UNIT 1 PREFERENCES AND UTILITY

Structure

1.0 OBJECTIVES

After going through this unit, you should be able to:

- justify why a consumer prefers a particular bundle over the other available bundle;
- differentiate between weak and strict preferences;
- analyse the assumptions regarding well-behaved preferences;
- define marginal rate of substitution and underline importance of it for analysing consumers' behaviour;
- define properties of an indifference curve;
- establish link between a Utility function and Preference relation;
- construct an indifference curve from the given utility function;
- explain the link between the marginal utilities and the marginal rate of substitution; and
- figure out some examples of the utility functions and the underlying indifference curves.

1.1 INTRODUCTION

You were comprehensively introduced to the concepts of consumer behaviour through cardinal and ordinal approaches in Units 4 and 5 of your Introductory Microeconomics course of Semester 1 (BECC-101). The present unit makes use of that theory base and the mathematical techniques you came across in your Mathematical Methods in Economics course of Semester 1 (BECC-107) for examining the economic behaviour of the consumer. A consumer, be it an individual or a household, makes decision regarding which commodity or service to be purchased and in what quantities. What guides this decision making? Why does a consumer purchase a certain bundle of commodities? We know that he gets satisfaction or utility from consumption of commodities, but there also exist alternatives which can give him similar satisfaction. So why does our consumer choose a particular bundle of commodities over the other available bundles? What determines the preference behaviour? We shall discuss various aspects of preferences in Section 1.2.

A consumer derives utility or satisfaction from consumption of commodities. The extent of satisfaction can be estimated by a utility function, which gives an ordinal value to the consumption of a particular bundle of commodities. In the subsequent section, you will come across a concept like utility function, representing a specific preference relation. After deriving an expression for marginal utility, a relationship between the marginal rate of substitution and the marginal utilities will be established. The discussion will end with some examples of utility functions and the underlying indifference curves— both representing the same preference ordering.

1.2 CONSUMER'S PREFERENCES

A consumer makes decision about allocating his limited income among available goods in order to obtain maximum satisfaction or utility. For this, he/she chooses the *best* commodity bundle that he/she can *afford*. The affordability is determined by the budget constraint the consumer faces— which, in turn, depends upon his/her income and prices of the commodities; while the choice of the best bundle is guided by consumer's preferences.

Preferences are subjective individual tastes that permit a consumer to rank different bundles of goods on the basis of the utility they give to the consumer. Independent of consumer's income and goods' prices, preferences establish the relationships between the bundles of the commodities that a consumer faces. Assuming N commodities available for consumption, a commodity bundle is given by, $A = (x_1, x_2, x_3,\ldots,x_N)$, where x_i with $i = 1,2,3,..N$ represents respective quantity of good 1,2,3, …,N. Given two bundles, A and B, if a consumer opts for bundle A when bundle B is available, then clearly bundle A is preferred to bundle B by this consumer. Please note — preferences establish relationship between bundles of commodities and not among individual commodities.

The consumer may prefer bundle A strictly over bundle B, or he/she might regard bundle A at least as good as bundle B (that is, not inferior to B). There may be a possibility that consumer fails to prefer bundle A over B—he/she may find them as good as one another. We are going to use certain symbols to denote various notions of preferences.

1.2.1 Weak and Strict Preference

Weak Preference : When a consumer considers bundle A to be at least as good as bundle B, we say he weekly prefers bundle A over B. Symbolically, this is denoted by: $A \succeq B$

Indifference: When both bundles A and B are regarded as good as one another. That is:

$$A \succeq B \text{ and } B \succeq A$$

We say that consumer is indifferent between bundle A and B, denoted by: $A \sim B$

Strict Preference: When bundle A is regarded as superior to B, then the relationship is that of strict preference, represented by: $A \succ B$

So, if $A \succeq B$ and neither $A \sim B$ nor $B \succeq A$, then we have $A \succ B$, or in words, "A is strictly preferred over B".

1.2.2 Assumptions about Preferences

Here, we are specifying certain assumptions about preferences. These assumptions help us in developing the theory of consumers' choice in a systematic manner. Preferences exhibit three important properties. They are:

- Completeness
- Reflexivity
- Transitivity

Completeness

By completeness it simply means, available bundle options can be compared. That is, for bundles A and B, either $A \succeq B$, or $B \succeq A$, or both (i.e., $A \sim B$). This means that it is always possible for a consumer to say whether or not he/she would prefer one bundle to another. There is no gap in the choice set, the consumer can make unambiguous choices on the assumption that he/she does not suffer from lack of information about the bundles he/she is asked to make a choice from.

Reflexivity

For any bundle A, $A \succeq A$. That is to say, any bundle A is at least as good as itself.

Transitivity

If bundle A is at least as good as bundle B, bundle B is at least as good as bundle C, then bundle A is at least as good as bundle C. Symbolically, If A $\succeq$ B and B $\succeq$ C

Then, A $\succeq$ C

If this condition is not satisfied the consumers' behaviour may suffer from irrational preference circularity, he may end up saying A $\succ$ B and B $\succ$ C but C $\succ$ A!

Given this background we can move into depiction of preferences with help of indifference curves.

Please Note: You were comprehensibly introduced to the concepts related to consumer theory in your Introductory Microeconomics course of Semester 1. We briefly present some concepts and theory here.

1.2.3 The Indifference Curve

Indifference curve is a locus of all the combinations of two goods that provide a constant level of satisfaction or utility to a consumer. Consider Fig. 1.1 below. Here combination bundles represented by point A, B, C give the consumer same level of utility, so that A $\sim$ B $\sim$ C.

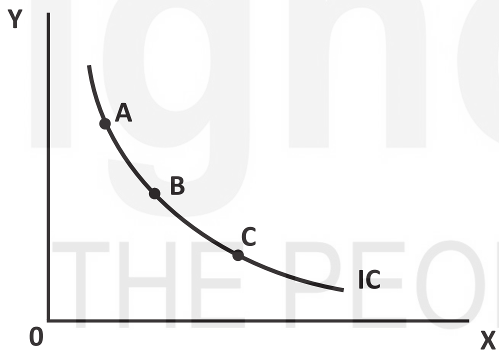

Fig. 1.1: An Indifference Curve

In Fig. 1.2 (a) and (b), we represent the set of bundles (given by the shaded region) weakly preferred to bundle A, and the set of bundles strictly preferred to bundle A, respectively. As you may notice,

In part (a) indifference curve forms the part of the set (the shaded area) of the bundles weakly preferred to bundle A. For instance, consumer will be indifferent between bundle B which belongs to this set and bundle A, as both are a part of the indifference curve, whereas bundle C which also is a part of this set, will be strictly preferred to bundle A or B, as it contains more of both the goods (X and Y) than is contained in bundles A or B.

In part (b) indifference curve is not included in the set (the shaded area) of bundles strictly preferred to bundle A, to show which we have constructed a dotted curve. Here, consumer is indifferent between bundle A and B, the reason bundle B does not forms the part of the set of bundles strictly preferred to bundle A. Bundle C on the other hand is strictly preferred to bundle A and thus forms the part of this set.

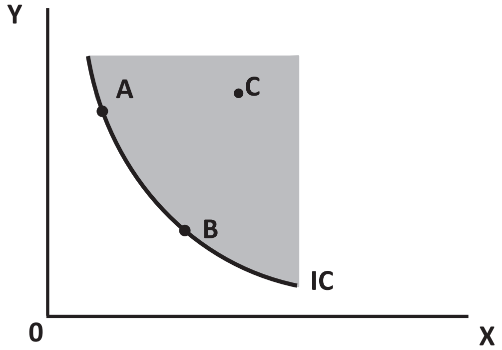

Fig. 1.2 (a): Set of Bundles Weakly preferred to A

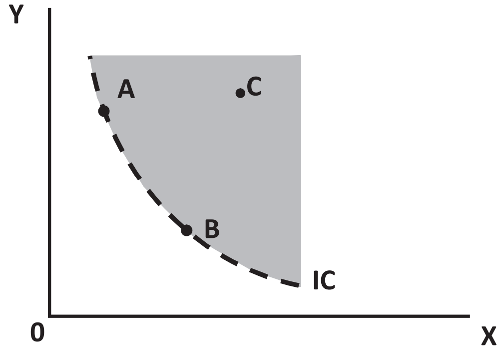

Fig. 1.2 (b): Set of Bundles Strictly preferred to A

Indifference Map

Entire set of indifference curves reflecting tastes and preference of a consumer in the form of different utility levels for the two goods is referred to as the indifference map. In Fig. 1.3, IC_1, IC_2, IC_3 represent such a set.

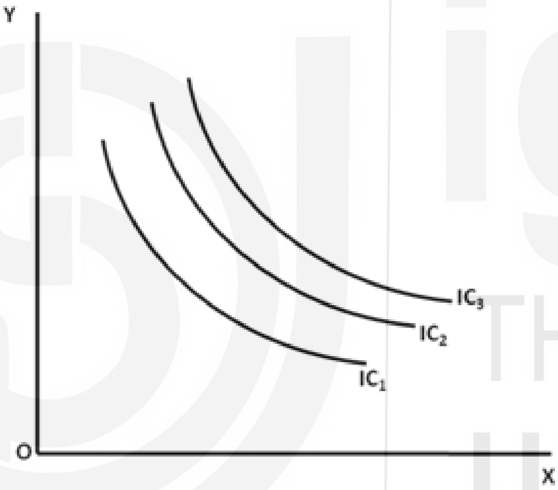

Fig. 1.3: Indifference Map

1.2.4 Well-behaved Preferences

In addition to the assumptions of reflexivity, transitivity and completeness, we usually make two further assumptions about consumers' well-behaved preferences. A preference relation is said to be "well-behaved" if it is monotonic and convex.

i) **Monotonicity:** Monotonic preference means that a rational consumer always prefers more of a commodity as it offers him a higher level of satisfaction. Monotone preferences essentially say that "more" is preferred to "less".

A consumer's preferences are said to be *weakly monotonic* if, given a consumption bundle A (X_1, Y_1), the agent prefers all consumption bundles B (X_2, Y_2), that have more of every good, *i.e.*, $X_2 > X_1$ and $Y_2 > Y_1$ (*a two commodity framework*) implies B $\succ$ A. A consumer's preferences are said to be *strongly monotonic* if, given a consumption bundle A (X_1, Y_1), the agent prefers all consumption bundles B (X_2, Y_2)

that have more of at least one good, and not less in any other good, *i.e.*, either $X_2 > X_1$ and $Y_2 = Y_1$ *or* $X_2 = X_1$, $Y_2 > Y_1$ (*a two commodity framework*) imply $B \succ A$. This assumption simply says— "the more, the better", so that a consumer prefers consuming more of a good to consuming less of it. That is, considering two bundles A and B, with bundle B having at least as much of all the goods as bundle A, and more of one, then $B \succ A$. This implies that indifference curve has a negative slope. You may observe this yourself (just think of a positively sloped indifference curve representing bundles of commodities with more of both the goods).

Note that, assumption of monotonicity cannot determine the order of two bundles if one bundle has higher quantity of some commodities and smaller quantity of others.

ii) **Convexity:** The assumption of convexity says that weighted average of commodity bundles is preferred to extreme bundles. Consider two commodity bundles A and B on the indifference curve in Fig. 1.4. Weighted average of these bundles will be given by any point (depending upon the weight given to extreme bundles) on the line connecting both of them. As you may notice, the weighted average points lie on the area representing bundles which are preferred to the indifference curve on which extreme bundles (A and B) lies. This explains why consumer prefers weighted average to extremes. The assumption of convexity implies consumer's preference is subject to diminishing marginal utility.

Symbolically, bundle C, where C is given by $tA + (1 - t)B$ or $[tX_1 + (1 - t)X_2, tY_1 + (1 - t)Y_2]$ with $t \in [0,1]$ will be preferred to bundle A (X_1, Y_1) or B (X_2, Y_2).

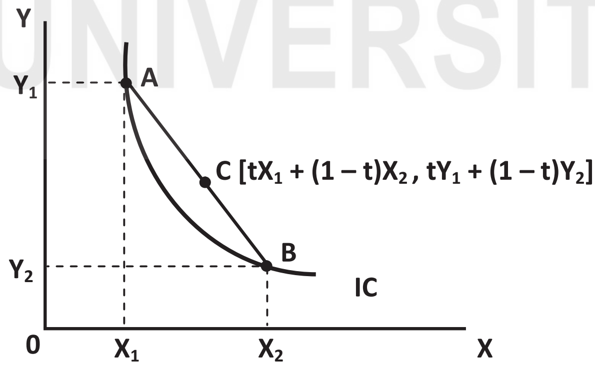

Fig. 1.4: Convex preferences

1.2.5 Marginal Rate of Substitution (MRS)

MRS is the rate at which consumer is willing to trade-off consumption of one commodity for consumption of the other, without affecting his level of satisfaction. Consider Fig. 1.5, suppose consumer is initially consuming bundle A. If he increases consumption of good Y by ΔY and reduces that of good X by ΔX, then marginal rate of substitution between good X and Y (MRS_{XY}) will be given by $\frac{\Delta Y}{\Delta X}$.

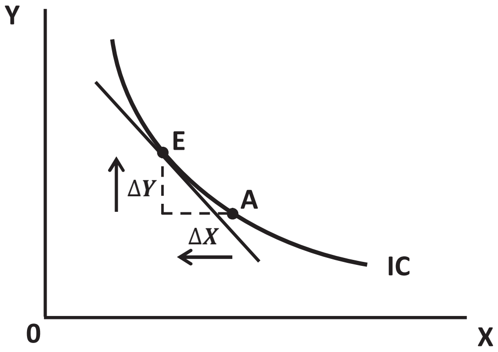

Fig. 1.5: Marginal Rate of Substitution

If we allow ΔX and ΔY to be very small, the ratio $\frac{\Delta Y}{\Delta X}$ will approach slope of IC at point E, which is then given by the slope of the tangent (i.e. $\frac{dY}{dX}$) to the point E. Thus, with infinitesimal small ΔX and ΔY, MRS_{XY} represent slope of indifference curve at a point. Mathematically,

$$MRS_{XY} = -\lim_{\Delta X \to 0} \frac{\Delta Y}{\Delta X} = -\frac{dY}{dX}$$

That is, MRS_{XY} represents the limiting value of the ratio $\frac{\Delta Y}{\Delta X}$ as the denominator approaches zero. As you may notice, we have inserted a negative sign in order to get MRS_{XY} as a positive quantity. This is done because indifference curve is negatively sloped with ratio $\frac{\Delta Y}{\Delta X}$ already possessing a negative sign.

1.2.6 Properties of Indifference Curves

1) Indifference curves are negatively sloped.
2) Indifference curves describing two distinct levels of utility cannot intersect or cross each other. This is a result of the transitivity assumption.

   Proof: Consider Fig. 1.6, where we have two intersecting *alleged* ICs, IC_1 and IC_2. Consider points A and B, they lie on IC_2 therefore, A ~ B.

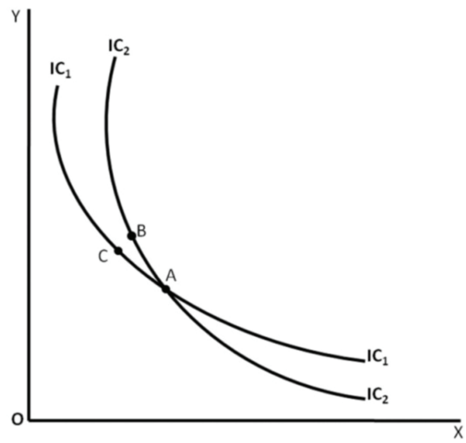

Fig. 1.6

But A and C lie on IC_1, therefore $A \sim C$. However, B lies to North-east of C, therefore $B \succ C$. Hence we have a contradiction: $A \sim C$ and $A \sim B \Rightarrow B \sim C$ (from transitivity assumption), but $B \succ C$. Both these statements cannot hold together. Therefore, IC_1 and IC_2 cannot intersect.

3) An indifference curve is usually convex to the origin. That is, slope diminishes as consumer substitute commodity X for commodity Y. This results from the fact that MRS_{XY} falls as we move down along an indifference curve. As more and more units of commodity X are consumed, consumer is willing to give up lesser and lesser units of commodity Y. The reason for this is that marginal utility from consumption of a good falls as more and more units of it are consumed. So with increase in consumption of X, marginal utility of it falls, while marginal utility of commodity Y rises, resulting in consumer's willingness to give up fewer units of Y for X.

Check Your Progress 1

1) Differentiate between strict and weak preference.

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2) Explain the three important properties of preferences with examples.

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3) Explain the properties of indifference curves?

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4) What is the notion of:

i) Convexity

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ii) Monotonicity

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1.3 UTILITY

Synonymous with “satisfaction”, “well-being”, “pleasure”, etc., the concept of utility has evolved over time in economic literature. Alfred Marshall considered utility to be real, measurable, *i.e.* of cardinal scale. He had assumed that utility accruing to a consumer from consumption of a unit of a commodity could be measured in terms of a cardinal number having the unit called ‘util’. But the problem in this approach was that of unavailability of an appropriate measurement index giving that cardinal number. For instance — whether 1 util for consumer A is equivalent to 1 util for consumer B? or does increasing utility from 1 to 2 utils indicate doubling of the utility attained? — are some of the issues left unsolved by the cardinal approach. Ordinal approach by J.R. Hicks, being unit-free, was able to overcome these problems, by way of ‘ranking’ and ‘preference-ordering’ bundles. According to this approach, one could ‘order’ different bundles as ‘better’, ‘worse’, or ‘as good as’, but saying nothing about the strength of the preferences.

1.3.1 Utility Function and Preferences

A utility function (U) defines the level of utility attained by a consumer as a function of the amount of commodities consumed by him. The function takes the following form:

$$U_1 = U(X, Y)$$

where X and Y represent the quantities of commodities consumed by the consumer, and U_1 is the utility level (a number) obtained from consuming this commodity bundle.

The utility function can be derived from preferences, or in other words, preferences can be represented by utility functions. The function U assigns values to different bundles that exactly reflect consumer’s preferences, that is,

$$U(A) \succeq U(B) \text{ if and only if } A \succeq B$$

Now, here A and B represent bundles of commodities X and Y.

As you may notice above, the preference relation among the bundles is preserved by the utility function. That is, if a consumer weakly prefers bundle A to B, then utility obtained from consumption of bundle A will not be less than that obtained from consumption of bundle B. For utility function to represent preference ordering, preference relation must be complete, transitive, reflexive, and continuous. By continuity it means that the preference relation has "no jumps”, that is, if bundle A is strictly preferred to B, then bundles “close to” A are also preferred to B.

Remember: Values given by utility functions only have ordinal meaning, that is, only the ordering of the numbers matter and not the cardinality (the difference between the numbers). It simply means a utility function U representing preference for bundles A, B and C by assigning utility numbers as U(A) = 1, U(B) = 2 and U(C) = 3, will represent the same preferences if utility numbers would have been U(A) = 1, U(B) = 1.5 and U(C) = 2. This implies that same preferences could be represented by many utility functions.

Relation between two Utility functions representing same Preferences: Considering two utility functions— U and V. They both will represent same preference if and only if, there exists a strictly increasing function F such that

$$V = F(U), \text{ such that } F'(U) > 0$$

For instance, if we define V= U + C, where C is any constant, then $V(A) \succeq V(B)$ if and only if $U(A) \succeq U(B)$, if and only if $A \succeq B$. Function V is any transformation of function U that leaves the preference ordering representation intact. Such transformations are called *monotonic* transformation. Thus, if a utility function represents a consumer's preferences, then a monotonic transformation of that utility function will result in another utility function representing the same preferences.

1.3.2 Utility Function and Indifference Curve

We just discussed— a utility function $U_1 = U(X, Y)$ represents the preferences of a consumer. Also, we know that an Indifference curve links bundles which yield the same level of utility. Thus, an indifference curve can be graphically represented by a function of quantities of two commodities yielding same level of utility, or in other words, a representation of a utility function with a given level of utility value. We can obtain such a function by setting U_1 on the left-hand side of the utility function equal to some constant value, like 10, 12, etc. and then express Y as a function of X. Let us consider an example:

Let our utility function be given by, U(X, Y) = XY, setting it equal to a constant number 'K', we get,

$$XY = K$$

It can be solved for Y, such that $Y = \frac{K}{X}$

Now, for different levels of K, *i.e.* 1, 2, 3, we can obtain a set of indifference curves, which constitute our indifference map in Fig. 1.7.

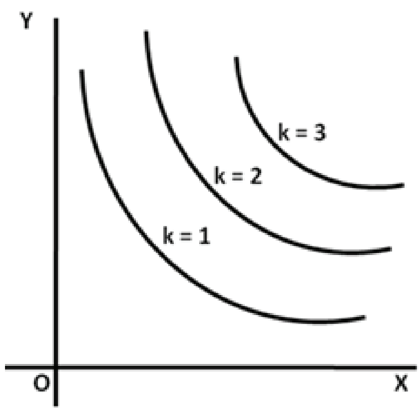

Fig. 1.7

1.3.3 Marginal Utility (MU)

Marginal utility is the change in total utility resulting from a small change in the quantity of one of the commodities consumed holding constant the quantity of the other commodity. For a given utility function U(X,Y), marginal utility with respect to commodity X will be given by,

$$MU_X = \lim_{\Delta X \to 0} \frac{\Delta U}{\Delta X} = \lim_{\Delta X \to 0} \frac{U(X+\Delta X, Y) - U(X,Y)}{\Delta X}$$

This implies, change in total utility resulting from change in consumption of commodity X, $\Delta U = MU_X \, \Delta X$

Similarly, marginal utility with respect to commodity Y will be given by,

$$MU_Y = \lim_{\Delta Y \to 0} \frac{\Delta U}{\Delta Y} = \lim_{\Delta Y \to 0} \frac{U(X, Y+\Delta Y) - U(X,Y)}{\Delta Y}$$

With change in total utility resulting from change in consumption of commodity Y,

$$\Delta U = MU_Y \, \Delta Y$$

When ΔX and ΔY approaches zero, or in other words, when change in the commodities become infinite small, then the marginal utilities are derived as a partial derivative of the utility function with respect to X in case of MU_X and with respect to Y in case of MU_Y, that is

$$MU_X = \frac{\partial U(X,Y)}{\partial X} \text{ and } MU_Y = \frac{\partial U(X,Y)}{\partial Y}$$

Remember: The magnitudes of MU will depend upon the specific utility function reflecting consumer's preference behaviour, that is, their own magnitude will have no particular significance. Despite having no behavioural content of its own, the MU can help in calculating something with behavioural content. This is marginal rate of substitution (MRS).

1.3.4 Relationship between MU and MRS

Indifference curve is a locus of those bundles of X and Y which give same level of utility or satisfaction to our consumer. Therefore, it can be represented in a functional form:

$$U(X, Y) = U_1$$

where U_1 represents a given utility level.

Differentiating this function totally, we get

$$\frac{\partial U(X,Y)}{\partial X} \, . dX + \frac{\partial U(X,Y)}{\partial Y} \, dY = dU_1$$

As utility remains constant along an IC, therefore dU_1 will be 0.

$$MU_X \, dX + MU_Y \, dY = 0$$

$$\left[\text{where } MU_X = \frac{\partial U(X,Y)}{\partial X} \text{ and } MU_Y = \frac{\partial U(X,Y)}{\partial Y}\right]$$

or $$MU_X \, dX = - MU_Y \, dY$$

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

This makes possible another interpretation of the MRS. Marginal Rate of Substitution is ratio of marginal utilities of the two goods.

1.3.5 Utility Functions and Underlying Indifference Curves: Some Examples

Let us now consider some examples of utility functions and the underlying indifference curves:

Perfect Substitutes

Commodities which are Perfect substitute to each other are said to have a constant rate of trade-off (MRS_{XY}) between them. Utility function in this case takes the form:

$$U(X, Y) = aX + bY, \text{ where } a, b > 0$$

where 'a' units of X can be substituted for by 'b' units of Y. Now, $MU_X = \frac{\partial U(X,Y)}{\partial X} = a$ and $MU_Y = \frac{\partial U(X,Y)}{\partial Y} = b$

slope is given by

$MRS_{XY} = \frac{MU_X}{MU_Y} \Longrightarrow MRS_{XY} = \frac{a}{b}$ (which is a constant, independent of X and Y)

Underlying indifference curve will be linear with a constant slope, $-\frac{a}{b}$ (refer Fig.1.8)

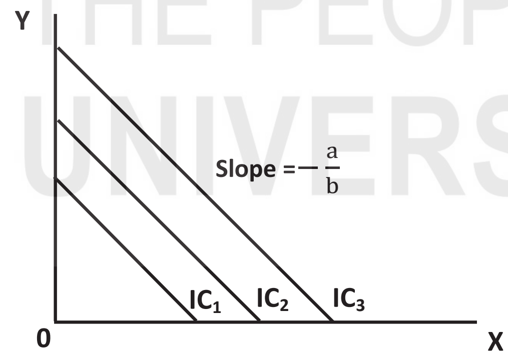

Fig.1.8: Indifference Curves when goods are Perfect Substitutes

Perfect Compliments

When commodities are perfect compliments, they are consumed in fixed proportion (not necessarily 1:1). Utility function takes the form:

$$U(X, Y) = \min(aX, bY), \qquad \text{where } a, b > 0$$

Indifference curves will have L-shape with kinks at points A, B, C, where aX = bY (refer Fig. 1.9). MRS_{XY} equals 0 along the vertical part of the curve, and infinity along the horizontal part of the curve, whereas, along the kinks, MRS_{XY} is not defined (as you may notice no unique tangent can be drawn at the kinks).

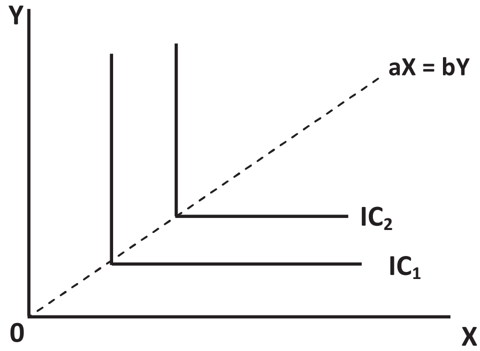

Fig. 1.9: Indifference Curves when goods are Perfect Complements

Cobb-Douglas

Cobb-Douglas utility function is used very often in economic analysis. It is specified as:

$$U(X, Y) = X^c Y^d$$

where positive numbers c, d, describes relative importance of the commodities.

$$MRS_{XY} = \frac{MU_X}{MU_Y} \Longrightarrow MRS_{XY} = \frac{cX^{c-1}Y^d}{dX^cY^{d-1}} = \frac{c}{d}\frac{Y}{X}$$

In the utility function $U(X, Y) = X^c Y^d$, let the utility level be K, *i.e*. we have $K = X^c Y^d \Longrightarrow Y = K^{1/d} X^{-c/d}$. Substituting value of Y in expression for MRS_{XY}, we get

$$MRS_{XY} = \frac{c}{d} K^{1/d} X^{-(c+d)/d}$$

Here MRS_{XY} decreases $(\frac{\partial MRS_{XY}}{\partial X} < 0)$ with increase in X, that is, MRS_{XY} is diminishing as we move down the indifference curve, resulting in convex-shaped ICs. General shapes for Cobb-Douglas indifference curves are indicated in Fig. 1.10a and 1.10b. Note that shapes vary as per relative magnitudes of c and d.

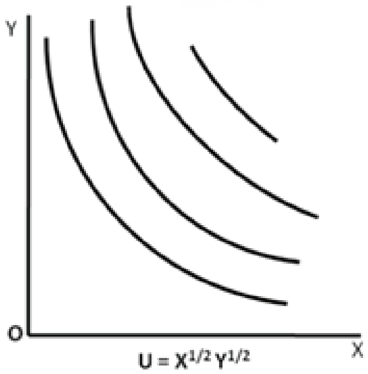

Fig. 1.10 (a)

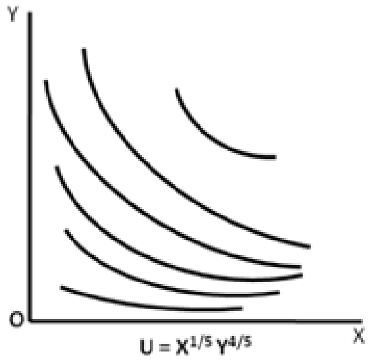

Fig. 1.10 (b)

One reason for popularity of C-D indifference curves is that these are well behaved indifference curves. The formula $U = X^c Y^d$, where c + d = 1 is the simplest algebraic expression that generates well-behaved ICs. Their monotonic transformation will also give same well behaved set of ICs. For example: if we have $U(X, Y) = X^c Y^d$, then a utility function given by $V = \ln [U(X, Y)] \Longrightarrow V = \ln (X^c Y^d) = c \ln X + d \ln Y$ gives the same preference relation or set of ICs. We can generate similar ICs through another transformation.

We have $\quad U(X, Y) = X^c Y^d$

Raising utility function to the power $\frac{1}{c+d}$, we get

$$[U(X, Y)]^{1/(c+d)} = X^{c/(c+d)} . Y^{d/(c+d)}$$

Assuming $a = \frac{c}{c+d}$, then $1 - a = 1 - \frac{c}{c+d} = \frac{d}{c+d}$

Now, we can rewrite the above function as

$$U(X, Y) = X^a Y^{1-a}$$

Thus, a monotonic transformation of a Cobb-Douglas utility function will be Cobb-Douglas function whose exponents add up to unity.

Quasi-linear

Quasi-linear utility function is a function which is linear in one commodity (let say Y) and non-linear in the other (here X), that reason it is called quasi-linear. The function is given by

$$U(X, Y) = f(X) + Y \;;\; f'(X) > 0,\; f''(X) < 0$$

Now, MRS_{XY} will be given by, $MRS_{XY} = \frac{MU_X}{MU_Y} \Longrightarrow MRS_{XY} = f'(X)$.

Note here that MRS_{XY} only depends upon X and not on Y; hence ICs are parallel shifts of each other as shown in Fig. 1.11.

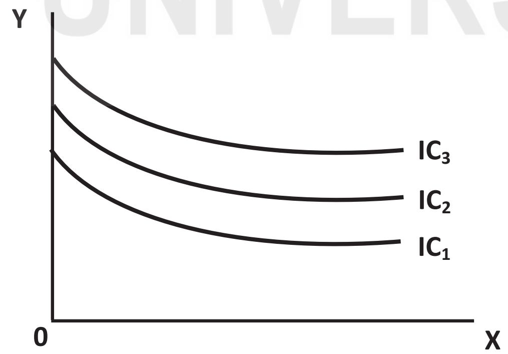

Fig. 1.11 : Quasi-linear (non-linear in X here)

An example of a quasi-linear function could be, $U(X, Y) = \ln X + Y$, where '*ln*' represents 'natural log— log to the base e'. Here, $MRS_{XY} = \frac{1}{X}$.

Check Your Progress 2

1) Distinguish between cardinal and ordinal utility.

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2) A preference relation, in order to be represented by a utility function must satisfy what all properties?

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3) Derive the relation between the Marginal rate of substitution and the marginal utilities.

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1.4 LET US SUM UP

The unit has described the theory of consumer's preferences. We had some detailed discussion about the concepts related to the preferences. We distinguished between weak and strict preferences, defined the notion of indifference curves and map, discussed assumptions about preferences, and particularly about well-behaved preferences. All this has set forth the base for analysing a particular preference behaviour of a consumer.

After some brief introduction of the concept of utility, we came across the function that assigns a numerical value corresponding to the level of utility obtained from consumption of commodities bundles — called the utility function. We established the link between the utility function and the indifference curve, as both represented the same preference ordering. Subsequently, the concept of marginal utility was explained, and further to this, relationship between marginal rate of substitution and marginal utilities was derived. We concluded the unit by presenting some examples of utility functions along with the underlying indifference curves, with both representing the same preference relation.

1.5 REFERENCES

1) Varian, HR, (1999). *Intermediate Microeconomics: A Modern Approach* 5^{th} Edition.

2) Newman , Peter, (1965). *Theory of Exchange*.

1.6 ANSWERS OR HINTS TO CHECK YOUR PROGRESS EXERCISES

Check Your Progress 1

1) Strict preference: A is at least as good as B and B is not at least as good as A. Weak preference: A is at least as good as B but A need not be superior to B.

2) Reflexivity, for all A, $A \succeq A$.

   Completeness, for all A, B either $A \succeq B$ or $B \succeq A$;

   Transitive, for all A, B and C, if $A \succeq B$ and $B \succeq C$ then $A \succeq C$

3) A normal well-behaved indifference curve is:

   i) Higher Indifference curve indicate higher level of utility;

   ii) Monotonically sloping downwards to the right;

   iii) Convex to the origin; and

   iv) Two indifference curves do not touch or intersect.

4) Refer Sub-section 1.2.4 and answer.

Check Your Progress 2

1) Cardinal Utility: Utility is exactly measurable, Ordinal utility: Utility is not exactly measurable but ordered so that one can compare utilities from two bundles and say which one is giving higher satisfaction.

2) For utility function to represent preference ordering, preference relation must be complete, transitive, reflexive, and continuous.

3) Refer Sub-section 1.3.4 and answer.