

Unit 3

Theory of Consumer Behavior

3.1 THE CONCEPT OF UTILITY

Utility

- The satisfaction which a consumer gets by having or consuming goods or services is called *utility*. The same commodity gives different utilities to different consumers. Even for the same consumer, utility varies from unit to unit, from time to time and from place to place

Measurement of Utility

- We measure utility in units called *utils*. It is useful, analytically, to distinguish between the two utility concepts:

Total Utility:- refers to the sum total of satisfaction which a consumer receives by consuming the various units of the commodity. The more units of a commodity she/he consumes, the greater will be her/his total utility or satisfaction from it, up to a certain point.

As he/she keeps on increasing the consumption of the commodity, he/she eventually reaches the point of saturation represented by maximum total utility.

If further units of the commodity are consumed, her/his total utility starts declining.

Marginal Utility:- of a good is defined as the change in total utility resulting from one unit change in the consumption of the good

3.1 Relationship between Total Utility and Marginal Utility

The relation between total utility and marginal utility can be easily discussed with the help of the following table.

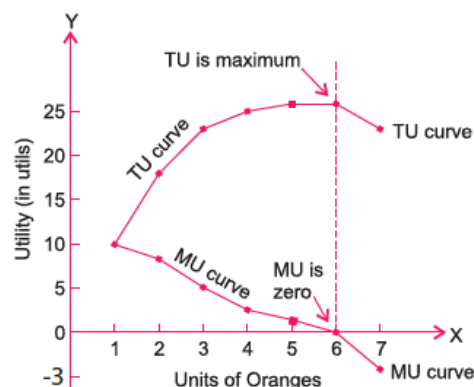
Table 3.1: Marginal Utility and Total Utility

Units of Oranges Consumed	Marginal Utility (utils)	Total Utility (utils)
0	–	0
1	10	10
2	8	18
3	5	23
4	2	25
5	1	26
6	0	26
7	–3	23

If a consumer consumes only one orange, the first unit is the marginal unit, so the marginal utility as well as total utility is 10 utils. If she/he consumes 2 oranges, the second orange is the additional unit and utility from it is marginal utility which is 8 utils. The total utility from 2 oranges is now 18 utils (10 from first orange + 8 from second orange). In this way total utility can be calculated from consuming 3, 4 or 5 oranges. We may say total utility is the sum of marginal utilities of various units of a commodity.

Total Utility = Sum of all Marginal Utilities

Table 3.1 can be represented graphically in the form of TU and MU curves, as follows.



A study of Table 3.1 and Figure 3.1 indicates the following relationship between Total Utility (TU) and Marginal Utility (MU).

- *TU increases as long as marginal utility is positive.*
- *TU is maximum when MU is zero.*
- *TU starts declining when MU becomes negative.*

3.2 THE CARDINAL UTILITY THEORY

This theory has been given by traditional economists and it makes the following assumptions

Assumptions

- ✓ **Rationality** - *The consumer is rational. She/he aims at the maximization of her/his utility, subject to the constraints imposed by her/his given income.*
- ✓ **Cardinal utility**: *The utility of each commodity is measurable. Utility is a cardinal concept.*
- ✓ **Constant Marginal Utility of Money**: *This assumption is necessary if the monetary unit is used as the measure of utility. The essential feature of a standard unit of measurement is that it is constant.*
- ✓ **Diminishing Marginal Utility**: *The utility gained from the successive units of a commodity diminishes. In other words, the marginal utility of a commodity diminishes as the consumer consumes larger quantities of it. This is the axiom of diminishing marginal utility.*

The Law of Diminishing Marginal Utility

- According to the law of diminishing marginal utility, “for any individual consumer the value that she/ he attaches to successive units of a particular commodity will diminish steadily as her/his total consumption of that commodity increases, the consumption of all other goods being held constant.” (R.G. Lipsey)
- As the amount of commodity increases, the utility derived by the consumer from the additional units, that is, marginal utility, goes on decreasing.

Assumptions of the Law of Diminishing Marginal Utility

- Various units of the good are homogeneous,
- There is no time gap between consumption of the different units,
- Consumer is rational (that is, she/he has complete knowledge and maximizes utility),
- Tastes, preferences and fashions remain unchanged.

Consumer’s Equilibrium or Law of Equi-Marginal Utility

A consumer will be in equilibrium when she/he spends her/ his given income on the purchase of different commodities in such a way so as to maximize her/his total utility. This is sometimes also referred as Utility Maximizing Rule.

Assumptions

The concept of consumer’s equilibrium is based on the following assumptions:

- *The consumer is rational. She/he aims the maximization of her/his utility or satisfaction,*
- *Cardinal measurement of utility is possible,*
- *If utility is measured in terms of money, marginal utility of money remains constant,*
- *The law of diminishing marginal utility operates,*
- *Consumer’s income is given and remains constant,*
- *Prices of commodities are given and remain constant.*

Explanation

The law of equi-marginal utility states that a consumer gets maximum satisfaction when the ratio of marginal utilities of all commodities and their prices is equal. In other words, the consumer should incur expenditure on different commodities in such a manner that the marginal utility of the last Birr spent on each one of them is equal.

Mathematically, the conditions of equilibrium are as follows.

$$\frac{MU_x}{P_x} = \frac{MU_y}{P_y} = \dots\dots = \frac{MU_n}{P_n}$$

Where, MU_x = Marginal utility of commodity x;

MU_y = Marginal utility of commodity y;

MU_n = Marginal utility of commodity n

P_x = Price of x

P_y = Price of y

P_n = Price of n

Expenditure on x + Expenditure on y + ... + Expenditure on n = Consumer's Income or

$$P_x \times Q_x + P_y \times Q_y + \dots + P_n \times Q_n = I$$

Where, Q_x , Q_y and Q_n are quantities of commodities x, y and n, respectively and I = consumer's income.

Suppose there are two commodities x and y. P_x = Birr 4 per unit; P_y = Birr 2 per unit; consumer's money income = Birr 30. Marginal utilities of x and y are given in Table 3.2 below

Unit	MU_x	MU_y
1	80	40
2	72	38
3	64	36
4	56	34
5	48	32
6	40	30
7	32	28
8	24	26
9	16	24
10	8	22

Let us see how the consumer should allocate his income between x and y. Or, what respective quantities of x and y should be purchased so that the consumer can obtain maximum satisfaction. To maximize her/his satisfaction, the consumer will equate

$$\frac{MU_x}{P_x} \text{ (per Birr } MU_x) \text{ with } \frac{MU_y}{P_y} \text{ (per Birr } MU_y).$$

This means that the consumer will equate the marginal utility of the last Birr spent on these two commodities. In order to know the position of the consumer's equilibrium, we may restructure the above mentioned table by dividing MU_x by Birr 4 and MU_y by Birr 2.

Table 3.3: Per Birr MU of x and y

Unit	MU_x/P_x	MU_y/P_y
1	20	20
2	18	19
3	16	18
4	14	17
5	12	16
6	10	15
7	8	14
8	6	13
9	4	12
10	2	11

To obtain maximum utility, the consumer will purchase 4 units of x and 7 units of y, because it satisfies the following two conditions required for the consumer's equilibrium:

$$\text{At 4 units of } x = \frac{MU_x}{P_x} = 14 \text{ and at 7 units of } y = \frac{MU_y}{P_y} = 14.$$

$$\therefore \frac{MU_x}{P_x} = \frac{MU_y}{P_y}$$

$$\text{Also, } P_x \times Q_x = 4 \times 4 = \text{Birr } 16$$

$$P_y \times Q_y = 2 \times 7 = \text{Birr } 14 \text{ and } I = \text{Birr } 30$$

$$\therefore P_x \times Q_x + P_y \times Q_y = I: (16 + 14 = 30)$$

3.3 THE ORDINAL UTILITY THEORY: INDIFFERENCE CURVE APPROACH

- Ordinal Utility Theory, which deals with consumer behavior under the assumption that utility from different units of a good or between different goods, need only be rankable and not measurable.

- If a consumer gets more utility from bundle A than from bundle B, it means that the consumer will rank bundle A above bundle B. Since Ordinal Utility Theory makes use of indifference curves to study consumer behavior, it is also known as Indifference Curve Approach.

Assumptions of Ordinal Utility Theory

- **Rationality:** A consumer aims to maximize her/his utility (subject to income and prices) under conditions of certainty.
- **Complete Ordering:** All possible combinations of goods can be ordered into preferred, indifferent or inferior combinations when compared to a given combination of the good.
- **Consistency:** This condition requires that if a consumer prefers bundle A to bundle B, he/she does not, at the same time, prefer bundle B to bundle A.
- **Transitivity:** If consumer prefers bundle A to B and B to C, she/he prefers A to bundle C.
- **Non-satiation:** A bigger bundle is preferred to a smaller bundle.
- **Diminishing Marginal Rate of Substitution:** This means that as the consumer substitutes more and more of one commodity (say Y) for another commodity (say X), she/he will be prepared to give up lesser units of the later (X) for each additional unit of the former (Y).

Indifference Set, Curve, and Map

Indifference Set

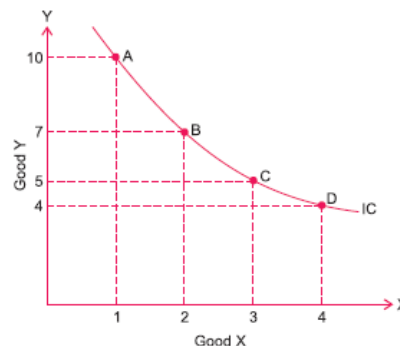
An indifference set refers to a table that shows various combinations of two goods which give equal level of satisfaction (utility) to the consumer. Since each of these combinations gives equal satisfaction, the consumer is indifferent among them.

Table 3.4: Indifference Set

Combination	Good X (units)	Good Y (units)
A	1	10
B	2	7
C	3	5
D	4	4

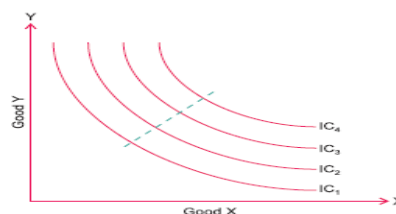
Indifference Curve

- An indifference curve shows various combinations of two goods which give equal satisfaction to the consumer.
- It is the locus of points, each point representing a different combination of two goods, which yield the same level of satisfaction to the consumer so that he/she is indifferent between these combinations.



Indifference Map

An indifference map is a group or set of indifference curves, each one of which represents a given level of satisfaction



Properties of Indifference Curve

- Indifference curve is downward sloping
- Indifference curve is convex to the origin
- Two indifference curves never intersect each other

Marginal Rate of Substitution (MRS)

- The marginal rate of substitution of X for Y (MRS_{xy}) is defined as the number of units of good Y that must be given up in exchange for an extra unit of good X so that the consumer maintains the same level of satisfaction
- It shows the rate at which one good is substituted for another good, while remaining on the same indifference curve

$$MRS_{xy} = \frac{\text{Amount of Y lost}}{\text{Amount of X gained}} = \frac{\Delta Y}{\Delta X}$$

Table 3.5: Marginal Rate of Substitution

Combination	Good X	Good Y	MRS_{xy}
A	1	12	
B	2	8	4
C	3	5	3
D	4	3	2
E	5	2	1

The above Table 3.5 shows that when the consumer moves from combination A to B, he gives up 4 units of Y for the gain of one additional unit of X. Therefore, his MRS of X for Y is given by

$$MRS_{xy} = \frac{\Delta Y}{\Delta X} = \frac{4}{1} = 4$$

Similarly, when he/she moves from combination B to C, he/she forgoes 3 units of Y for the additional one unit gain in X and hence $MRS_{xy} = 3$ and so on.

The Budget Line or Iso-Expenditure Line

A good is demanded by the consumer if he/she has:

- a preference for that good, and
- Purchasing power to buy the good, his/her preference pattern is represented by a set of indifference curves (indifference map), while his/her purchasing power depends upon her/his money income and market prices of the goods.

$$E = Q_X \cdot P_X + Q_Y \cdot P_Y$$

Where, E = Expenditure on goods X and Y

Q_X and Q_Y = Quantity of good X and good Y respectively

P_X and P_Y = prices of good X and good Y respectively

Let a consumer have E = Birr 2,000, P_X = Birr 50 and P_Y = Birr 40. The maximum amount of X

Which he can buy can be found from his budget equation:

$$2000 = 50(Q_X) + 40(0) \text{ or } Q_X = 40$$

Similarly, we find that the maximum amount of $Q_Y = 50$

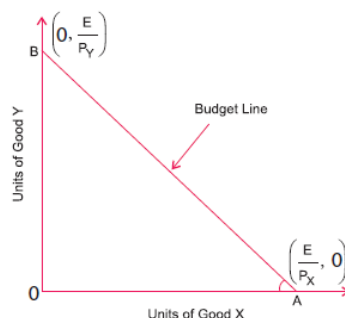


Figure 3.6: The Budget Line

Effect of Change in Income/Price of Goods

In case income of the consumer changes, with prices of the two goods remaining the same, there will be a parallel shift in the budget line (Figure 3.7). Whereas with a change in price of good, say X, (income and price of Y remaining constant), the budget line shifts only at its end touching the relevant-axis (X-axis here) (Figure 3.8). The budget line A_1B_1 shifts outward to A_1B_2 when price of X declines. It would have shifted inward if price of X increased.

$$\frac{\Delta Y}{\Delta X} = \frac{E/P_y}{E/P_x} = \frac{P_y}{P_x} \text{ relative prices of X and Y.}$$

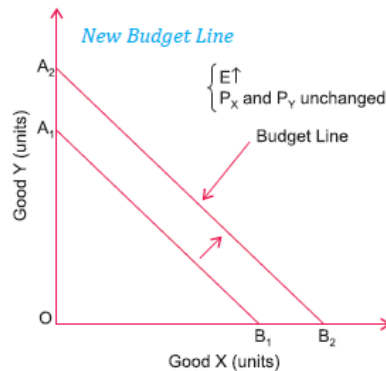


Figure 3.7: Change in Consumer's Income

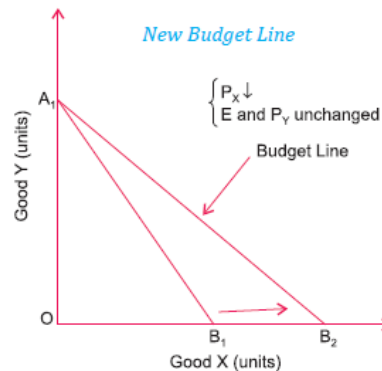


Figure 3.8: Decrease in Price of Good X

Consumer's Equilibrium

- A consumer shall be in equilibrium where she/he can maximize her/his utility, subject to her/his budget constraint. In other words, where the indifference curve and the budget line are tangent to each other (that is, their slopes are equal) the consumer will attain equilibrium.
- The equilibrium combination of the goods X and Y gives her/him maximum satisfaction because that relates to the highest indifference curve the consumer can reach within his/her available budget.



Figure 3.9: Consumer's Equilibrium

Note that at the point of tangency E,

Slope of budget line = Slope of indifference curve I_3

Also, slope of budget line = $\frac{P_x}{P_y}$ (price ratio of X and Y) and,

slope of indifference curve = $\frac{\Delta Y}{\Delta X} = MRS_{xy}$

∴ At equilibrium point E,

$$\frac{P_x}{P_y} = \frac{\Delta Y}{\Delta X} \quad (3.7)$$

Income Effect (Income Consumption Curve)

- When income of the consumer rises, the budget line moves outwards by the proportion of increase in the purchasing power. While when income declines the budget line moves inwards in accordance with the decrease in the purchasing power
- For example, if the consumer's income increases from Birr 1,000 to Birr1,200, P_x and P_y remaining constant, the points A and B would instead shift to A_1 and B_1 respectively (Figure 3.10). Consequently, the new budget line is the straight line A_1B_1 . There would, on the other

hand, be a downward shift like A_2B_2 when income of the consumer declines. Thus, we get a family of budget lines depending on different levels of income of the consumer, given the prices of the goods.

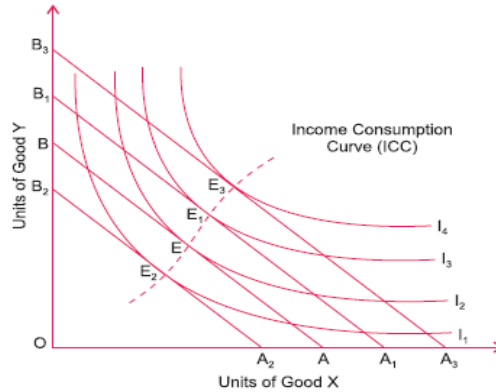


Figure 3.10: Income Effect

Price Effect (Price Consumption Curve)

- When the price of a commodity falls, the consumer can buy more of it. So the budget line shifts to the right on that axis, which represents that commodity.
- For example, in Figure 3.11, when the price of good X falls, the budget line shifts from AB_1 to AB_2 , while, if the price of X rises, it shifts from AB_1 to AB_3 .
- The new budget line (AB_2) is tangent to the higher indifference curve and a new equilibrium occurs at E_2 , to the right of E_1 , showing that as the price of X falls, more of X will be bought.
- If the price of X rises, the budget line shifts from AB_1 to AB_3 and the new equilibrium point E_3 is on a lower indifference curve.
- If we join the successive equilibrium points, we get the *price consumption curve* (PCC) which shows the way in which consumption varies as price of a commodity changes (income of the consumer and price of the other commodity remaining constant).

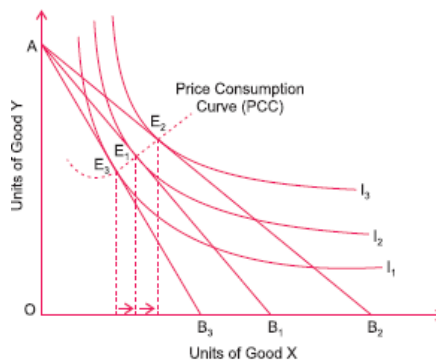


Figure 3.11: Price Effect