Chapter Three

Theory of Consumer Behaviour

3.1 Consumer preferences

A consumer makes choices by comparing bundle of goods. Given any two consumption bundles, the consumer either decides that one of the consumption bundles is strictly better than the other, or decides that she is indifferent between the two bundles. In order to tell whether one bundle is preferred to another, we see how the consumer behaves in choice situations involving two bundles. If she always chooses X when Y is available, then it is natural to say that this consumer prefers X to Y. We use the symbol $\succ$ to mean that one bundle is strictly preferred to another, so that $X \succ Y$ should be interpreted as saying that the consumer strictly prefers X to Y, in the sense that she definitely wants the X-bundle rather than the Y-bundle. If the consumer is indifferent between two bundles of goods, we use the symbol $\sim$ and write $X \sim Y$. Indifference means that the consumer would be just as satisfied, according to her own preferences, consuming the bundle X as she would be consuming bundle Y. If the consumer prefers or is indifferent between the two bundles we say that she weakly prefers X to Y and write $X \succeq Y$.

The relations of strict preference, weak preference, and indifference are not independent concepts; the relations are themselves related. For example, if $X \succeq Y$ and $Y \succeq X$, we can conclude that $X \sim Y$. That is, if the consumer thinks that X is at least as good as Y and that Y is at least as good as X, then she must be indifferent between the two bundles of goods. Similarly, if $X \succeq Y$ but we know that it is not the case that $X \sim Y$, we can conclude that $X \succ Y$. This just says that if the consumer thinks that X is at least as good as Y, and she is not indifferent between the two bundles, then she thinks that X is strictly better than Y.

3.2 The concept of utility

Economists use the term utility to describe the satisfaction or pleasure derived from the consumption of a good or service. In other words, utility is the power of the product to satisfy human wants. Given any two consumption bundles X and Y, the consumer definitely wants the X-bundle than the Y-bundle if and only if the utility of X is better than the utility of Y.

In defining utility, it is important to bear in mind the following points.

- ♣ Utility' and 'Usefulness' are not synonymous. For example, paintings by Picasso may be useless functionally but offer great utility to art lovers. Hence, usefulness is product centric whereas utility is consumer centric.
- ♣ Utility is subjective. The utility of a product will vary from person to person. That means, the utility that two individuals derive from consuming the same level of a product may not be the same. For example, non-smokers do not derive any utility from cigarettes.

- ♣ Utility can be different at different places and time. For example, the utility that we get from drinking coffee early in the morning may be different from the utility we get during lunch time.

3.3 Approaches of measuring utility

There are two major approaches to measure or compare consumer‘s utility: cardinal and ordinal approaches. The cardinalist school postulated that utility can be measured objectively. According to the ordinalist school, utility is not measurable in cardinal numbers rather the consumer can rank or order the utility he derives from different goods and services.

1. *The cardinal utility theory*

According to the cardinal utility theory, utility is measurable by arbitrary unit of measurement called utils in the form of 1, 2, 3 etc. For example, we may say that consumption of an orange gives Bilen 10 utils and a banana gives her 8 utils, and so on. From this, we can assert that Bilen gets more satisfaction from orange than from banana.

Assumptions of cardinal utility theory

1. Rationality of consumers. The main objective of the consumer is to maximize his/her satisfaction given his/her limited budget or income. Thus, in order to maximize his/her satisfaction, the consumer has to be rational.

2. Utility is cardinally measurable: -The utility or satisfaction of each commodity is measurable. Utility is measured in subjective units called utils.

3. Constant marginal utility of money. A given unit of money deserves the same value at any time or place it is to be spent. A person at the start of the month where he has received monthly salary gives equal value to 1 birr with what he may give it after three weeks or so.

4. Diminishing marginal utility (DMU). The utility derived from each successive units of a commodity diminishes.

5. The total utility of a basket of goods depends on the quantities of commodities. If there are n commodities in the bundle i.e. X1, X2..... Xn total utility is given by TU = f (*X*1, *X* 2 .....*X n*).

Total and marginal utility

Total Utility (TU) is the total satisfaction a consumer gets from consuming some specific quantities of a commodity at a particular time. As the consumer consumes more of a good per time period, his/her total utility increases. However, there is a saturation point for that commodity beyond which the consumer will not be capable of enjoying any greater satisfaction from it.

$TU=f(X_1, X_2……..X_n)$,where the X’s are consumption bundles

Marginal Utility (MU) is the *extra satisfaction* a consumer realizes from an additional unit of the product. In other words, marginal utility is the change in total utility that results from the consumption of one more unit of a product. Graphically, it is the slope of total utility.

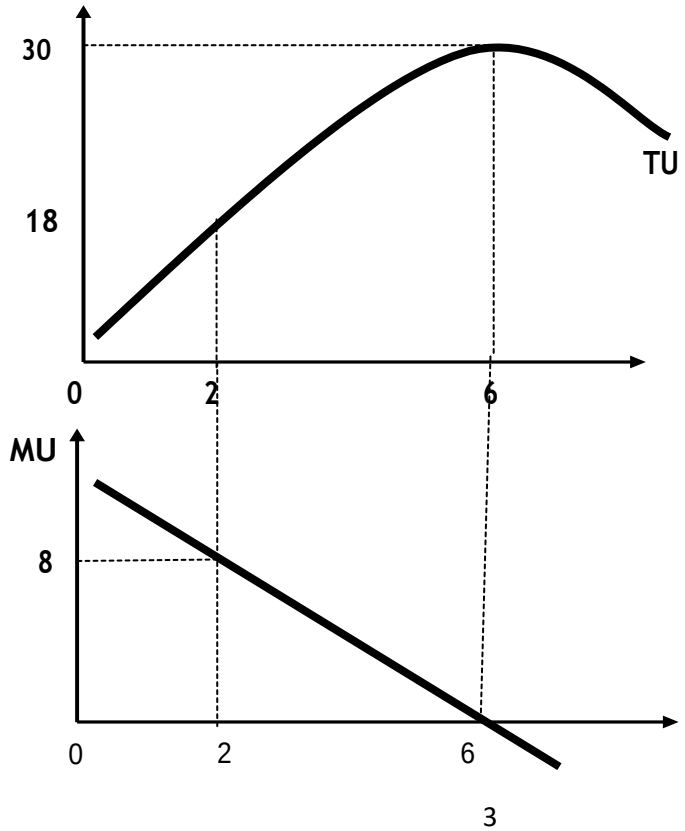
$MU = \frac{\Delta TU}{\Delta Q}$ Where, ΔTU is the change in total utility, and ΔQ is the change in the amount of product consumed.

Table 3.1: Total and marginal utility

Quantity	**Total utility (TU)**	**Marginal utility (MU)**
0	0	-
1	10	10
2	18	8
3	24	6
4	28	4
5	30	2
6	30	0
7	28	-2

Graphically, the above data can be depicted as follows.

Figure 3.1: Total and marginal utility curves



The total utility first increases, reaches the maximum (when the consumer consumes 6 units) and then declines as the quantity consumed increases. On the other hand, the marginal utility continuously declines (even becomes zero or negative) as quantity consumed increases.

From the above table and graph, we can deduce the following points

- When TU is increasing, MU is positive.
- When TU is maximized, MU is zero.
- When TU is decreasing, MU is negative.

Law of diminishing marginal utility (LDMU)

The *law of diminishing marginal utility* states that as the quantity consumed of a commodity increases per unit of time, the utility derived from each successive unit decreases. In other words, the extra satisfaction that a consumer derives declines as he/she consumes more and more of the product in a given period of time. This gives sense in that the first banana a person consumes gives him more marginal utility than the second and the second banana also gives him higher marginal utility than the third and so on (see figure 3.1)

The law of diminishing marginal utility is based on the following assumptions.

- ✓ The consumer is rational
- ✓ The consumer consumes identical or homogenous product. The commodity to be consumed should have similar quality, color, design, etc.
- ✓ There is no time gap in consumption of the good
- ✓ The consumer taste/preferences remain unchanged

Equilibrium of a consumer

a. The case of one commodity

The equilibrium condition of a consumer that consumes a single good X occurs when the marginal utility of X is equal to its market price.

$MU_X=P_X$

b. The case of two or more commodities

For the case of two or more goods, the consumer‘s equilibrium is achieved when the marginal utility per money spent is equal for each good purchased and his money income available for the purchase of the goods is exhausted. That is,

$$\frac{MU_X}{P_X}=\frac{MU_Y}{P_Y}=\cdots\cdots\frac{MU_N}{P_N} and\ p_xQ_x+p_yQ_y+\cdots\cdots p_nQ_n=M$$

Where, M is the income of the consumer.

Example: Suppose Saron has 7 Birr to be spent on two goods: banana and bread. The unit price of banana is 1 Birr and the unit price of a loaf of bread is 4 Birr. The total utility she obtains from consumption of each good is given below.

Table 3.2: Utility schedule for two commodities

Income = 7 Birr, Price of banana = 1 Birr, Price of bread = 4 Birr							
Banana				*Bread*			
Quantity	*TU*	*MU*	*MU/P*	*Quantity*	*TU*	*MU*	*MU/P*
0	0	-	-	0	0	-	-
1	6	6	6	1	12	12	3
2	11	5	5	2	20	8	2
3	14	3	3	3	26	6	1.5
4	16	2	2	4	29	3	0.75
5	16	0	0	5	31	2	0.5
6	14	-2	-2	6	32	1	0.25

Recall that utility is maximized when the condition of marginal utility of one commodity divided by its market price is equal to the marginal utility of the other commodity divided by its market price.

$$\frac{MU_1}{P_1} = \frac{MU_2}{P_2}$$

In table 3.2, there are two different combinations of the two goods where the MU of the last birr spent on each commodity is equal. However, only one of the two combinations is consistent with the prices of the goods and her income. Saron will be at equilibrium when she consumes 3 units of banana and 1 loaf of bread. At this equilibrium,

$\frac{MU_{banana}}{P_{banana}} = \frac{MU_{bread}}{P_{bread}} = \frac{3}{1} = \frac{12}{4}$ and $p_{banana}xQ_{banana} + p_{bread}xQ_{bread} = M, (3x1) + (4x1) = 7$

The total utility that Saron derives from this combination can be given by: TU= TU1 + TU2 TU= 14 + 12 TU= 26

Given her fixed income and the price level of the two goods, no combination of the two goods will give her higher TU than this level of utility.

Limitation of the cardinal approach

1. The assumption of cardinal utility is doubtful because utility may not be quantified. Utility cannot be measured absolutely (objectively).

2. The assumption of constant MU of money is unrealistic because as income increases, the marginal utility of money changes.

2. The ordinal utility theory

In the ordinal utility approach, it is not possible for consumers to express the utility of various commodities they consume in absolute terms, like 1 util, 2 utils, or 3 utils but it is possible to express the utility in relative terms. The consumers can rank commodities in the order of their preferences as 1 st, 2nd, 3 rd and so on. Therefore, the consumer need not know in specific units the utility of various commodities to make his choice. It suffices for him to be able to rank the various baskets of goods according to the satisfaction that each bundle gives him.

Assumptions of ordinal utility theory

The ordinal approach is based on the following assumptions.

- **Consumers are rational** - they maximize their satisfaction or utility given their income and market prices.
- **Utility is ordinal** - utility is not absolutely (cardinally) measurable. Consumers are required only to order or rank their preference for various bundles of commodities.
- **Diminishing marginal rate of substitution:** The marginal rate of substitution is the rate at which a consumer is willing to substitute one commodity for another commodity so that his total satisfaction remains the same. The rate at which one good can be substituted for another in consumer‘s basket of goods diminishes as the consumer consumes more and more of the good.
- The **total utility** of a consumer is measured by the amount (quantities) of all items he/she consumes from his/her **consumption basket.**
- **Consumer’s preferences are consistent.** For example, if there are three goods in a given consumer‘s basket, say, X, Y, Z and if he prefers X to Y and Y to Z, then the consumer is expected to prefer X to Z. This property is known as axioms of ***transitivity*****.**

The ordinal utility approach is explained with the help of indifference curves. Therefore, the ordinal utility theory is also known as the *indifference curve approach.*

Indifference set, curve and map

Indifference set/ schedule is a combination of goods for which the consumer is indifferent. It shows the various combinations of goods from which the consumer derives the same level of satisfaction. Consider a consumer who consumes two goods X and Y (table 3.3).

combination	A	B	C	D
Good X	10	6	3	2
Good Y	2	4	6	8
Utility	20	20	20	20

Table 3.3: Indifference schedule

In table 3.3 above, each combination of good X and Y gives the consumer equal level of total utility. Thus, the individual is indifferent whether he consumes combination A, B, C or D.

Indifference curve: When the indifference set/schedule is expressed graphically, it is called an *indifference curve*. An indifference curve shows different combinations of two goods which yield the same utility (level of satisfaction) to the consumer. A set of indifference curves is called **indifference map.**

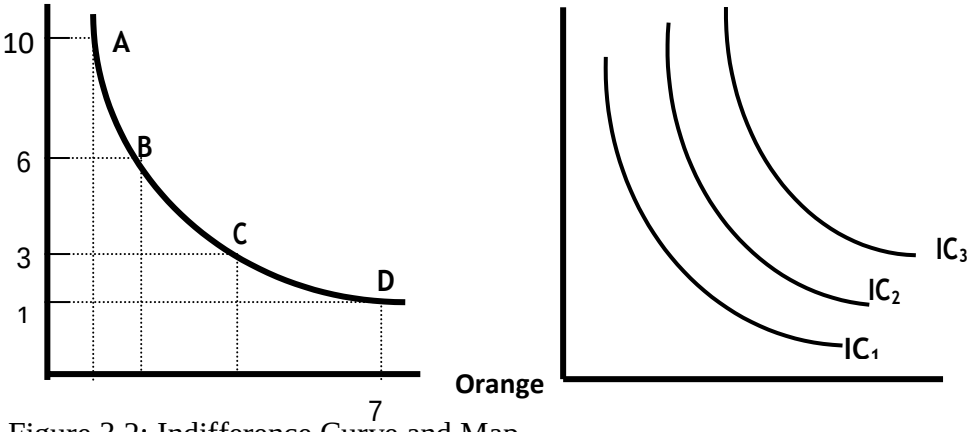


Figure 3.2: Indifference Curve and Map

Properties of indifference curves

Indifference curves have negative slope (downward sloping to the right): -Indifference curves are negatively sloped because the consumption level of one commodity can be increased only by reducing the consumption level of the other commodity. In other words, in order to keep the utility of the consumer constant, as the quantity of one commodity is increased the quantity of the other must be decreased.

Indifference curves are convex to the origin: -This implies that the slope of an indifference curve decreases (in absolute terms) as we move along the curve from the left downwards to the right. The convexity of indifference curves is the reflection of the diminishing marginal rate of substitution. This assumption implies that the commodities can substitute one another at any point on an indifference curve but are not perfect substitutes.

A **higher indifference curve is always preferred to a lower one: -**The further away from the origin an indifferent curve lies, the higher the level of utility it denotes. Baskets of goods on a higher indifference curve are preferred by the rational consumer because they contain more of the two commodities than the lower ones.

Indifference curves never cross each other (cannot intersect): -The assumptions of consistency and transitivity will rule out the intersection of indifference curves.

Marginal rate of substitution (MRS)

Marginal rate of substitution is a rate at which consumers are willing to substitute one commodity for another in such a way that the consumer remains on the same indifference curve. It shows a consumer‘s willingness to substitute one good for another while he/she is indifferent between the bundles.

Marginal rate of substitution of X for Y is defined as the number of units of commodity Y that must be given up in exchange for an extra unit of commodity X so that the consumer maintains the same level of satisfaction. Since one of the goods is scarified to obtain more of the other good, the MRS is negative. Hence, usually we take the absolute value of the slope.

$$MRS = \frac{Number\ of\ units\ of\ Y\ given\ up}{Number\ of\ units\ of\ X\ gained} = \frac{\Delta Y}{\Delta X}$$

MRS X, Y It is also possible to derive MRS using the concept of marginal utility. is related to MUX and MUY as follows

$$MRS_{XY} = \frac{MU_X}{MU_Y} = -\frac{dY}{dX}$$

The budget line or the price line

Indifference curves only tell us about consumer preferences for any two goods but they cannot show which combinations of the two goods will be bought. In reality, the consumer is constrained by his/her income and prices of the two commodities. This constraint is often presented with the help of the budget line.

The *budget line* is a set of the commodity bundles that can be purchased if the entire income is spent. It is a graph which shows the various combinations of two goods that a consumer can purchase given his/her limited income and the prices of the two goods. In order to draw a budget line facing a consumer, we consider the following assumptions.

- There are only two goods bought in quantities, say, X and Y.
- Each consumer is confronted with market determined prices, PX and PY.
- The consumer has a known and fixed money income (M). Assuming that the consumer spends all his/her income on the two goods (X and Y), we can express the budget constraint as:

$$M = P_X X + P_Y Y$$

By rearranging the above equation, we can derive the following general equation of a budget line.$Y = \frac{M}{P_Y} - \frac{P_X X}{P_Y}$

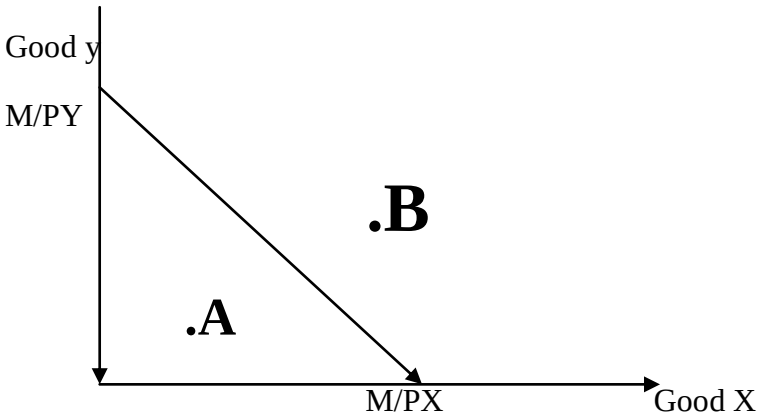


Figure 3.3: The budget line

Note that:

- ♠ The slope of the budget line is given is by $\frac{P_X}{P_Y}$(the ratio of the prices of the two goods).
- ♠ Any combination of the two goods within the budget line (such as point A) or along the budget line is attainable.
- ♠ Any combination of the two goods outside the budget line (such as point B) is unattainable (unaffordable).

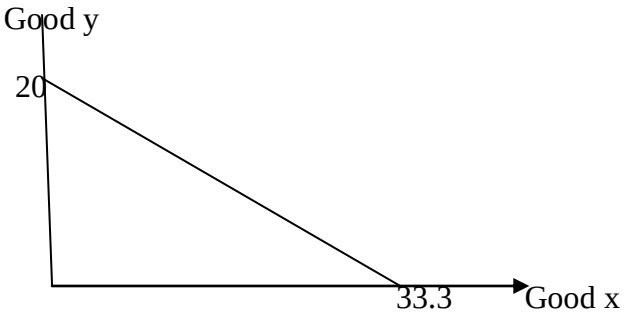
Example: A consumer has $100 to spend on two goods X and Y with prices $3 and $5 respectively. Derive the equation of the budget line and sketch the graph. **Solution:** The equation of the budget line can be derived as follows.

$M = P_X X + P_Y Y.$

100=3X+5Y

100-3X=5Y

100/5-3X/5=Y Or Y=20-3X/5



Change in income: If the income of the consumer changes (keeping the prices of the commodities unchanged), the budget line also shifts (changes). Increase in income causes an upward/outward shift in the budget line that allows the consumer to buy more goods and services and decreases in income causes a downward/inward shift in the budget line that leads the consumer to buy less quantity of the two goods. It is important to note that the slope of the budget line (the ratio of the two prices) does not change when income rises or falls.

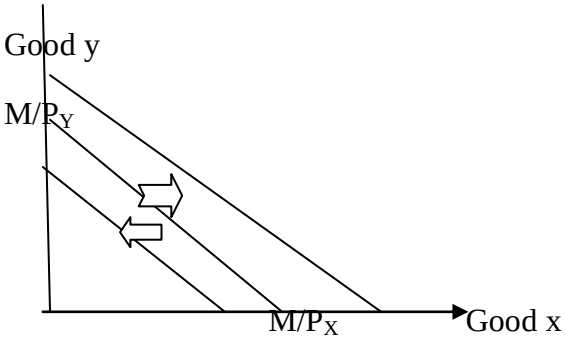


Figure 3.4*: Effects of increase (right) and decrease (left) in income on the budget line*

Change in prices: An equal increase in the prices of the two goods shifts the budget line inward. Since the two goods become expensive, the consumer can purchase the lesser amount of the two goods. An equal decrease in the prices of the two goods, one the other hand, shifts the budget line out ward. Since the two goods become cheaper, the consumer can purchase the more amounts of the two goods.

An increase or decrease in the price of one of the two goods, keeping the price of the other good and income constant, changes the slope of the budget line by affecting only the intercept

of the commodity that records the change in the price. For instance, if the price of good X decreases while both the price of good Y and consumer‘s income remain unchanged, the horizontal intercept moves outward and makes the budget line flatter. The reverse is true if the price of good X increases. On the other hand, if the price of good Y decreases while both the price of good X and consumer‘s income remain unchanged, the vertical intercept moves upward and makes the budget line steeper. The reverse is true for an increase in the price of good Y.

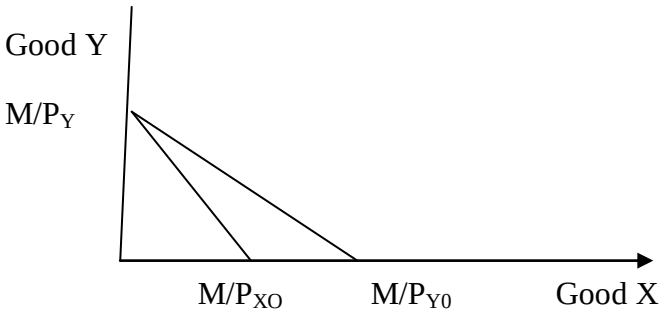


Figure 3.5: Effect of decrease in the price of only good X on the budget line

Equilibrium of the consumer

The preferences of a consumer (what he/she wishes to purchase) are indicated by the indifference curve. The budget line specifies different combinations of two goods (say X and Y) the consumer can purchase with the limited income. Therefore, a rational consumer tries to attain the highest possible indifference curve, given the budget line. This occurs at the point where the indifference curve is tangent to the budget line so that the slope of the indifference is equal to the slope of the budget line. In figure 3.6, the equilibrium of the consumer is at point E where the budget line is tangent to the highest attainable indifference curve (IC2).

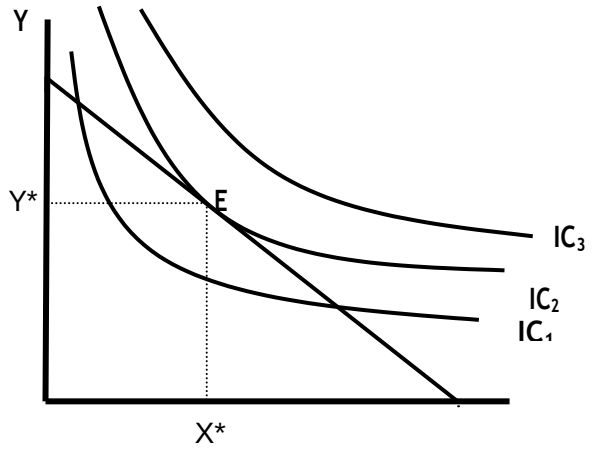


Figure 3.6: Consumer equilibrium under indifference curve approach

Mathematically, consumer optimum (equilibrium) is attained at the point where: *Slope of indifference curve = Slope of the budget line*

$MRS_{XY}=P_X/P_Y$ so that we equate, $\frac{MU_X}{MU_Y}=\frac{P_X}{P_Y}$.