Petersburg Paradox. To explain it, Bernoulli composed the following game.

A coin is tossed and a payment is made to the player, depending upon which toss of the com first comes up 'heads'. If heads occurs on the first toss, the player receives £ 2 and the game stops. If it comes up in the second throw, £22 = £4 is paid and the game stops. If heads appears for the first time after n tosses, £2n is paid to the player. How much would a rational person be willing to pay to take part in this game? Or, what is the expected monetary value of the pay-off to such a game? The expected monetary value of the game is infinite. The probability that heads will occur on the first toss of the coin is 1/2. The probability of obtaining heads for the first time on the nth toss is (1/2)n. Since there is no finite number of throws within which guarantee can be given that a head will occur, the expected pay-off of the game or the expected monetary value of the game,

$$EMV = (_{1/2})2 + (_{1/2})^2 2^2 + (_{1/2})^3 2^3 + \ldots\ldots\ldots\ldots + (_{1/2})^{n.2n}$$

cc

$$= \Sigma^{\infty}_{n=1} (_{1/2})^n 2^n = 1 + 1 + 1 + \ldots + 1 \ldots$$

= infinity.

As the EMV is infinity, a person whose objective is to maximise expected monetary value would be willing to pay everything he has to play the game. Bernoulli resolved the St. Petersburg Paradox by suggesting that the reason why people would not be prepared to pay their entire income to play such a game is that the marginal utility of money diminishes as income rises.

A person who stakes Rs. 100 at even odds of winning or losing Rs. 10 will not play the game if he is a rational being. For if he wins, he will have Rs. 110, which are equal to the gain of utility from Rs. 10 won added to Rs. 100. If he loses, he will have Rs. 90 which is equal to the loss of utility from Rs. 10 lost subtracted from Rs. 100.

Though the monetary gain or loss is equal, the loss in utility is greater than the gain in utility in this game. Thus in Bernoulli's view, rational decisions in the case of risky choices would be made on the basis of expectations of total utility rather than the mathematical expectations of monetary value. This is illustrated in Figure 1.

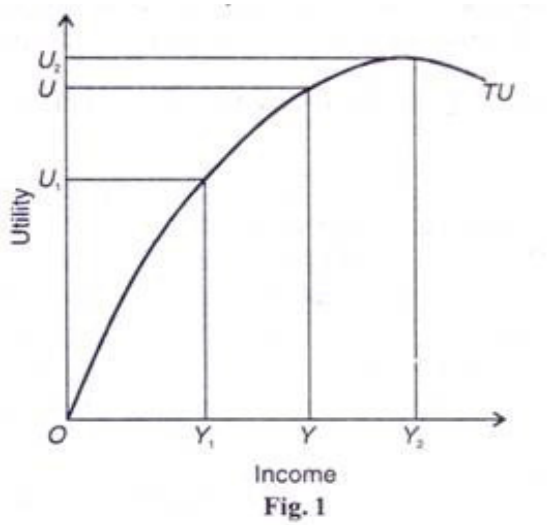


Fig. 1

Where TU is the total utility curve which becomes less and less steep at higher levels of income, indicating diminishing marginal utility of income. Suppose the person is at the income level OY (Rs. 100 in our example) which gives him utility OU. He is considering whether or not to accept a fair bet with a 50-50 probability of either increasing his income to OY2 (Rs. 110) or reducing it to OY1 (Rs. 90) by an equal amount.

He will consider its effect on his utility. If his income increases to OY2 his utility rises to OU2 and if his income decreases to OY1his utility falls to OU1. As is clear from the figure, the loss in utility by UU1 is greater than the gain in utility by UU2 .The loss or gain in total utility refers to marginal utility. Since the expectation of loss in utility is greater than the gain in utility, this person will not accept a fair bet.

Bernoulli's solution to the St. Petersburg Paradox in terms of expected utility instead of expected monetary value of the game led Neumann and Morgenstem to construct their utility index under risky choices.

THE NEUMANN-MORGENSTERN METHOD OF MEASURING UTILITY:

J. Von Neumann and O. Morgenstem in their book Theory' of Games and Economic Behaviour evolved the method of cardinal measurement of expected utility from risky choices which are found in gambling, lottery tickets, etc. For this, they constructed a utility index which is called the N-M utility index.

Assumptions:

The N-M utility index is based on the following assumptions:

1) The individual behaves in risky situations in order to maximise expected utility.
2) His choices are transitive: if he prefers A prize (win) to B prize and B to C, then he prefers A to C.
3) There is probability P which lies between 0 and 1 (0< P< 1) such that the individual is indifferent between prize A which is certain and the lottery tickets offering prizes C and B with probability P and 1 – P respectively.
4) If two lottery tickets offer the same prizes, the individual prefers the lottery ticket with the higher probability of winning.
5) The individual can completely order probability combinations of uncertain choices.
6) Uncertainty or risk does not possess utility or disutility of its own.

The N-M Utility Index:

Neumann and Morgenstern have suggested the following method of measuring the utility index. "Consider three events, C, A, B, for which the order of individual's preferences is the one stated. Let a be a real number between 0 and 1, such that A is exactly equally desirable with the combined event consisting of a change of probability 1- a for B and the remaining chance of probability a for C. Then we suggest the use of a as a numerical estimate for the ratio of the preference of A over B to that of C over B.

Their formula becomes A=B (1- a + aC). Substituting P for a probability, we have A = B (1 -P) + P.C.

Given the assumptions, it is possible to derive a cardinal utility index based on the above formula.

Suppose there are the three events (lotteries) C, A, B. Out of these, event (lottery) A is certain, C has probability P, and B probability (1-P), and if their respective utilities are U_a ,U_b and U_c then $U_a = PU_c$ (1-P)U_b

Since the consumer is expected to maximize utility, the utility of A with certainty must be equal to some value P, the expected utility of the events (lotteries) C and B.

In order to construct a utility index based on the N-M equation, we have to assign utility values C and B. These utility values are arbitrary except for the fact that higher value should be assigned to a preferred event (lottery). Suppose we assign the following arbitrary utility values: Uc = 100 utils, Ub =0 util, and P= 4/5 or 0.8, then

U_a = (4/5) 100 + (1-4/5) (0)

= 80 + (1/5) (0) = 80

Thus the utility index in this situation is

Situation U_a U_b U_c

1 80 0 100

Proceeding this way, one can derive utility values for Ua, Ub, Uc, etc. and construct a complete N-M utility index for all possible combinations starting from two arbitrary situations involving probabilities of risk.

It's Appraisal:

The N-M utility index provides conceptual measurement of cardinal utility under risky choices. It is meant to be used for making predictions about two or more alternatives relating to gambling, lottery tickets, etc. and out of them which one a person may prefer.

The N-M index is based on the expected values of utilities. It provides a method to measure cardinally the marginal utility of money. But it does not refer to whether the marginal utility of money diminishes or increases. In this sense, this method of measuring utility is incomplete.

But the N-M cardinal utility is different from the neo-classical cardinal utility. It is not like measures of length or weight. Nor does it measure the intensity of introspective satisfaction or pleasure from goods and services, as is the case with the neo-classical utility'. The N-M method of measuring utility analyses the actions of a person making risky choices.

Despite the fact that there is arbitrariness in computing the N-M utility index, it is measurable upto a linear transformation. It does not involve additively but permits ordinal measurement of relative preferences of risky choices.

THE FRIEDMAN-SAVAGE HYPOTHESIS:

The Neumann-Morgenstern method is based on the expected values of utilities and therefore, does not refer to whether the marginal utility of money diminishes or increases. In this respect, this method of measuring utility is incomplete. When a person gets an insurance policy, he pays to escape or avoid risk. But when he buys a lottery ticket, he gets a small chance of a large gain.

Thus he assumes risk. Some people indulge both in buying insurance and gambling and thus they both avoid and choose risks. Why'? The answer has been provided by the Freedman-Savage Hypothesis as an extension of the N-M method.

It states that marginal utility of money diminishes for incomes below some level, it increases for incomes between that level and some higher level of income, and again diminishes for all incomes above that higher level. This is illustrated in Figure 2 in terms of the total utility curve TU where utility is plotted on the vertical axis and income on the horizontal axis.

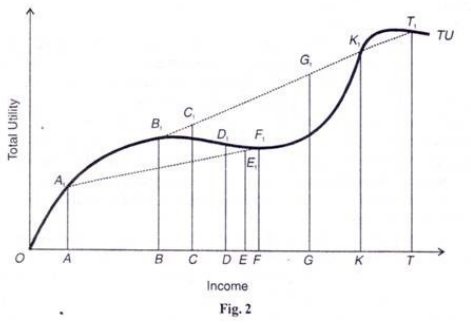


Fig. 2

Suppose a person buys insurance for his house against the small chance of a heavy loss from fire and also buys a lottery ticket which offers a small chance of a large win. Such a conflicting behaviour of a person who buys insurance and also gambles has been shown by Friedman and Savage with a total utility curve. Such a curve first rises at a diminishing rate so that the marginal utility of money declines and then it rises at an increasing rate so that the marginal utility of income increases.

The curve TU in the figure first rises facing downward up to point F1and then facing upward up to point K1 .Suppose the person's income from his house is OF with FF1 utility without a fire. Now he buys insurance to avoid risk from a fire. If the house is burnt down by fire, his income is reduced to OA with AA utility. By joining points A1 and F1, we get utility points between these two uncertain income situations. If the probability of no fire is P, then the expected income of this person on the basis of the N-M utility index is

$$Y = P\,(OF) + (1 - P)\,(OA).$$

Let the expected income (Y) of the person be OE, then its utility is EE1 on the dashed line At Fr Now assume that the cost of insurance, (insurance premium) is FD. Thus the person's assured income with insurance is OD (= OF-FD) which gives him greater utility DD1 than EE1from expected income OE with probability of no fire. Therefore, the person will buy insurance to avoid risk and have the assured income OD by paying FD premium in case his house is burnt down by fire.

With OD income left with the person after buying insurance of the house against fire, he decides to purchase a lottery ticket which costs DB. If he does not win, his income would fall to OB with utility BB_1. If he wins, his income would increase to OK with utility KK_1 Thus his expected income with probability P' of not winning the lottery is

$$Y_1 = P'(OB) + (1 - P') (OK)$$

Let the expected income F, of the person be OC, then its utility is CC1 on the dashed line B1K1which gives him greater utility (CC1) by purchasing the lottery ticket than DD1 if he had not bought it. Thus the person will also buy the ticket along with insurance for the house against fire.

Let us take OG expected income in the rising portion F1K1 of the TU curve when the marginal utility of income is increasing. In this case, the utility of buying the lottery ticket is GG1which is greater than DD1 if he were not to buy the lottery. Thus he will stake his money on the lottery.

In the last stage when the expected income of the person is more than OK in the region K1T1of the TU curve, the marginal utility of income is declining and consequently, he is not willing to undertake risks in buying lottery tickets or in other risky investments except at favorable odds. This region explains St. Petersburg Paradox.

Friedman and Savage believe that the TU curve describes the attitudes of people towards risks in different socio-economic groups. However, they recognise many differences between persons even in the same socio-economic group. Some are habitual gamblers while others avoid risks. Still, Friedman and Savage believe that the curve describes the propensities of the main groups.

According to them, people in the middle income group with increasing marginal utility of income are those who are willing to take risks to improve their lot. If they succeed in their efforts in having more money by taking risks, they lift themselves up into the next higher socio-economic group. They do not want just more consumer goods. Rather, they want to rise in the social scale and to change their patterns of life. That is why, the marginal utility of income increases for them.

THE MARKOWITZ HYPOTHESIS:

Prof. Markowitz found the Friedman-Savage hypothesis contrary to common observations. According to him, it is not correct to say that the poor and the rich are unwilling to gamble and take risks except at favourable odds. Rather, both purchase lotteries and gamble on horse races. They also play the games at casinos and gamble alike in the stock market.

Thus Friedman and Savage failed to observe the actual behaviour of the poor and the rich because they assume that the marginal utility of income depends on the absolute level of income. Markowitz has modified it by relating the marginal utility of income to changes in the level of present income.

According to Markowitz, when income increases by a small increment, it leads to increasing marginal utility of income. But large increases in income lead to diminishing marginal utility of income. That is why at higher levels of income people are reluctant to indulge in gambling even at fair bets and people in slowly rising income groups indulge in gambling to improve their position.

On the other hand, when there are small decreases in income, the marginal utility of income rises. But large decreases in income lead to diminishing marginal utility of income. That is why people insure against small losses but indulge in gambling where large losses are involved.

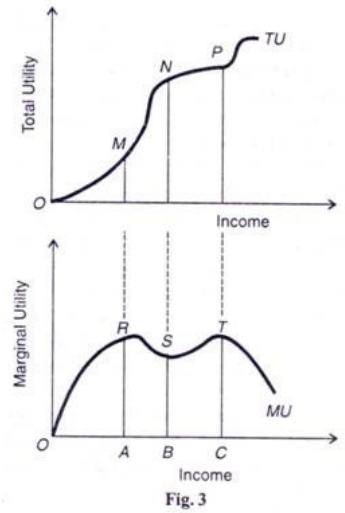


Fig. 3

This is called the Markowitz hypothesis which is explained in Figure 3 where Markowitz takes three inflexion points M, N and P in the upper portion of the diagram with present income at the middle point N on the TU curve of income.

The marginal utility of income curve MU is derived in the lower portion of the diagram where the present income level is OB. With a small increase in the income of a person from OB to OC, the marginal utility of income increases from point S to T on the MU curve. But large increases in income beyond OC lead to diminishing marginal utility of income from point T onwards along the MU curve.

On the other hand, small decreases in income from OB to O A lead to increasing marginal utility of income from S to R on the MU curve. But large decreases in income to the left of A lead to diminishing marginal utility of income from point R towards O along the MU curve.

The Markowitz hypothesis is an improvement over the Friedman-Savage hypothesis. Instead of the absolute level of income, it takes the present level of income of a person. It suggests that a person's behaviour towards insurance and gambling is the same whether he is poor or rich. The emphasis is on small or large increases or decreases in the present income of a person that determines his behaviour towards insurance and gambling.

Critical Appraisal of Modern Utility Analysis:

In the modem utility analysis of risk or uncertainty, the Neumann and Morgenstem hypothesis implies measurable utility up to a linear transformation thereby reintroducing diminishing or increasing marginal utility. The Friedman-Savage hypothesis contains an added element.

It attempts to explain the shape of the curve of total utility of income. These hypotheses are thus attempts to rehabilitate the measurement of utility. But the N-M theory of risky choices along with its variants like the Friedman- Savage hypothesis and Markowitz hypothesis ate still a subject of controversy on two counts; firstly, from the practical standpoint, and secondly, whether it is a cardinal or an ordinal method.

Firstly, it is doubtful if risk is measurable when Neumann and Morgenstem assume that the risk does not possess any utility or disutility of its own, they ignore the pleasures or pains of uncertainty- bearing. Secondly, in the majority of individual choices the element of uncertainty is very little. Thirdly, individual choices are of an infinite variety. Guaranteed that they are uncertain, it is possible to measure them with the N-M method? Lastly, it does not measure the 'strength of feelings' of individuals towards goods and services under uncertain choices.

The question whether the N-M method measures utility cardinally or ordinally, there is great confusion among economists. Robertson in his Utility and All That uses it in the cardinal sense, while Profs. Baumol, Fellner and others are of the view that the ranking of utility makes it ordinal. According to Baumol, the N-M theory has nothing in common with the neo-classical theory regarding cardinality.

In the neo-classical theory the word "cardinal" is used to denote introspective absolute marginal measurement of utility while in this theory it is used operationally. In the N-M theory, utility numbers are assigned to lottery tickets according to a person's ranking of the prizes and the prediction is made numerically as to which of the two tickets will be chosen. Though the N-M formula is used to derive the utility index, yet it says nothing about diminishing marginal utility. Thus the N-M utility is not the neoclassical cardinal utility.

The refinements made by Friedman-Savage and Markowitz have tendered to drop the neo-classical assumption that the marginal utility of income diminishes for all ranges of income. Thus the theory of measurement of utility under risky choices is superior to the neo-classical introspective cardinalism of certain choices.

Economists like Dorfman, Samuelson and Solow have derived the Paretian indices of utility from the N-M formula. And when the N-M index based on individual ranking is constructed, it conveys information about his preferences. Baumol uses further the N-M measurement in the ordinal sense when he equates the N-M marginal utility with the marginal rate of substitution. He writes: "The N-M marginal utility X of ends up as no more than the marginal rate of substitution between and the probability of winning the pre-specified prize (E) of the standard lottery ticket. This is surely not cardinal measurement in the classical sense.

Module- II

DEMAND ANALYSIS

Definition

The Demand Analysis is a process whereby the management makes decisions with respect to the production, cost allocation, advertising, inventory holding, pricing, etc. Although, how much a firm produces depends on its production capacity but how much it must endeavor to produce depends on the potential demand for its product.

The demand shows the relationship between two economic variables, the price of the product and the quantity of product that a consumer is willing to buy for a given period of time, other things being equal.

Features/Characteristics of Demand

The following are the main features or characteristics of demand that the marketer must keep in mind while analyzing the demand for its product:

- The demand is the specific quantity that a consumer is willing to purchase. Thus, it is expressed in numbers.
- The demand must mean the demand per unit of time, per month, per week, per day.
- The demand is always at a price, e. any change in the price of a commodity will bring about a certain change in its quantity demanded.
- The demand is always in a market, a place where a set of buyers and sellers meet. The market needs not to be a geographical area.

Law of Demand

Definition: The Law of Demand asserts that there is an inverse relationship between the price, and the quantity demanded, such as when the price increases the demand for the commodity decreases and when the price decreases the demand for the commodity increases, other things remaining unchanged.

In the definition, the "other things" are the factors that influence the demand such as consumer's income, price of related goods, consumer's tastes and preferences, advertisement, etc. The law of demand can be further illustrated by the Demand Schedule and the Demand Curve.

Its Assumptions:

(1) The consumer's tastes do not change.

(2) His choice for a combination reveals his preference for that.

(3) The consumer chooses only one combination at a given price-income line, i.e., any change in relative prices will always lead to some change in what he purchases.

(4) He prefers a combination of more goods to less in any situation.

(5) The consumer's choice is based on strong ordering.

(6) It assumes consistency of consumer behaviour. If A is preferred to B in one situation, B cannot be preferred to A in the other situation. This is the two-term consistency, according to Hicks which must satisfy two conditions on a straight line curve: (a) If A is left to B, B must be right of A. (b) If A is right of B, B must be left of A.

(7) This theory is based on the assumption of transitivity. Transitivity, however, refers to three-term consistency. If A is preferred to B, and B to C, then the consumer must prefer A to C. This assumption is necessary for the revealed preference theory if the consumer is to make a consistent choice from given alternative situations.

(8) Income elasticity of demand is positive i.e., more commodity is demanded when income increases, and less when income falls.

Fundamental Theorem or Demand Theorem:

Given these assumptions, Samuelson states his "Fundamental Theorem of Consumption Theory," also known as demand theorem, thus: "Any good that is known always to increase in demand when money income alone rises must definitely shrink in demand when its price alone rises." It means that when income elasticity of demand is positive, price elasticity of demand is negative. This can be shown both in the case of a rise and a fall in the price of a good.

Rise in Price:

First, we take a rise in the price of, say, good X. To prove this Fundamental Theorem, let us divide it into two stages. Firstly, take a consumer who spends his entire income on two goods X and Y. LM is his original price-income line where the consumer is observed to have chosen the combination represented by R in Figure 14.2. The triangle OLM is the consumer's area of choice for the different combinations of V and Y available to him, as given by his price-income line LM. By choosing only the combination R. the consumer is revealed to have preferred this combination to all others in or on the triangle OLM.

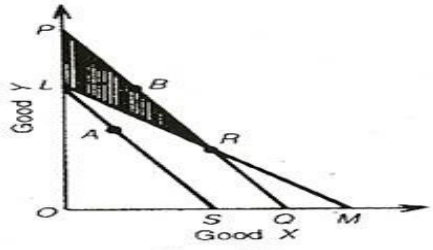


Figure 14.2

Suppose the price of X rises, the price of Y remaining constant so that the new price-income line is LS. Now he chooses a new combination, say, point A which shows that the consumer will buy less of A than before as the price of A" has risen. In order to compensate the consumer for the loss in his real income as a result of rise in the price of X, let us give him LP amount of money in terms of good Y As a result, PQ becomes his new price-income line which is parallel to the LS line and passes through point R. Prof. Samuelson calls it Over Compensation Effect. Mow the triangle 0P0 becomes his area of choice. Since R was revealed preferred to any other point on the original price-income line LM, all points lying below R on the RQ segment of PO line will be inconsistent with consumer behaviour.

This is because he cannot have more of X when its price has risen. The consumer will, therefore, reject all combinations below R and choose either combination R or ay other combination, say, B in the shaded area LRP on the segment PR of the price-income line PQ. If he chooses the combination R, he will buy the same quantities of X and Y which he was buying before the rise in the price of X. On the other hand, if he chooses the combination B, he will buy less of X and more of Y than before.

In the second stage, if the packet of extra money LP given to the consumer is taken back, he will be to the left of R at point A on the price-income line LS where he will buy less of X, if the income elasticity of demand for X is positive. Since with the rise in the price of X, its demand has fallen (when the consumer is at point A), it is proved when income elasticity is positive, price elasticity is negative.

With the rise in the price of X, the consumer buys less of X. So price elasticity of demands negative because price and demand move in the opposite directions. But with the rise in the price of X, the real income of the consumer falls and buys less of X. Therefore, his income elasticity of demand is positive because both income and demand move in the same direction.

Fall in Price:

The demand theorem can also be proved when the price of good X falls. It can be defined thus: "Any good (simple or composite) that is known always to decrease demand when money income alone falls must definitely expand in demand when its price alone falls." This is explained in Figure 14.3. LM is the original price-income line on which the consumer reveals his preference at point R. With the fall in the price of X, the price of Y remaining constant, his new price-income line is LS. The consumer reveals his preference on this line at, say, combination A which shows that he buys more of X than before. The movement from point R to A is the price effect as a result of fall in the price of X which has led to increase in its demand.

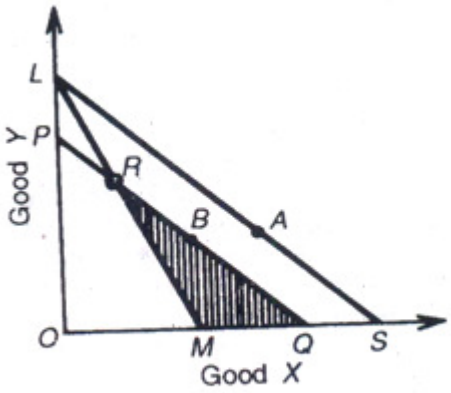


Figure 14.3

Suppose the increase in the real income of the consumer as a result of fall in the price of X is taken away from him in the form of LP quantity of Y. Now PQ becomes his new price-income line which is parallel to LS and passes through R. The new triangle OPQ becomes his

area of choice. Since the consumer was revealing his preference at point R on the line LM, all points lying above R on the segment RP of line PQ will be inconsistent with his choice.

This is because on the RP segment he will have less of good X when its price has fallen. But this is not possible. The consumer will, therefore, reject all combinations above R. He will either choose combination R or any other combination, say, B on the segment RQ of the line PQ in the shaded area MRQ. If he chooses the combination R, he will buy the same quantities of X and Y which he was buying before the fall in the price of X. And if he chooses the combination B, he will buy more of X and less of Y than before. The movement from R to B is the substitution effect of a fall in the price of X.

If the money taken from the consumer in the form of LP is returned to him, he will be at the old combination A on the price-income line LS where he will buy more of X with the fall in its price. The movement from B to A is the income effect. So the demand theorem is again proved that positive income elasticity means negative price elasticity of demand.

It is to be noted that Samuelson's explanation of the substitution effect is different from that of the indifference curve analysis. In the case of indifference curve analysis, the consumer moves from one combination to another on the same indifference curve and his real income remains constant. But in the revealed preference theory, indifference curves are not assumed and the substitution effect is a movement along the price-income line arising from changing relative prices.

REVEALED PREFERENCE

For a long time, consumer behavior, most notably consumer choice, had been understood through the concept of utility. In economics, utility refers to how much satisfaction or pleasure consumers get from the purchase of a product, service, or experienced event.

Samuelson's "Revealed Preference Theory," which posited that consumer behavior was not based on utility, but on observable behavior that relied on a small number of relatively uncontested assumptions.

Revealed preference is an economic theory regarding an individual's consumption patterns, which asserts that the best way to measure consumer preferences is to observe their purchasing behavior. Revealed preference theory works on the assumption that consumers are rational. In other words, they will have considered a set of alternatives before making a purchasing decision that is best for them. Thus, given that a consumer chooses one option out of the set, this option must be the preferred option.

Revealed Preference Theory of Demand

Prof. Samuelson's theory of demand is based on the revealed preference axiom or hypothesis which states that choice reveals preference. Keeping this fact into view, a consumer buys a combination of two goods either because he likes this combination in relation to others or this is cheaper than others. Suppose the consumer buys combination A rather than combination B. C or D. It means that he reveals his preference for combination A. He can do this for two reasons. First, combination A may be cheaper than the other combinations B, C, D. Seconds combination A may be dearer than others and even then he likes it more than other combinations. In such a situation, it can be said that A is revealed preferred to B, C, D or B, C, D are revealed inferior to A. This is explained in Figure 14.1.

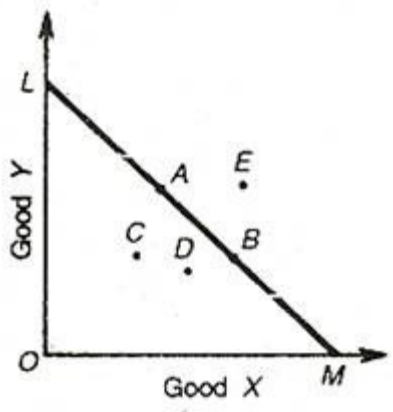


Figure 14.1

Given the income and prices of the two goods X and Y. LM is the price-income line of the consumer. The triangle OLM is the area of choice for the consumer which shows the various combinations of X and Y on the given price- income situation LM. In other words, the consumer can choose any combination between A and B on the line LM or between C and D below this line.

If he chooses A, it is revealed preferred to B. Combinations C and D are revealed inferior to A because they are below the price-income line LM. But combination E is beyond the reach of the consumer being dearer for him because it lies above his price-income line LM. Therefore, A is revealed preferred to other combinations within and on the triangle OLM.

Superiority of Revealed Preference Theory:

The revealed preference approach is superior to the Hicksian ordinal utility approach to consumer behavior.

(1) It does not involve any psychological introspective information about the behaviour of the consumer. Rather, it presents a behaviouristic analysis based on observed consumer behaviour in the market. This approach has helped, according to Samuelson, to divest the theory of demand of the "last vestiges" of the psychological analysis. Thus the revealed preference hypothesis is more realistic, objective and scientific than the earlier demand theorems.

(2) It avoids the "continuity" assumption of the utility and indifference curve approaches. An indifference curve is a continuous curve on which the consumer can have any combination of the two goods. Samuelson believes that there is discontinuity because the consumer can have only one combination.

(3) The Hicksian demand analysis is based on the assumption that the consumer always behaves rationally to maximise his satisfaction from a given income. Samuelson's demand theorem is superior because it completely dispenses with the assumption that the consumer always maximises his satisfaction, and makes no use of the dubious hypothesis like the Law of Diminishing Marginal Utility of the Marshallian analysis or the Law of Diminishing Marginal Rate of Substitution of the Hicksian approach.

(4) In the first stage of Samuelson's demand theorem the 'over compensation effect' is more realistic as an explanation of consumer behaviour than the Hicksian substitution effect. It permits the consumer to shift to a higher price-income situation in case of rise in the price of X and vice versa. Thus it is an improvement over Hicks' substitution effect. Similarly, the second stage of the Samuelsonian Theorem explains the Hicksian 'income effect in a

much simpler way. Hicks himself admits the superiority of Samuelson's theory when he writes that as a clear alternative to the indifference technique its presentation is the newest and important contribution of Samuelson to the theory of demand.

(5) This theory provides the basis for welfare economics in terms of observable behaviour based on consistent choice.

Defects of the Revealed Preference Theory:

There are, however, certain weaknesses in Samuelson's revealed preference theory.

1. **Neglects Indifference:**

It neglects "indifference" in the consumer behaviour altogether. It is, of course, true that the consumer does not reveal his indifference in a single-valued demand function in or on the budget line when he chooses a particular set of goods at point R on the budget line LM. But it is possible that there are points like A and B on every side of a given point R, shown within the circle in Figure 14.4, towards which the consumer is indifferent. If this criticism by Armstrong is accepted, then Samuelson's fundamental theorem breaks down. Suppose the price of X rises.

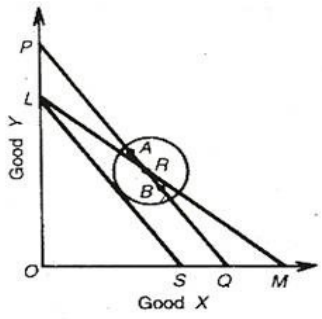


Figure 14.4

As a result, his new budget line is LS. Now give the consumer some extra money to enable him to buy the same combination R on the line PQ. In this new price- income situation, suppose he chooses point B below R towards which he is indifferent. This is based on Armstrong's assumption that the consumer is indifferent between points around the chosen point.

But the choice of B on the PQ line means that the consumer buys more of X when its price has risen.

This breaks down the Samuelson theorem because with the rise in the price of X, its demand has expanded instead of shrinking.

2. **Not Possible to Separate Substitution Effect:**

Samuelson's Fundamental Theorem is conditional and not universal. It is based on the postulate that positive income elasticities imply negative price elasticities. Since the price effect consists of the income and substitution effects, it is not possible to isolate the substitution effect from the income effect on the level of observation. If the income effect is not positive, price elasticity of demand is indeterminate. On the other hand, if the income elasticity of demand is positive, the substitution effect following a change in price cannot be established. Thus, the substitution effect cannot be distinguished from the income effect in the Samuelsonian Theorem.

3. **Excludes Giffen Paradox:**

Samuelson's revealed preference hypothesis excludes the study of the Giffen Paradox, for it considers only positive income elasticity of demand. Like the Marshallian Law of Demand, the Samuelsonian Theorem fails to distinguish between negative income effect of a Giffen good combined with a weak substitution effect and a negative income effect with a powerful substitution effect. Samuelson's Fundamental Theorem is, therefore, inferior to and less integrated than the Hicksian price effect which provides an all inclusive explanation of the income effect, the substitution effect and of Giffen's Paradox.

4. **Consumer does not choose only one Combination:**

The assumption that the consumer chooses only one combination on a given price-income situation is incorrect. It implies that the consumer chooses something of everything of both the goods. But it is seldom that anybody purchases something of everything.

5. **Choice does not reveal Preference:**

The assumption that "choice reveals preference" has also been criticised. Choice always does not reveal preference. Choice requires rational consumer behaviour. Since a consumer does not act rationally at all times, his choice of a particular set of goods may not reveal his preference for that. Thus the theorem is not based on observed consumer behaviour in the market.

6. Fails to derive Market Demand Curve:

The revealed preference approach is applicable only to an individual consumer. Negatively inclined demand curves can be drawn for each consumer with the help of this approach by assuming 'other things remaining the same.' But this technique fails to help in drawing market demand schedules.

7. Not Valid for Game Theory:

According to Tapas Majumdar, the revealed preferences hypothesis "is invalid for situations where the individual choosers are known to be capable of employing strategies of a game theory type."

8. Fails in Risky or Uncertain Situations:

The revealed preference theory fails to analysis consumer's behaviour in choices involving risk or uncertainty. If there are three situations, A, B, and C, the consumer prefers A to B and C to A. Out of these, A is certain but chances of occurring B or C are 50-50. In such a situation, the consumer's preference for C over A cannot be said to be based on his observed market behaviour.

HICK'S LOGICAL THEORY OF DEMAND:

Preference Hypothesis and Logic of Ordering

In order to explain the behaviour of an ideal consumer Prof. Hicks assumes preference hypothesis as a principle which governs the behaviour of such a consumer.The assumption of behavior according to a scale of preferences is known as preference hypothesis.

Hicks explains the meaning of preference hypothesis or behaviour according to the scale of preference as follows:

"The ideal consumer (who is not affected by anything else than current market conditions) chooses that alternative out of the various alternatives open to him, which he most prefers, or ranks most highly. In one set of market conditions he makes one choice, in others other choices; but the choices he makes always express the same ordering, and must, therefore,

be consistent with one another. This is the hypothesis made about the behaviour of the ideal consumer."

The above statement of Hicks implies that the consumer in a given market situation chooses the most preferred combination and he will choose different combinations in different market situations but his choices in different market situations will be consistent with each other.

It is important to remember that Hicks' demand theory presented in Value and Capital' was also based upon the preference hypothesis but there he expressed the given scale of preferences at once in the form of a set of indifference curves. This direct introduction of geometrical device has, as already noted above, various disadvantages and has, therefore, been given up. In 'Revision of Demand Theory Hicks begins from the logic of ordering itself rather than starting from the geometrical application of it.

According to him, "the demand theory which is based upon the preference hypothesis turns out to be nothing else but an economic application of the logical theory of ordering." Therefore, before deriving demand theory from preference hypothesis he explains the "logic of order". In this context he draws out difference between strong ordering and weak ordering. He then proceeds to base his demand theory on weak-ordering form of preference hypothesis.

Strong and Weak Orderings Distinguished:

A set of items is strongly ordered, if each item has a place of its own in the order and each item could then be given a number and to each number there would be one item and only one item which would correspond. A set of items is weakly ordered if the items are clustered into groups but none of the items within a group can be put ahead of the others. "A weak ordering consists of a division into groups, in which sequence of groups is strongly ordered, but in which there is no ordering within the groups."

It should be noted that indifference curves imply weak ordering in as much as all the points on a given indifference curve are equally desirable and hence occupy same place in the order. On the other hand, revealed preference approach implies strong ordering since it assumes that the choice of a combination reveals consumer's preference for it over all other alternative

combinations open to him. Choice can reveal preference for a combination only if all the alternative combinations are strongly ordered.

Weak ordering implies that the consumer chooses a position and rejects others open to him, then the rejected positions need not be inferior to the position actually chosen but may have been indifferent to it. Hence, under weak ordering, actual choice fails to reveal definite preference. The strong ordering and weak-ordering as applied to the theory of demand are illustrated in Fig. 13.1.

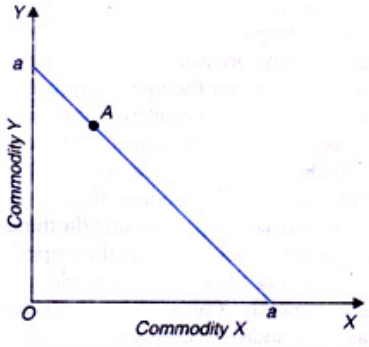


Fig. 13.1. *Strong Ordering : Choice reveals preference.*

If the consumer is confronted with the price-income situation aa, then he can choose any combination that lies in or on triangle aOa. Suppose that our consumer chooses the combination A. Let us assume that our consumer is an ideal consumer who is acting according to his scale of preferences. Now, the question is how his act of choice of A from among the available alternatives within and on the triangle aOa is to be interpreted.

If the available alternatives are strongly ordered, then the choice of A by the consumer will show that he prefers A over all other available alternatives. In Samuelson's language he 'reveals his preference' for A over all other possible alternatives which are rejected. Since, under strong ordering, the consumer shows definite preference for the selected alternative, there is no question of any indifferent positions to the selected one.

Hicks' Criticism of the Logic of Strong Ordering:

Hicks criticises the logic of strong ordering. "If we interpret the preference hypothesis to mean strong ordering, we cannot assume that all the geometrical points, which lie within or on

the triangle aOa represent effective alternatives. A two-dimensional continuum point cannot be strongly ordered."

Prof. Hicks further says that if commodities are assumed to be available only in discrete units, so that the diagram is to be conceived as being drawn on squared paper and the only effective alternatives are the points at the corners of squares and therefore the selected point must also lie at the corner of a square, then the strong ordering hypothesis is acceptable.

Since in the real world, commodities are available in discrete units, therefore the strong ordering hypothesis should not present any difficulty. But Hicks contends that the actual commodities may be available in integral number of units but this cannot be said of the composite commodity money, which is usually measured on the V-axis.

Hicks regard money to be finally divisible. To quote him:

"If everyone of the actual commodities into which M can be exchanged is itself only available in discrete units; but if the number of such commodities is large, there will be a large number of ways in which a small increment of M can be consumed by rearrangement of consumption among the individual commodities, whence it will follow that the units in which M is to be taken to be available must be considered as exceedingly small.

And as soon as any individual commodity becomes available in units that are finally divisible, M must be regarded as finally divisible. In practice, we should usually think of M as being money, held back for the purchase of other commodities than X; though money is not finally divisible in a mathematical sense, the smallest monetary unit (farthing or cent) is so small in relation to the other units with which we are concerned that the imperfect divisibility of money is in practice a thing of no importance.

For these reasons, while it is a theoretical improvement to be able to regard the actual commodity X as available in discrete units it is no improvement at all to be obliged to impute same indivisibility to the composite commodity M. It is much better to regard money as finally divisible.

So, according to Hicks, where the choice is between any good which is available in discrete units and money which is finally divisible, the possibility of equally desired combinations must be accepted and strong ordering has, therefore, to be given up. Why the strong ordering hypothesis is not valid when the choice is between money which is finally divisible and is represented on the Y-axis and the commodity X which is imperfectly divisible and is represented on the X-axis is illustrated in Fig. 13.2.

This is because when money measured on Y-axis is taken to be finally divisible, the effective alternatives will no longer be represented by square corners, they will appear in the diagram as a series of parallel lines (or stripes) as shown in Fig. 13.2. All points on the stripes will be effective alternatives but such alternatives cannot be strongly ordered "unless the whole of one stripe was preferred to the whole of the next stripe, and so on; which means that the consumer would always prefer an additional unit of X whatever he had to pay for it." But this is quite absurd.

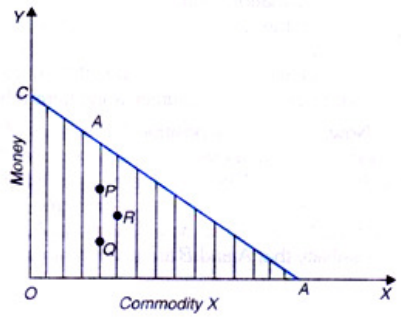


Fig. 13.2. *Strong ordering cannot be maintained when one commodity is money*

Thus, the effective alternatives appearing on the stripes cannot be strongly ordered. Again, suppose there are two alternatives P and Q on a given stripe which are such that P is preferred to R on another stripe, while R is preferred to Q. Given that, we can always find a point between P and Q on a given stripe which is indifferent to R.

It is thus evident that when various alternatives appear as a series of stripes, there can be a relation of indifference between some of them. Thus strong ordering cannot be maintained when various alternative combinations consist of the composite commodity money which is finally divisible and actual commodity which is available only in discrete units. "As soon as we introduce the smallest degree of continuity (such as is introduced by the 'striped' hypothesis) strong ordering has to be given up."

The Logic of Weak Ordering:

After rejecting the strong ordering hypothesis. Hicks proceeds to establish the case for the adoption of the weak ordering hypothesis. As noted above, the weak ordering hypothesis recognizes the relation of indifference, while the strong ordering hypothesis does not. In the words of Hicks, "If the consumer's scale of preferences is weakly ordered, then his choice of a particular position A does not show (or reveal) that A is preferred to any rejected position within or on the triangle: all that is shown is that there is no rejected position which is preferred to A. It is perfectly possible that some rejected position may be indifferent to A; the choice of A instead of that rejected position is then a matter of 'chance'.

From the above statement of Hicks it is clear that, under the weak ordering hypothesis, the choice of a particular combination does not indicate preference for that particular combination over another possible alternative combination but it only shows that all other possible alternative combinations within or on the choice triangle cannot be preferred to the chosen combination.

There is possibility of some rejected combinations being indifferent to the selected one. If preference hypothesis in its weak ordering form is adopted, then it yields so little information about the consumer's behavior that the basic propositions of demand theory- cannot be derived from it.

Therefore, Hicks has felt it necessary to introduce an additional hypothesis along with the adoption of the weak ordering hypothesis so as to derive basic propositions of demand theory. This additional hypothesis which is introduced is simply that 'the consumer will always prefer a larger amount of money to a smaller amount of money, provided that the amount of good X at his disposal is unchanged.

It should be carefully noted that it is not necessary to make this additional hypothesis if strong ordering form of preference hypothesis is adopted. But this additional hypothesis which has been introduced by Hicks is very reasonable and is always implicit in economic analysis, even though it is not explicitly stated every time.

Now the question is what positive information is provided by weak ordering approach when supported by the above additional hypothesis. Let us consider Fig. 13.3. From all the available combinations within and on the triangle aOa the consumer chooses A. Under weak ordering hypothesis alone the choice of A rather than B which lies within the triangle aOa does

not show that A is preferred to B; it only shows that B is not preferred to A. In other words, under weak ordering alone, the choice of A rather than B means that either A is preferred to B, or the consumer is indifferent between A and B.

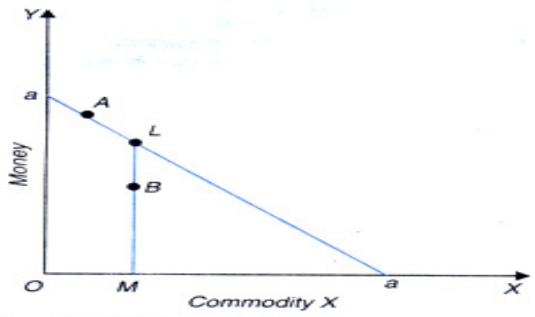


Fig. 13.3. Weak-ordering Approach along with an additional hypothesis about money

Now, consider the position L which lies where the stripe through B meets the line aa. On the additional hypothesis made, L is preferred to B, since L contains more amount of money than B, amount of X being the same in both the positions. If A and Bare indifferent, then from the transitivity it follows that L is preferred to A. But L was available when A was selected. Therefore, though L can be indifferent to A, it cannot be preferred to A.

Thus, it follows that the possibility that A and B are indifferent must be ruled out. Hence, when we adopt the weak ordering along with the additional hypothesis we come to the conclusion that the chosen combination A is preferred to any combination such as B which lies within the triangle. What cannot be said with certainty under weak ordering even with the additional hypothesis is whether the chosen combination A is preferred to a combination such as L which lies on the triangle, that is, on the line aa. A can be either preferred to L or indifferent to it.

Drawing the difference between the implications of strong and weak orderings. Hicks says. “The difference between the consequences of strong and weak ordering so interpreted amounts to no more than this: that under strong ordering the chosen position is shown to be preferred to all other positions within and on the triangle, while under weak ordering it is preferred to all positions within the triangle, but may be indifferent to other positions on the same boundary as itself.”

It will be evident from above that the difference between the effects of the strong and weak orderings is very small and that it only affects a class of limiting cases (i.e., positions lying on the triangle). The weak ordering theory, Hicks says, “has a larger tolerance and, therefore, it

deals with these limiting cases rather better". Apart from this, weak ordering hypothesis, contends Hicks, is more useful and desirable.

"If we take the strong ordering approach, we are committing ourselves to discontinuity not merely to the indivisibility of the particular commodity, demand for which is being studied, but also to the indivisibility of the composite commodity used as a background. If, on the other hand, we take the weak ordering approach, we are committing ourselves to some degree of continuity but divisibility of the background commodity is itself quite sufficient to ensure that the weak ordering approach is practicable."

As stated above, the weak ordering approach to be useful for demand theory requires an additional assumption to be made, namely, that the consumer prefers a larger amount of money to a smaller amount. Further, another assumption which is to be necessarily made when the weak ordering approach is adopted is that the preference order is transitive. These two additional assumptions are not required in the case of strong ordering approach.

BANDWAGON EFFECT

The bandwagon effect arises from psychological, sociological, and, to some extent, economic factors. People like to be on the winning team and they like to signal their social identity. Economically, some amount of bandwagon effect can make sense, in that it allows people to economize on the costs of gathering information by relying on the knowledge and opinions of others. The bandwagon effect permeates many aspects of life, from stock markets to clothing trends to sports fandom.

- The bandwagon effect is when people start doing something because everybody else seems to be doing it.
- The bandwagon effect can be attributed to psychological, social, and economic factors.
- The bandwagon effect originates in politics, where people vote for the candidate who appears to have the most support because they want to be part of the majority.

The bandwagon effect has wider implications outside of politics and buying behaviors. In social psychology, this tendency of people to align their beliefs and behaviors with those of a group is also called "herd mentality" or "groupthink."

The bandwagon effect refers to people's propensity to do something primarily because other people especially a lot of other people -- are doing it. This is regardless of whether what is being done aligns with their original beliefs.

The bandwagon effect has been shown to be so powerful that its effect has been observed in politics, public policy, and marketing. Studies have shown that the bandwagon effect influences people's willingness to not only use an item but to also pay more for it. Studies have also shown that the bandwagon effect influences people's choice of movies to watch, particularly in instances where they are uncertain of the quality of movies. Studies have also found that the bandwagon effect can strongly influence undecided voters to vote in favor of the person "expected to win."

Politics

In politics, the bandwagon effect might cause citizens to vote for the person who appears to have more popular support because they want to belong to the majority. The term "bandwagon" refers to a wagon that carries a band through a parade. During the 19th century, an entertainer named Dan Rice traveled the country campaigning for President Zachary Taylor. Rice's bandwagon was the centerpiece of his campaign events, and he encouraged those in the crowd to "jump on the bandwagon" and support Taylor. By the early 20th century, bandwagons were commonplace in political campaigns, and "jump on the bandwagon" had become a derogatory term used to describe the social phenomenon of wanting to be part of the majority, even when it means going against one's principles or beliefs.

Consumer Behavior

Consumers often economize on the cost of gathering information and evaluating the quality of consumer goods by relying on the opinions and purchasing behavior of other consumers. To some extent, this is a beneficial and useful tendency; if other people's preferences are similar, their consumption decisions are rational, and they have accurate information about the relative quality of available consumer goods, then it makes perfect sense to follow their lead and effectively outsource the cost of gathering information to someone else.

However, this kind of bandwagon effect can create a problem in that it gives every consumer an incentive to free ride on the information and preferences of other consumers. To the extent that it leads to a situation where information regarding consumer products might be under produced, or produced solely or mostly by marketers, it can be criticized.

VEBLEN EFFECT

Abnormal market behavior where consumers purchase the higher-priced goods whereas similar low-priced (but not identical) substitutes are available. It is caused either by the belief that higher price means higher quality, or by the desire for conspicuous consumption (to be seen as buying an expensive, prestige item).

Veblen good is a type of luxury good named after American economist Thorstein Veblen. It shows a positive relationship between price and demand, and thus an upward-sloping demand curve.

The demand for a Veblen good rises (drops) when its price increases (decreases). A Veblen good generally is considered a high-quality product and a status symbol. When the price gets higher, its status symbol makes the Veblen good more desirable to consumers with high social and economic standing. Some common examples of Veblen goods include luxury cars, wines, and fine jewelry.

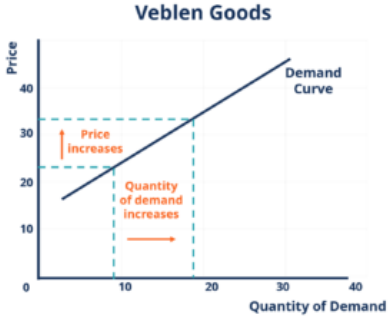
Summary

- Veblen goods are luxury goods and appeal as a high quality and status symbol.
- Veblen goods take on an upward-sloping demand curve, for which the quantity of demand increases (decreases) as the price increases (decreases).
- Veblen goods come with snob value status, a premium that consumers are willing to pay for the exclusive products that are different from the commonly preferred ones.

Veblen Good and the Law of Demand

Veblen good is an exclusion to the law of demand, which is a concept of microeconomics. It states that the price and quantity of demand for goods demonstrate an inverse relationship as a result of the substitute effect.

When the price of good increases, the quantity of demand decreases, and when the price drops, the quantity of demand increases. However, due to its specific features as a luxury, a Veblen good will see a higher demand when its price increases. The diagrams below show the two kinds of demand and price relationships for normal goods (which follow the law of demand) and Veblen goods (which violate the law of demand).



Besides Veblen goods, Giffen goods are another type of non-ordinary goods that are contrary to the law of demand. Unlike Veblen goods, Giffen goods are low-income, non-luxury products with few close substitutes.

It is more difficult to identify Giffen goods than Veblen goods. Giffen goods also assume an upward-sloping demand curve, but their demand is impacted by income pressures (income effect) and lack of close substitutes (substitution effect). Some examples of Giffen goods include rice, wheat, and bread, which are generally essential goods.

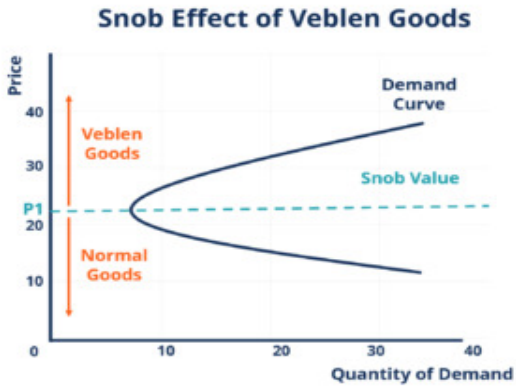
Veblen Good – Snob Effect

The abnormal demand for Veblen goods is influenced by the snob effect, a situation that consumers prefer to own exclusive products that are different from the commonly preferred ones. It leads to a higher demand for a product when its price increases.

If the price of the product decreases, its snob appeal diminishes, which makes it less desirable to wealthy consumers. Generally, the fewer items available in the market, the higher their snob values are. Veblen goods are a typical sort of product with snob value status.

The snob value of a product can be identified through its demand curve. Sometimes, a Veblen good can take on a downward-sloping demand curve and show the characteristics of normal goods at lower prices. When the price is above a certain level, the snob effect starts to play a role in turning the demand curve upward. The product turns into a Veblen good and starts to assume snob value.

In the diagram shown below, when the price is below P1, the product is just a normal good for which the customers are more willing to purchase when the price gets lower. When the price is high enough (above the level of P1), the product becomes a Veblen good, and the customers are more willing to pay higher prices for its exclusive nature and status symbol. The price that the customers are willing to pay above the price level of a normal good (P1) is the snob value of that product.



For example, smartphones are normal goods in general. Consumers are price-sensitive and more willing to buy the ones at lower prices. When the price of a smartphone, such as the Lamborghini or Vertu, is above a certain level, the phone becomes a Veblen good, and the demand is driven by the snob effect.

Module – III

THEORY OF PRODUCTION AND COST

Production Function: Meaning, Definitions and Features

Production is the result of co-operation of four factors of production viz., land, labour, capital and organization.

This is evident from the fact that no single commodity can be produced without the help of any one of these four factors of production.

Therefore, the producer combines all the four factors of production in a technical proportion. The aim of the producer is to maximize his profit. For this sake, he decides to maximize the production at minimum cost by means of the best combination of factors of production.

The producer secures the best combination by applying the principles of equi-marginal returns and substitution. According to the principle of equi-marginal returns, any producer can have maximum production only when the marginal returns of all the factors of production are equal to one another. For instance, when the marginal product of the land is equal to that of labour, capital and organisation, the production becomes maximum.

Meaning of Production Function:

In simple words, production function refers to the functional relationship between the quantity of a good produced (output) and factors of production (inputs).

"The production function is purely a technical relation which connects factor inputs and output." Prof. Koutsoyiannis

Defined production function as "the relation between a firm's physical production (output) and the material factors of production (inputs)." Prof. Watson

In this way, production function reflects how much output we can expect if we have so much of labour and so much of capital as well as of labour etc. In other words, we can say that

production function is an indicator of the physical relationship between the inputs and output of a firm.

The reason behind physical relationship is that money prices do not appear in it. However, here one thing that becomes most important to quote is that like demand function a production function is for a definite period.

It shows the flow of inputs resulting into a flow of output during some time. The production function of a firm depends on the state of technology. With every development in technology the production function of the firm undergoes a change.

The new production function brought about by developing technology displays same inputs and more output or the same output with lesser inputs. Sometimes a new production function of the firm may be adverse as it takes more inputs to produce the same output.

Mathematically, such a basic relationship between inputs and outputs may be expressed as:

$$Q = f(L, C, N)$$

Where Q = Quantity of output
L = Labour
C = Capital
N = Land.

Hence, the level of output (Q), depends on the quantities of different inputs (L, C, N) available to the firm. In the simplest case, where there are only two inputs, labour (L) and capital (C) and one output (Q), the production function becomes.

$$Q = f (L, C)$$

Definitions:

"The production function is a technical or engineering relation between input and output. As long as the natural laws of technology remain unchanged, the production function remains unchanged." Prof. L.R. Klein

"Production function is the relationship between inputs of productive services per unit of time and outputs of product per unit of time." Prof. George J. Stigler

"The relationship between inputs and outputs is summarized in what is called the production function. This is a technological relation showing for a given state of technological knowledge how much can be produced with given amounts of inputs." Prof. Richard J. Lipsey

Thus, from the above definitions, we can conclude that production function shows for a given state of technological knowledge, the relation between physical quantities of inputs and outputs achieved per period of time.

Features of Production Function:

Following are the main features of production function:

1. Substitutability:

The factors of production or inputs are substitutes of one another which make it possible to vary the total output by changing the quantity of one or a few inputs, while the quantities of all other inputs are held constant. It is the substitutability of the factors of production that gives rise to the laws of variable proportions.

2. Complementarity:

The factors of production are also complementary to one another, that is, the two or more inputs are to be used together as nothing will be produced if the quantity of either of the inputs used in the production process is zero.

The principles of returns to scale is another manifestation of complementarity of inputs as it reveals that the quantity of all inputs are to be increased simultaneously in order to attain a higher scale of total output.

3. Specificity:

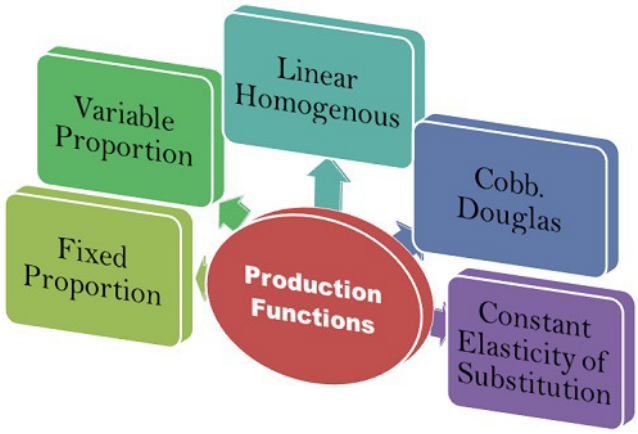
It reveals that the inputs are specific to the production of a particular product. Machines and equipment's, specialized workers and raw materials are a few examples of the specificity of factors of production. The specificity may not be complete as factors may be used for production of other commodities too. This reveals that in the production process none of the factors can be

ignored and in some cases ignorance to even slightest extent is not possible if the factors are perfectly specific.

Production involves time; hence, the way the inputs are combined is determined to a large extent by the time period under consideration. The greater the time period, the greater the freedom the producer has to vary the quantities of various inputs used in the production process.

In the production function, variation in total output by varying the quantities of all inputs is possible only in the long run whereas the variation in total output by varying the quantity of single input may be possible even in the short run.

It can be classified on the basis of the substitutability of the inputs by other inputs:



1. Fixed Proportion Production Function
2. Variable Proportion Production Function
3. Linear Homogeneous Production Function
4. Cobb. Douglas Production Function
5. Constant Elasticity of Substitution

1. Fixed Proportion Production Function

Definition: The Fixed Proportion Production Function, also known as a Leontief Production Function implies that fixed factors of production such as land, labor, raw materials are used to produce a fixed quantity of an output and these production factors cannot be substituted for the other factors.

In other words, fixed quantity of inputs is used to produce the fixed quantity of output. All the factors of production are fixed and cannot be substituted for one another.

2. Variable Proportion Production Function

Definition: The Variable Proportion Production Function implies that the ratio in which the factors of production such as labor and capital are used is not fixed, and it is variable. Also, the different combinations of factors can be used to produce the given quantity, thus, one factor can be substituted for the other.

"As the proportion of the factor in a combination of factors is increased after a point, first the marginal and then the average product of that factor will diminish." Benham

"An increase in some inputs relative to other fixed inputs will in a given state of technology cause output to increase, but after a point the extra output resulting from the same additions of extra inputs will become less and less." Samuelson

"The law of variable proportion states that if the inputs of one resource is increased by equal increment per unit of time while the inputs of other resources are held constant, total output will increase, but beyond some point the resulting output increases will become smaller and smaller." Leftwitch

Law of variable proportions is based on following assumptions:

(i) Constant Technology:

The state of technology is assumed to be given and constant. If there is an improvement in technology the production function will move upward.

(ii) Factor Proportions are Variable:

The law assumes that factor proportions are variable. If factors of production are to be combined in a fixed proportion, the law has no validity.

(iii) Homogeneous Factor Units:

The units of variable factor are homogeneous. Each unit is identical in quality and amount with every other unit.

(iv) Short-Run:

The law operates in the short-run when it is not possible to vary all factor inputs.

In the case of variable proportion production function, the technical Coefficient of production is variable, i.e. the required quantity of output can be achieved through the combination of different quantities of factors of production, such as these factors can be varied by substituting other factor/ factors in its place.

3. Linear Homogeneous Production Function

Definition: The Linear Homogeneous Production Function implies that with the proportionate change in all the factors of production, the output also increases in the same proportion. Such as, if the input factors are doubled the output also gets doubled. This is also known as constant returns to a scale. The production function is said to be homogeneous when the elasticity of substitution is equal to one.

When all the inputs are increased in the same proportion, the production function is said to be homogeneous. The degree of production function is equal to one. This is known as linear homogeneous production function. In order to estimate the production function, it is necessary to express the function in explicit functional form. Mathematically, this form of production function is expressed as

$$nQ = f(nL, nK)$$

This production function also implies constant returns to scale. That is if L and K are increased by n-fold, the output Q also increases by n-fold. This form of production function is a well behaved production function. Which makes the task of the entrepreneur quite simple and convenient? He requires only Finding out just one optimum factor proportions.

So long as relative factor prices remain constant, he has not to make any fresh decision regarding factor proportions to be used, as he expands his level of production. Moreover, this feature of the same optimum factor proportions is also very useful in input- output analysis, In India, farm management studies have emphasised the constant return to scale and homogeneous production function.

4. The Cobb-Douglas Production Function

The Cobb-Douglas production function is based on the empirical study of the American manufacturing industry made by Paul H. Douglas and C.W. Cobb. It is a linear homogeneous production function of degree one which takes into account two inputs, labour and capital, for the entire output of the .manufacturing industry.

In Cobb-Douglas production function, only two input factors, labor, and capital are taken into the consideration, and the elasticity of substitution is equal to one. It is also assumed that, if any, of the inputs, is zero, the output is also zero.

Limitations of C-D Production Function

It has the following limitations:

(i) The function includes only two factors and neglects other inputs.

(ii) The function assumes constant returns to scale.

(iii) There is the problem of measurement of capital which takes only the quantity of capital available for production.

(iv) The function assumes perfect competition in the factor market which is unrealistic.

(v) It does not fit to all industries.

(vi) It is based on the substitutability of factors and neglects complementarity of factors.

(vii) The parameters cannot give proper and correct economic implication

The Cobb-Douglas production function is expressed as:

$$Q = AL^{a} C^{\beta}$$

where Q is output and L and C are inputs of labour and capital respectively. A, a and β are positive parameters where = a > O, β > O.

The equation tells that output depends directly on L and C, and that part of output which cannot be explained by L and C is explained by A which is the 'residual', often called technical change.

The production function solved by Cobb-Douglas had 1/4 contribution of capital to the increase in manufacturing industry and 3/4 of labour so that the C-D production function is

$$Q = AL^{3/4} C1^{/4}$$

which shows constant returns to scale because the total of the values of L and C is equal to one: (3/4 + 1/4), i.e.,(a + β = 1) . The coefficient of labourer in the C-D function measures the percentage increase in (Q that would result from a 1 per cent increase in L, while holding C as constant.

Similarly, B is the percentage increase in Q that would result from a 1 per cent increase in C, while holding L as constant. The C-D production function showing constant returns to scale is

depicted in Figure 20. Labour input is taken on the horizontal axis and capital on the vertical axis.

To produce 100 units of output, OC, units of capital and OL units of labour are used. If the output were to be doubled to 200, the inputs of labour and capital would have to be doubled. OC is exactly double of OC_1 and of OL_2 is double of OL_2.

Similarly, if the output is to be raised three-fold to 300, the units of labour and capital will have to be increased three-fold. OC_3 and OL_3 are three times larger than OC_1, and OL_1, respectively. Another method is to take the scale line or expansion path connecting the equilibrium points Q, P and R. OS is the scale line or expansion path joining these points.
It shows that the isoquants 100, 200 and 300 are equidistant. Thus, on the OS scale line OQ = QP = PR which shows that when capital and labour are increased in equal proportions, the output also increases in the same proportion.

C-D production function has the following properties:

(i) There are constant returns to scale.

(ii) Elasticity of substitution is equal to one.

(iii) A and p represent the labour and capital shares of output respectively.

(iv) A and p are also elasticities of output with respect to labour and capital respectively.

(v) If one of the inputs is zero, output will also be zero.

(vi) The expansion path generated by C-D function is linear and it passes through the origin.

(vii) The marginal product of labour is equal to the increase in output when the labour input is increased by one unit.

(viii) The average product of labour is equal to the ratio between output and labour input.

The C-D production function possesses the following merits:

(i) It suits to the nature of all industries.

(ii) It is convenient in international and inter-industry comparisons.

(iii) It is the most commonly used function in the field of econometrics.

(iv) It can be fitted to time series analysis and cross section analysis.

(v) The function can be generalised in the case of 'n' factors of production.

(vi) The unknown parameters a and p in the function can be easily computed.

(vii) It becomes linear function in logarithm.

(viii) It is more popular in empirical research.

5. CES [Constant Elasticity of Substitution] Production Function

Arrow, Chenery, Minhas and Solow in their new famous paper of 1961 developed the Constant Elasticity of Substitution (CES) function. This function consists of three variables Q, C and L, and three parameters A, and.

It may be expressed in the form:

$$Q = A\,[aC^{-\theta} + (1-\alpha)L^{-\theta}]^{-1/\theta}$$

where Q is the total output, C is capital, and L is labour. A is the efficiency parameter indicating the state of technology and organisational aspects of production.

It shows that with technological and/or organisational changes, the efficiency parameter leads to a shift in the production function, α (alpha) is the distribution parameter or capital intensity factor coefficient concerned with the relative factor shares in the total output, and θ (theta) is the substitution parameter which determines the elasticity of substitution.

The CES production function possesses the following properties:

1. The CES function is homogenous of degree one. If we increase the inputs C and L in the CES function by n-fold, output Q will also increase by n-fold. Thus like the Cobb-Douglas production function, the CES function displays constant returns to scale.

2. In the CES production function, the average and marginal products in the variables C and L are homogeneous of degree zero like all linearly homogeneous production functions.

3. From the above property, the slope of an isoquant, i.e., the MRTS of capital for labour can be shown to be convex to the origin.

The CES function has the following merits:

1. CES function is more general.

2. CES function covers all types of returns.

3. CES function takes account of a number of parameters.

4. CES function takes account of raw materials among its inputs.

5. CES function is very easy to estimate.

6. CES function is free from unrealistic assumptions.

Limitations of CES Production Function:

1. The CES production function considers only two inputs. It can be extended to more than two inputs. But it becomes very difficult and complicated mathematically to use it for more than two inputs.

2. The distribution parameter or capital intensity factor coefficient, α is not dimensionless.

3. If data are fitted to the CES function, the value of the efficiency parameter A cannot be made independent of 0 or of the units of Q, C and L.

4. If the CES function is used to describe the production function of a firm, it cannot be used to describe the aggregate production function of all the firms in the industry. Thus it involves the problem of aggregation of production function of different firms in the industry.

5. It suffers from the drawback that elasticity of substitution between any part of inputs is the same which does not appear to be realistic.

6. In estimating the parameters of CES production function, we may encounter a large number of problems like choice of exogenous variables, estimation procedure and the problem of multi-collinear ties.

7. There is little possibility of identifying the production function under technological change.

Cost Theory: Introduction, Concepts

Introduction:

The firm's costs determine its supply. Supply along with demand determines price. To understand the process of price determination and the forces behind supply, we must understand

the nature of costs. We study some important concepts of costs, and traditional and modern theories of cost.

Cost concepts:

Costs are very important in business decision-making. Cost of production provides the floor to pricing. It helps managers to take correct decisions, such as what price to quote, whether to place a particular order for inputs or not whether to abandon or add a product to the existing product line and so on.

Ordinarily, costs refer to the money expenses incurred by a firm in the production process. But in economics, cost is used in a broader sense. Here, costs include imputed value of the entrepreneur's own resources and services, as well as the salary of the owner-manager.

Accounting and Economic Costs:

Money costs are the total money expenses incurred by a firm in producing a commodity. They include wages and salaries of labour; cost of raw materials; expenditures on machines and equipment; depreciation and obsolescence charges on machines; buildings and other capital goods; rent on buildings; interest on capital borrowed; expenses on power, light, fuel, advertisement and transportation; insurance charges, and all types of taxes.

There are the accounting costs which an entrepreneur takes into consideration in making payments to the various factors of production. These money costs are also known as explicit costs that an accountant records in the firm's books. But there are other types of economic costs called implicit costs. Implicit costs are the imputed value of the entrepreneur's own resources and services.

Production Costs:

The total costs of production of a firm are divided into total variable costs and total fixed costs. The total variable costs are those expenses of production which change with the change in

the firm's output. Larger output requires larger inputs of labour, raw materials, power; fuel, etc. which increase the expenses of production. When output is reduced, variable costs also diminish. They cease when production stops altogether. Marshall called these variable costs as prime costs of production.

Actual Costs and Opportunity Costs:

Actual costs refer to the costs which a firm incurs for acquiring inputs or producing a good and service such as the cost of raw materials, wages, rent, interest, etc. The total money expenses recorded in the books of accounts are the actual costs.

Opportunity cost is the cost of sacrifice of the best alternative foregone in the production of a good or service. Since resources are scarce, they cannot be used to produce all things simultaneously. Therefore, if they are used to produce one thing, they have to be withdrawn from other uses. Thus the cost of the one is the alternative forgone. It is the opportunity missed or alternative forgone in having one thing rather than the other or in putting a factor-service to one use instead of the other.

Private and Social Costs:

Private costs are the costs incurred by a firm in producing a commodity or service. These^ include both explicit and implicit costs. However, the production activities of a firm may lead to economic benefit or harm for others. For example, production of commodities like steel, rubber and chemicals, pollutes the environment which leads to social costs.

On the other hand, production of such services as education, sanitation services, park facilities, etc. leads to social benefits. Take for instance, education which not only provides higher incomes and other satisfactions to the recipients but also more enlightened citizens to the society. If we add together the private costs of production and economic damage upon others such as environmental pollution, etc., we arrive at social costs.

Incremental Costs and Sunk Costs:

Incremental costs denote the total additional costs associated with the marginal batch of output. These costs are the additions to costs resulting from a change in the nature and level of business activity, e.g., change in product line or output level, adding or replacing a machine, changes in distribution channels, etc. In the long-run, firms expand their production, employ more men, materials, machinery and equipment. All these expenses are incremental costs.

Sunk costs are the costs that are not affected or altered by a change in the level or nature of business activity. It cannot be altered, increased or decreased by varying the level of activity or the rate of output. All past or actual costs are regarded as sunk costs. Thus, sunk costs are irrelevant for decision making as they do not vary with the changes expected for future by the management, whereas incremental costs are relevant to the management for business making.

Explicit Costs and Implicit Costs:

Explicit costs are those payments that must be made to the factors hired from outside the control of the firm. They are the monetary payments made by the entrepreneur for purchasing or hiring the services of various productive factors which do not belong to him. Such payments as rent, wages, interest, salaries, payment for raw materials, fuel, power, insurance premium, etc. are examples of explicit costs.

Implicit costs refer to the payments made to the self-owned resources used in production. They are the earnings of owner's resources employed in their best alternative uses

Incremental Costs and Marginal Costs

There is close relation between marginal cost and incremental cost. But they have difference also. In reality, incremental cost is used in a broad sense in relation to marginal cost. Marginal cost is the cost of producing an additional unit of output, while incremental cost is defined as the change in cost resulting from a change in business activities.

Cost-Output Relation:

The Cost-output relation is discussed in the traditional and modem theories of costs under the short-run and long-run cost analysis which are explained as under.

The Traditional Theory of Costs:

The traditional theory of costs analyses the behaviour of cost curves in the short run and the long run and arrives at the conclusion that both the short run and the long run curves are U-shaped but the long-run cost curves are flatter than the short-run cost curves.

(A) Firm's Short-Run Cost Curves:

The short run is a period in which the firm cannot change its plant, equipment and the scale of organisation. To meet the increased demand, it can raise output by hiring more labour and raw materials or asking the existing labour force to work overtime.

Short-Run Total Costs:

The scale of organisation being fixed, the short-run total costs are divided into total fixed costs and total variable costs:

$$TC = TFC + TVC$$

Total Costs or TC:

Total costs are the total expenses incurred by a firm in producing a given quantity of a commodity. They include payments for rent, interest, wages, taxes and expenses on raw materials, electricity, water, advertising, etc.

Total Fixed Costs or TFC:

Are those costs of production that do not change with output. They are independent of the level of output. In fact, they have to be incurred even when the firm stops production temporarily. They include payments for renting land and buildings, interest or borrowed money,

insurance charges, property tax, depreciation, maintenance expenditures, wages and salaries of the permanent staff, etc. They are also called overhead costs.

Total Variable Costs or TVC:

Are those costs of production that change directly with output. They a rise when output increases, and fall when output declines. They include expenses on raw materials, power, water, taxes, hiring of labour, advertising etc., They are also known as direct costs.

The relation between total costs, variable costs and fixed costs is presented in Table 1, where column (1) indicates different levels of output from 0 to 10 units. Column (2) indicates that total fixed costs remain at Rs. 300 at all levels of output. Column (3) shows total variable costs which are zero when output is nothing and they continue to increase with the rise in output.

In the beginning they rise quickly, and then they slow down as the firm enjoys economies of large scale production with further increases in output and later on due to diseconomies of production, the variable costs start rising rapidly. Column (4) relates to total costs which are the sum of columns (2), and (3) i.e., TC – TFC + TVC. Total costs vary with total variable costs when the firm starts production.

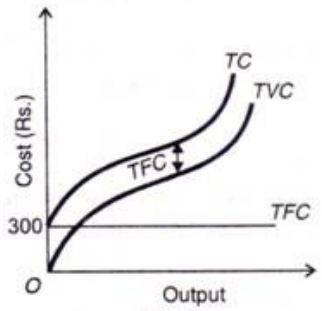


Fig. 2

The curves relating to these three total costs are shown diagrammatically in Figure 2. The TC curve is a continuous curve which shows that with increasing output total costs also increase. This curve cuts the vertical axis at a point above the origin and rises continuously from left to right. This is because even when no output is produced, the firm has to incur fixed costs

So long as the firm is using less variable factors in proportion to the fixed factors, the total variable costs rise at a diminishing rate. But after a point, with the use of more variable factors in proportion to the fixed factors, they rise steeply because of the application of the law of variable proportions. Since the TFC curve is a horizontal straight line, the TC curve follows the TVC curve at an equal vertical distance.

Short-Run Average Costs:

In the short run analysis of the firm, average costs are more important than total costs. The units of output that a firm produces do not cost the same amount to the firm. But they must be sold at the same price. Therefore, the firm must know the per unit cost or the average cost. The short-run average costs of a firm are the average fixed costs, the average variable costs, and the average total costs.

Average Fixed Costs or AFC equal total fixed costs at each level of output divided by the number of units produced:

$$AFC = TFC / Q$$

The average fixed costs diminish continuously as output increases. This is natural because when constant total fixed costs are divided by a continuously increasing unit of output, the result is continuously diminishing average fixed costs. Thus the AFC curve is a downward sloping curve which approaches the quantity axis without touching it, as shown in Figure 3. It is a rectangular hyperbola.

(B) Firm's Long-Run Cost Curves:

In the long run, there are no fixed factors of production and hence no fixed costs. The firm can change its size or scale of plant and employ more or less inputs. Thus in the long run all factors are variable and hence all costs are variable.

The long run average total cost or LAC curve of the firm shows the minimum average cost of producing various levels of output from all-possible short-run average cost curves (SAC). Thus the LAC curve is derived from the SAC curves. The LAC curve can be viewed as a series of alternative short-run situations into any one of which the firm can move.

Each SAC curve represents a plant of a particular size which is suitable for a particular range of output. The firm will, therefore, make use of the various plants up to that level where the short-run average costs fall with increase in output. It will not produce beyond the minimum short-run average cost of producing various outputs from all the plants used together.

Let there be three plants represented by their short-run average cost curves SAC_1 SAC_2 and SAC_3 in Figure 4. Each curve represents the scale of the firm. SAC_1depicts a lower scale while the movement from SAC_2 to SA C_1 shows the firm to be of a larger size. Given this scale of the firm, it will produce up to the least cost per unit of output. For producing ON output, the firm can use SAC_1or SAC_2 plant.

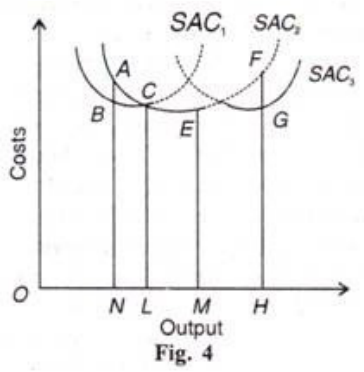


Fig. 4

The firm will, however, use the scale of plant represented by SAC_3since the average cost of producing ON output is NB which is less than NA, the cost of producing this output on the SAC_2 plant. If the firm is to produce OL output, it can produce at either of the two plants. But it would be advantageous for the firm to use the plant SA C_2 for the OL level of output.

The Modern Theory of Costs:

The modem theory of costs differs from the traditional theory of costs with regard to the shapes of the cost curves. In the traditional theory, the cost curves are U-shaped. But in the modem theory which is based on empirical evidences, the short-run SAVC curve and the SMC curve coincide with each other and are a horizontal straight line over a wide range of output. So far as the LAC and LMC curves are concerned, they are L-shaped rather than U-shaped. We discuss below the nature of short- run and long-run cost curves according to the modem theory.

(1) Short-Run Cost Curves:

As in the traditional theory, the short-run cost curves in the modem theory of costs are the AFC, SAVC, SAC and SMC curves. As usual, they are derived from the total costs which are divided into total fixed costs and total variable costs.

But in the modem theory, the SAVC and SMC curves have a saucer-type shape or bowl-shape rather than a U-shape. As the AFC curve is a rectangular hyperbola, the SAC curve has a U-shape even in the modem version. Economists have investigated on the basis of empirical studies this behaviour pattern of the short-run cost curves.

According to them, a modern firm chooses such a plant which it can operate easily with the available variable direct factors. Such a plant possesses some reserve capacity and much flexibility. The firm installs this type of plant in order to produce the maximum rate of output over a wide range to meet any increase in demand for its product.

The saucer-shaped SAVC and SMC curves are shown in Figure 7. To begin with, both the curves first fall upto point A and the SMC curvelies below the SAVC curve. “The falling part of the SAVC shows the reduction in costs due to the better utilisation of the fixed factor and the consequent increase in skills and productivity of the variable factor (labour).

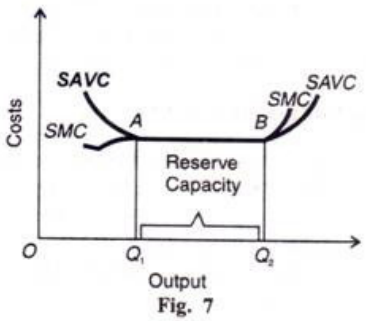


Fig. 7

With better skills, the wastes in raw materials are also being reduced and a better utilisation of the whole plant is reached." So far as the flat stretch of the saucer-shaped SAVC curve over Q_1Q_2 range of output is concerned, the empirical evidence reveals that the operation of a plant within this wide range exhibits constant returns to scale.

(2) Long-Run Cost Curves:

Empirical evidence about the long-run average cost curve reveals that the LAC curve is L-shaped rather than U-shaped. In the beginning, the LAC curve rapidly falls but after a point "the curve remains flat, or may slope gently downwards, at its right-hand end." Economists have assigned the following reasons for the L-shape of the LAC curve.

Empirical evidence about the long-run average cost curve reveals that the LAC curve is L-shaped rather than U-shaped. In the beginning, the LAC curve rapidly falls but after a point "the curve remains flat, or may slope gently downwards, at its right-hand end." Economists have assigned the following reasons for the L-shape of the LAC curve.

1. Production and Managerial Costs:

In the long run, all costs being variable, production costs and managerial costs of a firm are taken into account when considering the effect of expansion of output on average costs. As output increases, production costs fall continuously while managerial costs may rise at very large scales of output.

Production Costs:

As a firm increases its scale of production, its production costs fall steeply in the beginning and then gradually. The is due to the technical economies of large scale production enjoyed by the firm.

Managerial Costs:

In modern firms, for each plant there is a corresponding managerial set-up for its smooth operation. There are various levels of management, each having a separate management technique applicable to a certain range of output.

2. Technical Progress:

Another reason for the existence of the L-shaped LAC curve in the modern theory of costs is technical progress. The traditional theory of costs assumes no technical progress while explaining the U-shaped LAC curve. The empirical results on long-run costs conform the widespread existence of economies of scale due to technical progress in firms.

The period between which technical progress has taken place, the long-run average costs show a falling trend. The evidence of diseconomies is much less certain. So an upturn of the LAC at the top end of the size scale has not been observed. The L-shape of the LAC curve due to technical progress is explained in Figure 10.

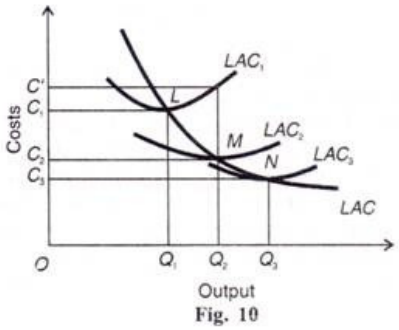


Fig. 10

The firm is producing OQ_1 output on LAC_1curve at a per unit cost of OC_1 If there is an increase in demand for the firm's product to OQ_2,with no change in technology, the firm will

produce OQ_2 output along the LAC_1 curve at a per unit cost of OC_2. If, however, there is technical progress in the firm, it will install a new plant having LAC_2 as the long-run average cost curve. On this plant, it produces OQ_2 output at a lower cost OC_2 per unit.

Similarly, if the firm decides to increase its output to OQ_3 to meet further rise in demand technical progress may have advanced to such a level that it installs the plant with the LAC_3 curve. Now it produces OQ_3output at a still lower cost OC_3 per unit. If the minimum points, L, M and N of these U- shaped long-run average cost curves LAC_1, LAC_2 and LAC_3 are joined by a line, it forms an L-shaped gently sloping downward curve LAC.

Isoquant and Isocosts

- An isoquant shows all combination of factors that produce a certain output
- An isocost show all combinations of factors that cost the same amount.
- Isocosts and isoquants can show the optimal combination of factors of production to produce the maximum output at minimum cost.

Isoquant Curve

An isoquant shows all the combination of two factors that produce a given output.

Definition: An isoquant curve is that convex shaped curve which is formed by joining the points depicting the different blends of the two production factors, providing constant output. Here, the term 'isoquant' can be cracked into 'iso' which implies equal and 'quant' that stands for quantity. The word altogether means the same volume or constant output at all points.

The production indifference curve works based on diminishing marginal rate of technical substitution of the production factors.

Content: Isoquant Curve

1. Example
2. Isoquant Map
3. Assumptions
4. Properties
5. Types
6. Example

Example

Given below is an isoquant schedule for the various labour and capital combinations which can be made when the output is 1000 Kgs at each time:

COMBINATION	LABOUR UNITS	CAPITAL UNITS	OUTPUT (KG)	MARGINAL RATE OF TECHNICAL SUBSTITUTION (ΔL/ΔK)
A	1	12	1000	_
B	2	8	1000	1:4
C	3	5	1000	1:3
D	4	3	1000	1:2
E	5	2	1000	1:1

Marginal Rate of Technical Substitution (MRTS)

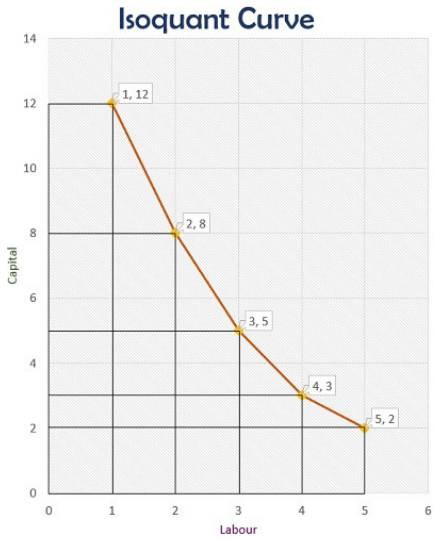
Marginal Rate of Technical Substitution is the proportion at which the one production factor partially replaces the other, to produce consistent output.

MRTS is computed as below: $$MRTS = \frac{\Delta L}{\Delta K}, or \frac{L_2 - L_1}{K_2 - K_1}$$

Where,

L1 is the labour employed in the first combination, and
L2 is the labour engaged in the second combination; and
K1 is the capital employed in the first combination and
K2 is the capital employed in the second combination.

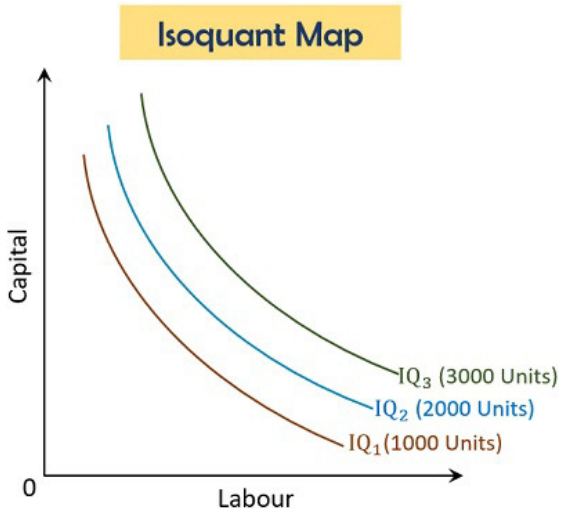
MRTS keeps on falling at each combination. Thus, the isoquant curve also slopes downwards, as shown below:



Iso quant Map

An iso quant map is very similar to an indifference map. It can be formed while producing a higher quantity of products from the various possible combinations of the two factors. It facilitates multiple levels of output.

In the given figure we can assume that 1000 units of a product are produced in IQ1, 2000 units in IQ2 and 3000 units in IQ3:



Assumptions for Isoquant Curve

Iso quant curve provides an understanding of how the change in one factor of production affects the other when the output remains constant.

To form an iso quant curve, we have to presume the following:

- Optimum Combinations: All the possible combinations of the production factors are efficient, yielding the same output and quality.
- Two Factors of Production: There are only two factors involved in the production function, as we can say that 'Q=f(L, K)'.
- Steady Production Technique: The production method or technology remains static throughout the process.
- Technical Substitution Possible: The factors of production should be such that it is possible to substitute one with the other, like labour and capital.
- Divisible Factors of Production: The production factors should be quantifiable or divisible into lesser units or smaller proportion.

Properties of Iso quant Curve

Do you remember the indifference curve we have previously discussed?

The indifference curve is in terms of consumption while the iso quant curve is in the context of the production.

Following are the properties of an iso quant curve:

Convex to the Origin: Since one production factor increases while the other decreases, a convex shaped curve to the origin point, is formed. Another reason for it is the diminishing MRTS.

Right Isoquant Indicates Higher Output than Left Isoquant: When there are more than one isoquant curves on a graph, the upper curve will always indicate a higher output. As in the above isoquant map, IQ2 and IQ3 produce more than IQ1.

Two or More Isoquants May or May Not Be Parallel: As the MRTS of each isoquant curve may vary from one another, two or more isoquant curves don't need to be parallel to each other.

Negative Slope: To increase the number of units for one factor, the producer has to decrease the units of the other production factor. This principle leads to negative sloping of the isoquant curve.

Two or More Isoquants Never Intersect: As we already know that on an isoquant map, all the isoquant curves depict a different level of output, we can say that they cannot have any combination of factors in common. Thus, the two curves can never intersect one another.

No Isoquant Cuts on Any of the Axis: In industrial application, no commodity can be produced using only one production factor. Therefore, an isoquant curve cannot touch the x or y-axis at any point.

Oval Shaped Curve: An isoquant curve forms a semi-oval shape since it passes through the combinations which show the competent use of the production factors.

Types of Isoquants

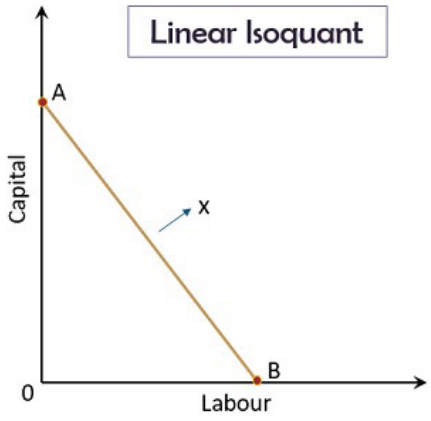
While going through the isoquant curves, we come across the numerous possibilities which may or may not be practically applicable.

Let us now discuss some of the most common types of isoquants along with their images below:

Linear Isoquant

It is quite an unrealistic approach where one factor completely substitutes the other in the production process. When the isoquant curve intersects x-axis, capital is entirely replaced by the labour.

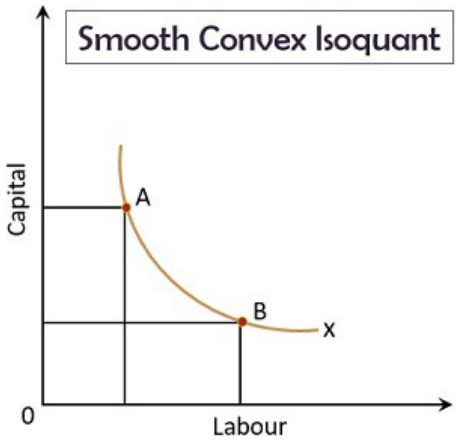
Also, when the curve crosses the y-axis, the production is done through capital itself, without employing any labour.



Smooth Convex Isoquant

The isoquant in which there can be only two possible combinations say A and B, except this the two factors of production are incapable of substituting each other.

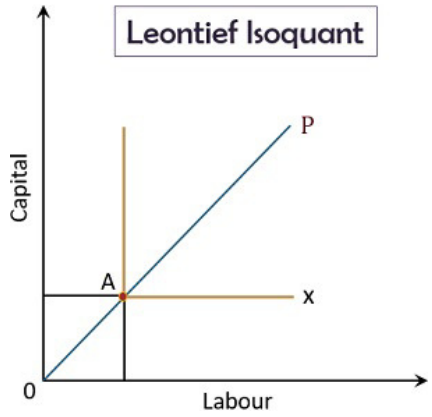
Thus a smooth convex curve is formed from A to B.



Leontief or Right Angled Isoquant

When the two factors of production cannot be replaced by one another, a right-angled isoquant curve is formed.

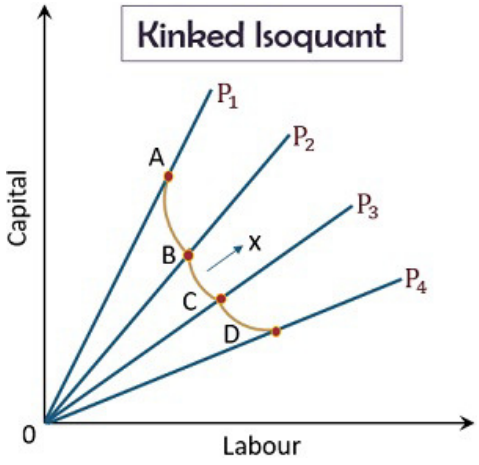
Here, the optimum level of production takes place at the edge of the curve or 'L'. Also, the output remains the same throughout.



Kinked Isoquant

In such an isoquant curve, the factors of production can substitute each other to a limited extent.

Also, there are a limited number of production processes to support this substitution.



Conclusion

Isoquant curve can be an indicator of efficiently utilizing the two input factors for improving productivity. The production factors involve cost and determining an isoquant curve helps to reduce the unnecessary expenses on these inputs.

Iso cost

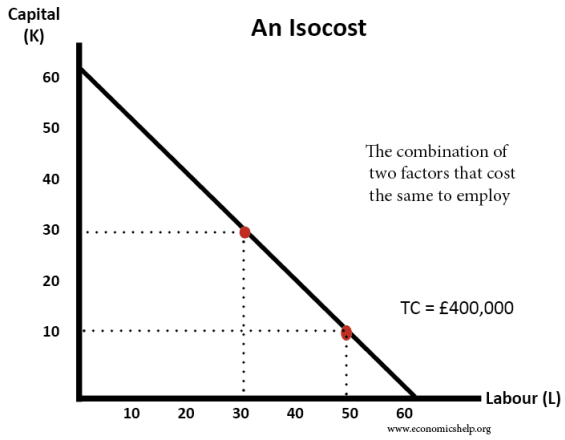
Isocosts refrs to that cost curve that represents the combination of inputs that will cost the producer the same amount of money.

In other words each iso costs denotes a particular level of total cost for a given level of production. If the given level of production changes, the total cost changes and iso cost curve moves upwarts and vice versa. An isocost shows all the combination of factors that cost the same to employ.

Iso-Cost lines

Iso-cost lines represent the prices of factors. An iso-cost line graphically represents all the combinations of the inputs which the firm can achieve with a given budget for production or given outlay.

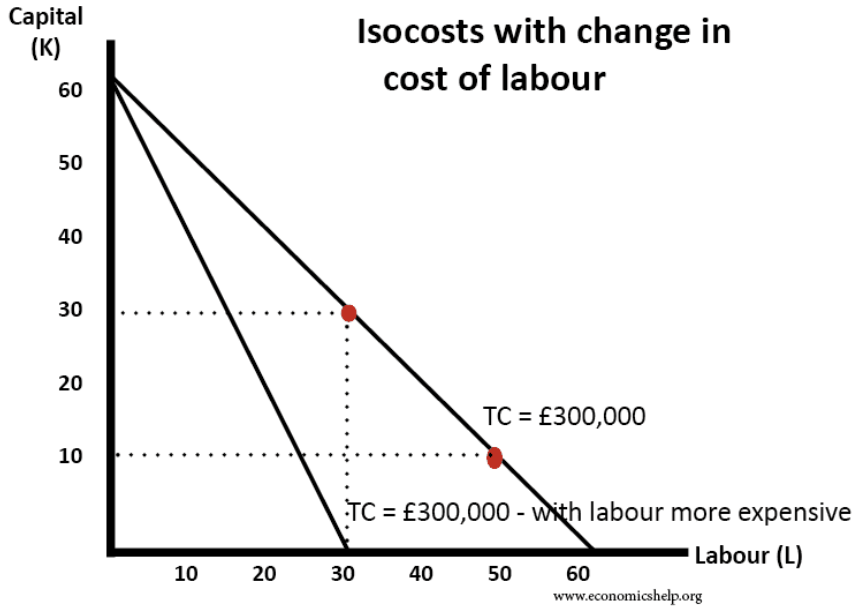
An isocost line is a locus of points showing the alternative combinations of factors that can be purchased with a fixed amount of money. In fact, every point on a given isocost line represents the same total cost. To construct isocost lines we need information about the market prices of the two factors. For example labour and capital.



In this example, a unit of labour and capital cost £6,666 each.

- If we employ 30K and 30L, the total cost will be £200,000 + £200,000
- If we employ 10 K and 50L, the total cost will be £66,666 +£333,333 = £400,000

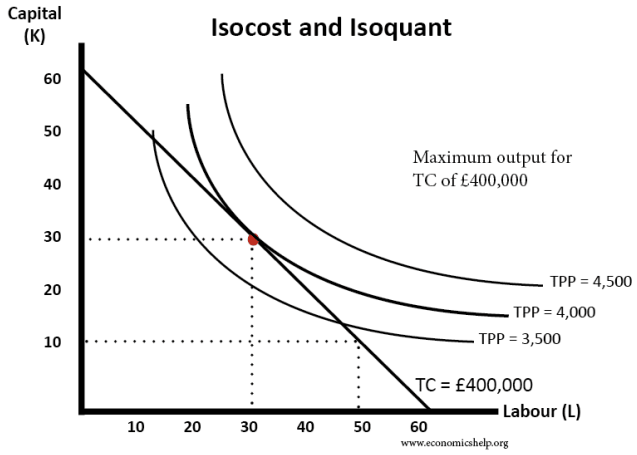
Change in labour costs



- In this example, initially, the cost of labour and capital is both £5,000. (e.g. 60L = 60 x £5,000 = £300,000)
- However, if Labour cost rises to £10,000, then the isocost shifts to the left. Now, to keep cost at £300,000, a firm could only employ 30 workers (30 x £10,000)
- The slope of an isocost is therefore P_L / P_K

PROFIT MAXIMIZATION

To maximise profits, a firm will wish to produce at the point of the highest possible isoquant and minimum possible isocost

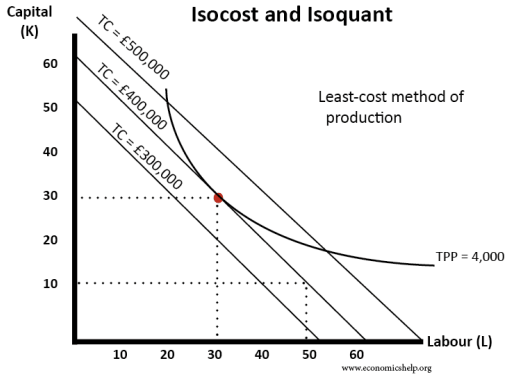


In this example, we have one isocost and three isoquants. With the isocost of £400,000 the maximum output a firm can manage would be a TPP of 4,000. If it produced at say 13 K and 48 Labour, it would only be able to produce a TPP of 3,500.

A total TPP of 4,500 is currently not possible without increasing costs beyond £400,000

Profit maximization – the least cost method of production

In economics, profit maximization is the short run or long run process by which a firm may determine the price, input, and output levels that lead to the highest profit. Neoclassical economics, currently the mainstream approach to microeconomics, usually models the firm as maximizing profit.



Another way of seeking to maximise profits is to target an output of say 4,00 and then find the isocost with the lowest possible cost. In this case, the isocost which touches the tangential point of the TPP is a TC of £400,000.