

[Academic Script]

Ordinal Utility Approach

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1. Introduction

Hicks and Allan, through their indifference curve approach advocated the concept of ordinal utility. Ordinal utility theory states that the satisfaction, which a consumer derives from the consumption of goods and services, can be measured through ranking system according to which the goods and services that provide higher level of satisfaction to the consumer, are assigned higher ranks while the goods and services that provide less satisfaction are assigned lower ranks. Thus the ordinal utility is a qualitative method that is used to measure consumption satisfaction.

Indifference Curves and Indifference Schedules

Indifference curves measure utility ordinally and explain the consumer behaviour in terms of his or her preferences for different combinations of goods. An indifference curve shows different combination of the goods that give same level of utility to the consumer. Table 1 shows the indifference schedules of a consumer for different combinations of two commodities X and Y. The consumer obtains equal level of satisfaction from these combinations.

	Units of	Units of
Combination	Commodity	Commodity
Number	``X″	``Υ″
1	3	20

Table 1: Indifference Schedules of a Consumer

2	4	15
3	5	12
4	6	10
5	7	9

In this indifference schedule, a consumer will be indifferent to combinations 1,2,3,4,and 5 because each combination provide equal amount of satisfaction to him. This is an example of one such indifferent schedule, and any number of such schedules can be made which may represent a higher or lower level of satisfaction to the consumer.

Indifference Curve

When various combinations of a particular indifference schedule are plotted on a graph, and when a line joins their locus points, the resultant diagram is called an indifference curve (IC). The IC is an iso-utility curve that represents an equal amount of satisfaction at all its points.

An IC represents just one indifference schedule. But when more number of such indifference schedules are plotted on a graph, then the resultant diagram will be called an indifference map on which the lower IC_1 represents a lesser level of satisfaction and vice versa. In diagram-1, point Q on IC_2 represents a larger amount of X than point P on IC_1 due to which the consumer will prefer to be at point Q. Therefore, the indifference curve analysis states that an IC which lies farther from the origin O, represents the larger combination of goods X and Y, and hence it will provide a higher level of satisfaction than an IC which lies nearer to the origin. Diagram 1 presents the indifference curves.



Diagram 1: Indifference Curves

Assumptions of Indifference Curve

The indifference curve approach is based on the following assumptions:

1. It is assumed that the consumer has a fixed amount of money to buy two goods at the given constant prices.

2. Consumer always prefer to move to a higher indifference curve to get higher and higher satisfaction.

3. Ordinal measure of utility where the consumer ranks his preferences on the basis of satisfaction obtained from each combination of goods.

4. Indifference curve analysis assumes diminishing marginal rate of substitution due to which it is convex to the origin.

5. The consumer is assumed to behave rationally and try to maximize his total satisfaction.

6. Assumption of Transitivity, which implies that the consumer's tastes are consistent.

2. Law of Diminishing Marginal rate of Substitution

An important principle of economic theory is that the marginal rate of substitution of X for Y (MRSxy) decreases as more and more of good X is substituted for good Y. in other words as the consumer gets more and more goods of X, he is prepared to forego less and less quantity of good Y. The principle of diminishing marginal rate of substitution is illustrated in diagram 2.



Diagram 2: Diminishing Marginal Rate of Substitution

In diagram 2 (a) When a consumer moves down from combination A to B, he gives up Δ Y of good Y for getting the compensating gain Δ X of good X. Thus the marginal rate of

substitution of X for Y (MRSxy) in this case is Δ Y1/ Δ X . But as the consumer slides down along the curve IC, the length of Δ Y becomes shorter and shorter, while the length of Δ X remains same. Therefore, in diagram 2(a) the Δ Y2 at point B is less than Δ Y1 at point A. Similarly the Δ Y4 at point D is less than Δ Y3 at point C. This states that as the consumer buys more of good X, the stock of good Y decreases with him. But he would forego less and less quantity of good Y for a given increment in good X. In other word the marginal rate of substitution of X for Y (MRSxy) falls as the consumer has more of good X and less of good Y.

The diminishing MRSxy can also be measured by drawing a tangents at different points on the indifference curve. The MRSxy at a point on the IC is equal to the slope of the IC at that point which can be measured by the tangent of the angle, which the tangent line makes with the X-axis. In diagram 2(b) three tangents DE, FG and HI are drawn at points A, B and C respectively on the given indifference curve. The slope of tangent DE is equal to OD/OE. Hence the marginal rate of substitution of X for Y at point A is equal to OD/OE. Similarly the marginal rate of substitution of X for Y at point A for Y at point B is equal to OF/OG and at point C it is equal to OH/OI. It can be seen that OF/OG is smaller than OD/OE and OH/OI is smaller than OF/OG. Thus the MRSxy diminishes a consumer slides down on his indifference curve.

Factors Responsible for Diminishing Marginal Rate of Substitution (MRS)

1. MRS falls due to diminishing marginal utility. As the consumer buys more and more of a good, the intensity of his want for that good decreases. Initially the consumer's stock of good Y is relatively large and that of good X it is relatively small. Since the consumer like to have more of good X in the beginning, gives up a large amount of Y for an additional unit of X. On the other hand, as the stock of good Y declines, the intensity liking for it increases due to which he is prepared to give up less and less of good Y for an additional unit of good X.

 Goods are imperfect substitutes for each other. If two goods are perfect substitutes, then an increase in quantity of one and decrease in the quantity of another will not make any difference. Therefore the MRSxy remains constant, and does not decrease.

3. The law of diminishing marginal rate of substitution will hold only if an increase in the quantity of one good does not increases the want satisfying power of the other good.

Properties of Indifference Curve

 Indifference curves are always convex to the origin: An indifference curve is convex to the origin because of diminishing MRS. MRS declines continuously because of the law of diminishing marginal utility.

2. Indifference curve slope downward: It implies that as a consumer consumes more of one good, he must consume less of the other good.

3. Higher Indifference curves represent higher levels of satisfaction.

4. Indifference curves can never intersect each other: As two indifference curves do represent the same level of satisfaction, they cannot intersect each other.

3. Budget Line and Consumer Preferences

A budget line or more technically, a budget constraint is an important component when analyzing consumer behaviour. It is also know as Price Line. A budget line illustrates all the possible combinations of two goods that the consumer can buy at the given prices and available budget. It is important to note that the amount of a good that a consumer can buy depends upon his income and the price of the good. The slope of the budget line is negative as it slopes downward. It is measured by dividing the price of the good on the horizontal axis (X-axis) by the price of the good on the vertical axis (Y-axis). Thus the slope = Px/Py.

A consumer, in his attempt to maximize his satisfaction, would like to reach at the highest possible indifference curve. But in his pursuit to achieve maximum satisfaction, he has to face two constraints: (i) he has to pay a given price for the goods, and (ii) he has as a limited amount of money income or budget to make the purchase. Under these constraints how much amount of each good he would buy and how much satisfaction he will achieve depends on his choice of purchases of different quantities of the two goods X and Y. Therefore the drawing of a budget line to represent prices of the two goods and his money income into indifference map is very important. Diagram 3 presents the budget line of a consumer for goods X and Y.



Suppose the consumer has a budget to spend Rs.100 on two good say X and Y. If the price of X is Rs.10 per unit and the price of Y is Rs. 5 per unit then the consumer can buy either 10 units of X or 20 units of Y. If a straight line joining 10X and 20Y is drawn, it is called price line or budget line. The price line shows all the combinations of the two goods that a consumer can afford to buy. Combination R that lies above the budget line will give him greater level of satisfaction, but it is beyond his reach. On the other hand, the combination S is within his reach but he has sufficient budget to buy more of X and or Y which gives him more satisfaction. Therefore, with the assumption that the whole of given budget is spent to purchase goods X and Y at the prevailing prices, the consumer will choose from all those combinations which lie on the budget line. According to indifference curve analysis, a consumer is at equilibrium where the budget line is tangent to an indifference curve. At equilibrium point the marginal rate of substitution (MRS_{XY}) is equal to the price ratio (P_X/P_Y) of two commodities. The budget line has two other significant characteristics viz change in income and change in price.

Shift in Budget Line when Price Changes

A change in product prices shifts the budget line. A decline in the prices of one or both products would increase the real income, which leads to a shift in the curve to the right. Conversely, an increase in the prices of one or both products would decrease the real income, which leads to shifts the curve to the left.



Diagram 4: Shift in Budget Line when Price Changes

In diagram 4 the initial price line was AB. If the price of x falls from Rs.10 to Rs.5, he can buy 20 units of x which is shown by the price line AC, and similarly if the price increases from Rs.10

to Rs.20, he can buy 5 units of x, and the price line will shift leftwords to AD.

Shift in Budget Line when Income Changes

The location of the budget line varies with money income. An increase in money income shifts the budget line to the right while a decrease in money income shifts it to the left. In diagram 5 the initial price line was AB. If the prices of the two goods remain the same, but if the income increases to Rs. 200, then the consumer can buy twice the quantity of both the goods, and thus the new price line, CD, shifts parallel to the right. Similarly, if the income is halved, the price line will shift to the left to EF.





Therefore the two determinants of the price line are (a) prices of the two goods and (b) the money income of the consumer. As stated earlier, the slope of an indifference Curve portrays the MRSxy. Similarly, the slope of the budget line (price line) represents the ratio of the prices of the two goods.

In diagram 5, the slope of price line AB, is OA/OB. It states that the consumer with a given budget can buy either OB quantity of good X or OA quantity of good Y.

4. Application of Indifference Curve Analysis

In addition to the analysis of consumer demand, the indifference curves have several other applications. Some important applications are discussed below.

Effects of Subsidy on Consumers

The indifference curve technique can be used to measure the effects of government subsidy on low-income groups. Take a situation when the subsidy is not paid in cash but the consumers receive supply of cereals at subsidized rates as the government pay price-difference to the distributor. This is implemented in most of the states in India.



Diagram 6: Effects of Subsidy on Consumers

In diagram 6 the income is measured on the vertical axis and supply of cereals on the horizontal axis. Suppose the consumer income is OM and his income line (price line) without subsidy is MN. When he gets cereals at a subsidized price (lower price), his price-income line is MP which is equivalent to a fall in the price of cereals. At this income line (price line), he is in equilibrium at point E on curve I_1 where he buys OB quantity of cereals by spending MS amount of money. The full market price of OB cereals is MD on the line MN where the curve I_0 touches. The government, therefore, pays SD amount of subsidy. But the consumer receives cereals at a lower price.

If the subsidy were to be paid to him in cash, he would receive MR amount of money. The equivalent variation MR shows that in the absence of the subsidy, a cash payment would bring the consumer on the same indifference curve, which makes him as better off as the subsidy. But the value of the subsidy MR to the consumer is smaller than the cost of the subsidy DS to the government. In this case, the cost of subsidy to the exchequer will also be less.

The Problem of Rationing:

The indifference curve technique is used to explain the problem arising from various systems of rationing. Usually rationing consists of giving specific and equal quantities of goods to each individual.

The other, rather liberal, scheme is to allow an individual more or less quantities of the rationed goods according to his taste. It can be shown with the help of indifference curve analysis that the latter scheme is better and beneficial than the former.

Suppose two goods rice and wheat are rationed and the prices of the two goods are equal. Let each consumer has the same money income. Thus, given the income and price-ratios of the two goods, MN is the income line, price line or budget line in diagram 7. Rice is taken on vertical axis and wheat on the horizontal axis in the following diagram.

According to the first system of rationing, both consumers A and B are given equal specific quantities of rice and wheat, OR + OW. Consumer A is on indifference curve Ia and B is on Ib. With the introduction of the liberal scheme each can have more or less of rice or wheat according to his taste. In this situation, A will move from P to Q on a higher indifference curve Ia₁. Now he can have ORa of rice + OWa of wheat. Similarly, B will move from P to R on a higher indifference curve Ib₁ and can buy ORb of rice + OWb of wheat. With the introduction of the liberal scheme of rationing both the consumers derive greater satisfaction. The total quantity of goods sold is the same.



Diagram 7: Rationing of Rice and Wheat

For when B buys more quantity of wheat WWb, he purchases less quantity of rice RRb and when A buys RRb more of rice, he purchases WWa less of wheat. Thus, the purpose of the government to ensure controlled distribution of goods is not disturbed.

5. Summary

Today we have discussed Indifference Curves and Indifference Schedules, Application of Indifference Curve Analysis, Law of Diminishing Marginal rate of Substitution, Budget Line and Preferences under different situations and shift in budget line.