CHAPTER II
CONSUMER THEORY

In this chapter, we will look at two concepts: the theory of marginal utility, and the theory of the indifference curve.

I. MARGINAL UTILITY THEORY

A. Definition of Utility Concept

Utility is a scientific tool used by economists to understand how rational consumers allocate their limited resources between the various goods and services that provide them with a certain level of satisfaction.

B. Definition of Total Utility

Utility is measured by the value paid to obtain the good and is symbolised by the U symbol.

The total utility provided by a good is the utility that the individual derives from choosing a certain quantity of that good. The total utility of a good varies according to the quantity chosen. It is defined for a fixed quantity of the other good(s) in the utility function.

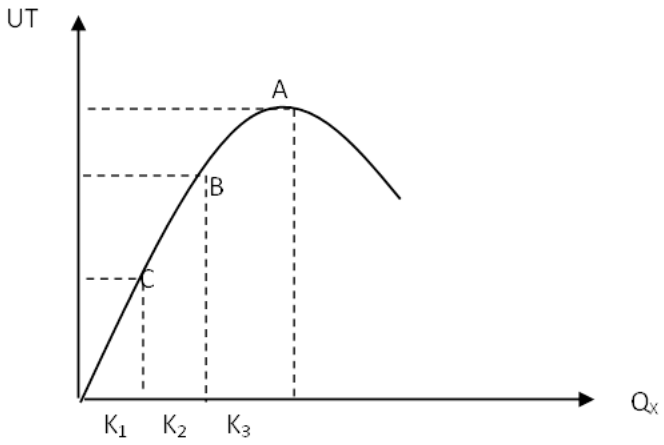
C. Utility Function

The total utility function for two goods is written as follows: $\mathbf{U= f(X,Y)}$

Assuming the consumer consumes only two goods. Then X and Y represent the quantities of goods, U represents total utility, which increases as the quantities the consumer obtains of one or both goods increase.

Note: The mathematical formula for utility can be given in two cases: a discrete case, i.e. the values are given in tabular form, and a continuous case, i.e. it is a mathematical equation.

The following curve shows the total utility of a specific consumer in relation to a product and explains the characteristics that have been discussed. The slope of this curve is a positive slope, which means that total utility increases as the number of units of the product consumed increases and reaches its maximum when the consumer obtains the greatest number of units of the product. Consequently, after point A, the total utility curve begins to change trajectory and starts to descend (negative slope), i.e. total utility begins to fall.



D. Marginal Utility

The marginal utility of a good X noted $U_m(X)$ is the utility obtained from consuming an additional unit of a good. The marginal utility of a good is the increase in total utility obtained from the consumption of an additional unit of that good, if the consumption of other goods remains constant. Marginal utility Um therefore measures the change in total utility "at the margin", i.e. for a very small variation in the quantity consumed.

- **Marginal utility in the discrete case**: this is equal to the variation in total utility in relation to the variation in units consumed of the good.

$$Umx = \frac{\Delta UTx}{\Delta X}$$

- **Marginal utility in the continuous case :**

$$Umx = \frac{\delta UTx}{\delta X}$$

Note :

$$UT_X = \sum_{i=1}^{n} Um_x$$

$$UT_X = \int_0^n \text{Umx dx}$$

Application Exercise

We suppose that utility is measurable and quantifiable. The satisfaction a consumer gets from consuming a good X is as follows :

Qx	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**
Total Utility	**0**	**10**	**17**	**23**	**27**	**29**	**29**	**27**

Questions

1) Calculate Um
2) Draw the UT and Um curves and indicate the saturation point, analyse and draw your conclusions.

Solutions

1) Marginal utility is therefore the ratio of the change in total utility to the change in the quantity consumed of a given good X.

mU (X) = ΔTU / ΔX = (17 – 10) / (2 – 1) = 7

In the same way, all Um values will be obtained:

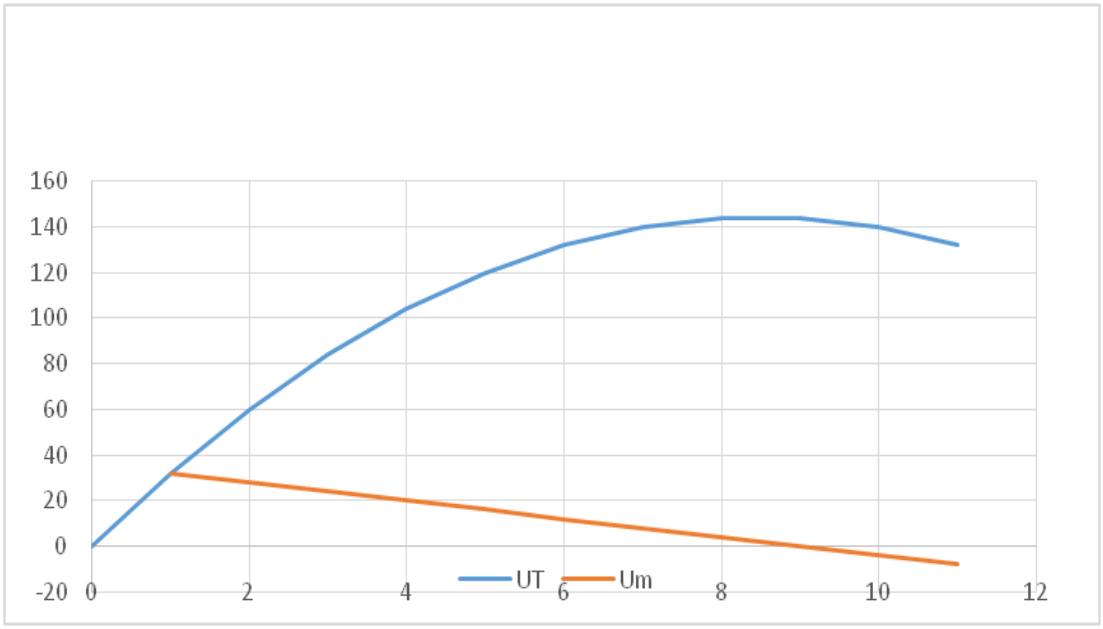
Qx	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**
Total Utility (TU)	**0**	**10**	**17**	**23**	**27**	**29**	**29**	**27**
Marginal Utility (mU)	**/**	**10**	**7**	**6**	**4**	**2**	**0**	**-2**

Analysis

- The consumer's consumption behaviour follows the law of diminishing marginal utility: Um(1st apple) > Um2 > Um3 > Um4 > Um5 > Um6 > Um7 10 > 7 > 6 > 4 > 2 > 0 > -2.

- The consumer is not rational because he consumed the 6th unit, which did not increase his satisfaction, and the 7th unit, which, more seriously, reduced his total utility. He should have stopped at the 5th unit.

2) **Graphical Analysis**



II. THE THEORY OF INDIFFERENCE CURVES

At the beginning of the 20th century, Pareto developed the theory of indifference curves. According to this theory, we no longer need to measure and quantify utility. Pareto adopted an ordinal approach in which the individual no longer measures the level of utility but is only able to indicate an order of preference.

A. The most important hypotheses used :

- We assume that consumers are rational and that they maximise their satisfaction by buying more goods ;
- We assume that the consumer knows which goods to choose to obtain maximum satisfaction at the lowest cost ;
- Utility is a function of different quantities of goods and increases as the quantity of these goods consumed increases ;

- Organise the goods according to their relative importance, and this order is consistent with the choice, i.e. if good X is better than Y and Y is better than Z, we deduce that X is better than Z in terms of utility.

B. **Definition of indifference curves**

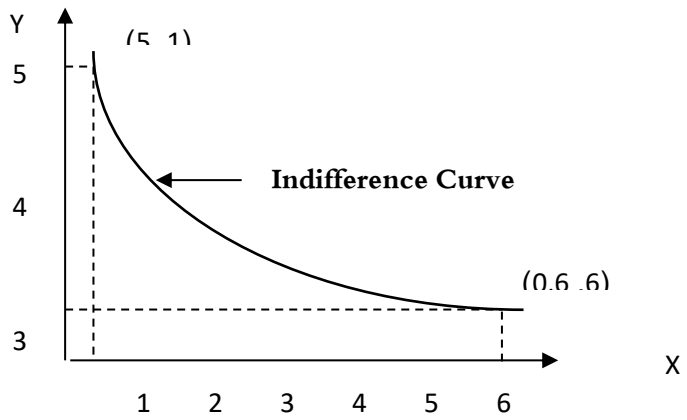
The groups of products from Y and X represented in the following table, which give the consumer the same level of satisfaction.

Indifference Table

Groups of products	**A**	**B**	**C**	**D**	**E**	**F**
Y	**5**	**3.5**	**2.5**	**1.7**	**1.1**	**0.6**
X	**1**	**2**	**3**	**4**	**5**	**6**

The table is called an indifference table because each point it contains gives the consumer the same level of utility, and can be represented as follows :

Graphic of Indifference Curve

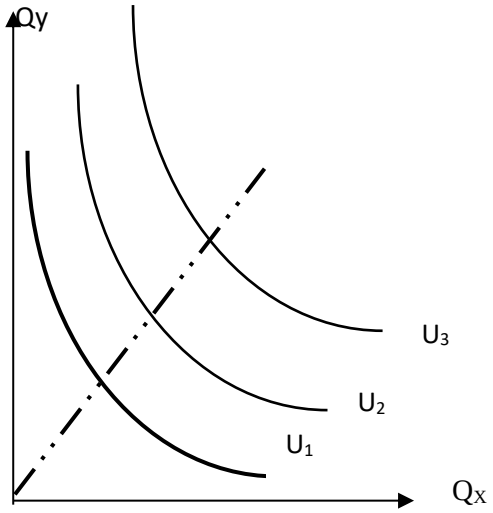


Note : **It is the curve that includes all the groups of products considered to be equal to the consumer and therefore giving him a level of satisfaction (or the same level of satisfaction).**

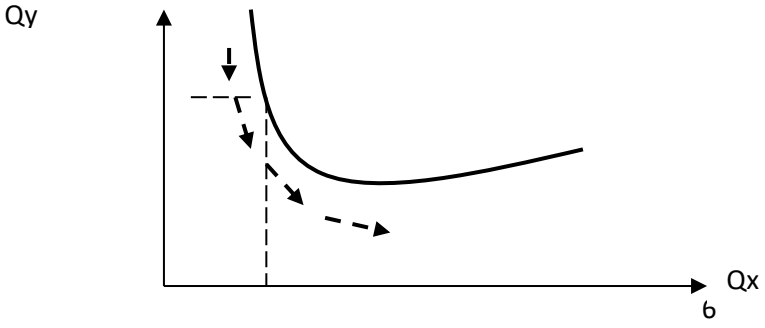
C. The Characteristics of Indifference Curves

The following is a list of characteristics of indifference curves :

- The indifference curves always head upwards because the second indifference curve is better than the first, and the third also has better utility than the second, which means U1 < U2 < U3 ;



- Indifference curves never cross ;
- The indifference curves are concave upward: This means that the indifference curve must lie above its tangent, which is necessary to maximize the consumer's satisfaction at a certain income. The slope of the indifference curves is negative because in order for the consumer to maintain a constant level of satisfaction, he must reduce the quantity Y that he possesses. The consumer must be compensated for his loss of Y. This is done by increasing the quantity he obtains of X. The rate at which the consumer is prepared to replace Y with a constant level of satisfaction is called the marginal rate of substitution.
- The indifference curves decrease towards the right or from above towards the right, and this is for the sake of a small amount of X we sacrifice a large amount of Y ;



D. Marginal Rate Substitution $MRS_{x/y}$

It is the rate at which a quantity of one of the two goods is exchanged for an additional unit of the other good while maintaining the same degree of satisfaction.

We express it mathematically : $\boldsymbol{MRS = -\frac{\Delta y}{\Delta x}}$

The (-) sign indicates the sacrifice: "Y" to acquire "X".

In the case of a continuous variable, the MRS has the following formula:

$$\boldsymbol{MRS = -\frac{dy}{dx}}$$

Application Exercise

Calculate the marginal rate of substitution for the points in the table above:

The groups of goods are represented in a table, it expresses the discrete case. We calculate the marginal rate using the Formula $\boldsymbol{MRS = -\frac{\Delta y}{\Delta x}}$

Groups of Goods	***A***	***B***	***C***	***D***	***E***	***F***
Y	5	3,5	2,5	1,7	1,1	0,6
X	1	2	3	4	5	6
MRS	-	1,5	1	0,8	0,6	0,5

Note : - The initial sign of the marginal rate is negative because of the substitution of one of the two goods by the other, so we take the absolute value ;

- The marginal rate decreases ;
- For the consumer to move from point « a » to point « b », he gives up 1.5 of good Y in exchange for one unit of x.