

Chapter - 4 Theory Of Consumer Behaviour

Cardinal Utility Approach

The concept of cardinal utility analysis was initially developed by H.H Grossen & popularized by famous neoclassical economist Alfred Marshall. According to Marshall, utility is a subjective phenomenon & it can be quantitatively measured by means of money as a measuring rod. It is based on the following assumptions:

1. Rational consumer : The consumer try to get maximum satisfaction with his limited given budget in a given price situation. That means a consumer is rational.
2. Cardinal measurement : According to cardinal utility analysis, utility can be measured quantitatively. For example, the total utility derived by consuming a commodity can be expressed in terms of cardinal numbers as 20, 30, 40 utils.
3. Constant marginal utility of money : Since the cardinal utility analysis used monetary unit as the measuring rod of utility, marginal utility of money is assumed to be constant.
4. Diminishing Marginal Utility : As more of a commodity is consumed the utility derived from successive units of it goes on diminishing.
5. Utilities are independent : Utilities of different commodities are assumed to be independent of one another so that utility of one commodity does not affect that of another at the time of consumption. The utility derived from the consumption of particular commodity is a function of the quantity of that commodity alone which is not affected by the consumption of another good. It does not depend on the quantity consumed of other commodity. $U = f(x_1, x_2, x_3 \dots x_n)$

Criticisms (Limitations) of Cardinal Utility Approach.

1. Irrational consumer: A consumer is influenced by taste, preference, habit, custom, etc. Hence, he may not get the maximum utility with his limited budget.
2. Cardinal measurement is not practical: According to this concept, utility can be measured in + number. But, utility is a psychological phenomenon. So, it differs from person to person & it is not possible to measure it in exact number. Cardinal measurement of utility is practically meaningless.
3. Constant marginal utility of money: It assumes that MU of money remains same to any increase or decrease in income of the consumer. But, in reality marginal utility of money decreases with increase in income & increases with decreases in income of the consumer.
4. Diminishing Marginal Utility: There are some exceptional goods which do not obey the law of diminishing marginal utility. The eg: of such goods are cigarette, drugs, wine, etc. The law of diminishing MU doesn't apply to such goods because consumer gets higher satisfaction when he consumes more & more units of such goods.
5. Utilities are independent: One of the strong assumption of this theory is utilities remains independent. But in practical life utilities remain dependent to each other because there are complementary & substitute goods. The utility of tea depends upon not only on quantity of tea but also on the availability of coffee. Car has no utility unless there is petrol(fuel).

Consumer's Equilibrium through Cardinal Utility Approach

1. In case of only one commodity (Law of diminishing marginal utility).
2. In case of more than one commodity (Law of substitution)

1. Law of Diminishing Marginal Utility

The utility obtained from every additional unit of commodity goes on decreasing is known as Law of Diminishing Marginal Utility.

Samuelson, "As the amt consumed of a good increases, the MU of the good leads to decrease".

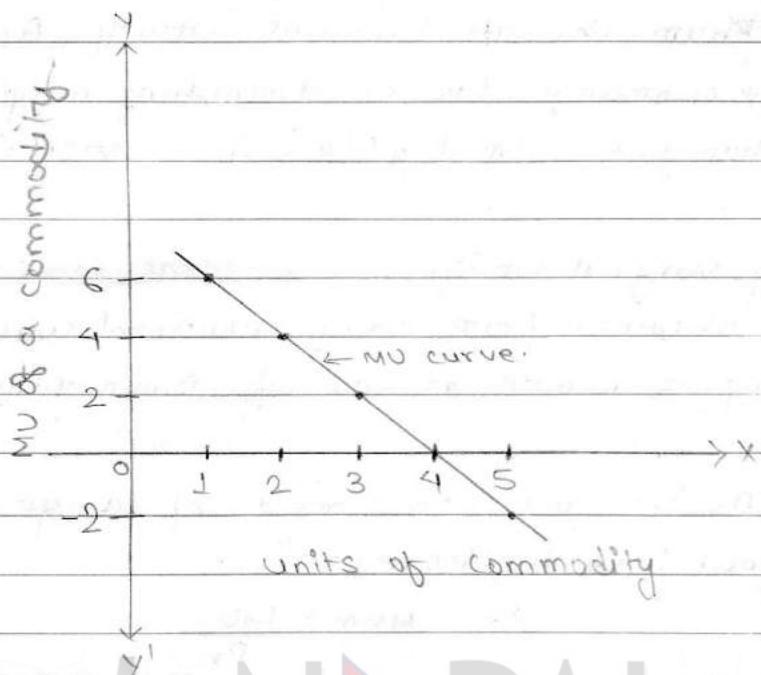
Assumptions:

$$MU_m = \frac{MU_x}{P_x}$$

- Rational consumer.
- Cardinal measurement of utility.
- Application of law of diminishing marginal utility.
- Constant marginal utility of money.
- Prices of commodities remain constant.

Units	TU	MU
1	6	6
2	10	4
3	12	2
4	12	0
5	10	-2

The table shows that, TU & MU at the consumption of diff. units. At the very beginning when a consumer is consuming 1st unit of the commodity, his TU & MU is 6 util. When he consumes successive units upto 3rd unit, TU increases continuously but MU decreases. TU becomes maximum when the consumer consumes 4th unit of commodity but MU is 0. When consumer consumes 5th unit he gets negative MU.



In the given figure, units of commodity & MU are measured along X-axis & Y-axis respectively. When a consumer consumes 1st unit of commodity he gain 6 utils of MU. When a consumer consume successive units upto 3rd unit there is positive MU. But when he consume 4th commodity MU becomes negative zero & at the 7th unit of a consumption MU become ~~2~~ negative (i.e.-2). According to the nature of MU, from the beginning MU is diminishing.

2. Law of Substitution | Equi-marginal utility

Consumer is in equilibrium when marginal utility of money expenditure on every commodity is equal to MU of that commodity.

Conditions for consumer's equilibrium

i $\frac{MU_X}{P_X} = \frac{MU_Y}{P_Y}$ $MU_X = MU$ of X $P_X = \text{Price of } X$
 $MU_Y = MU$ of Y $P_Y = \text{Price of } Y$

ii $(\text{expenditure on } X + \text{expenditure on } Y) = (\text{consumer's Income})$.

Assumptions

- Rational consumer
- Cardinal measurement of utility.
- MU of money remains constant
- Application of law of diminishing MU.
- Prices of commodities & income are given.
- Spent his income in two commodity.

Suppose there are two commodities X & Y

Units	MU_X	MU_Y	MU_X/P_X	MU_Y/P_Y
1	20	24	10	8
2	18	21	9	7
3	16	18	8	6
4	14	15	7	5
5	12	12	6	4
6	10	9	5	3

In order to have maximum utility consumer will purchase 6 units of X & 4 units of Y because it satisfies the following two conditions required for consumer's equilibrium.

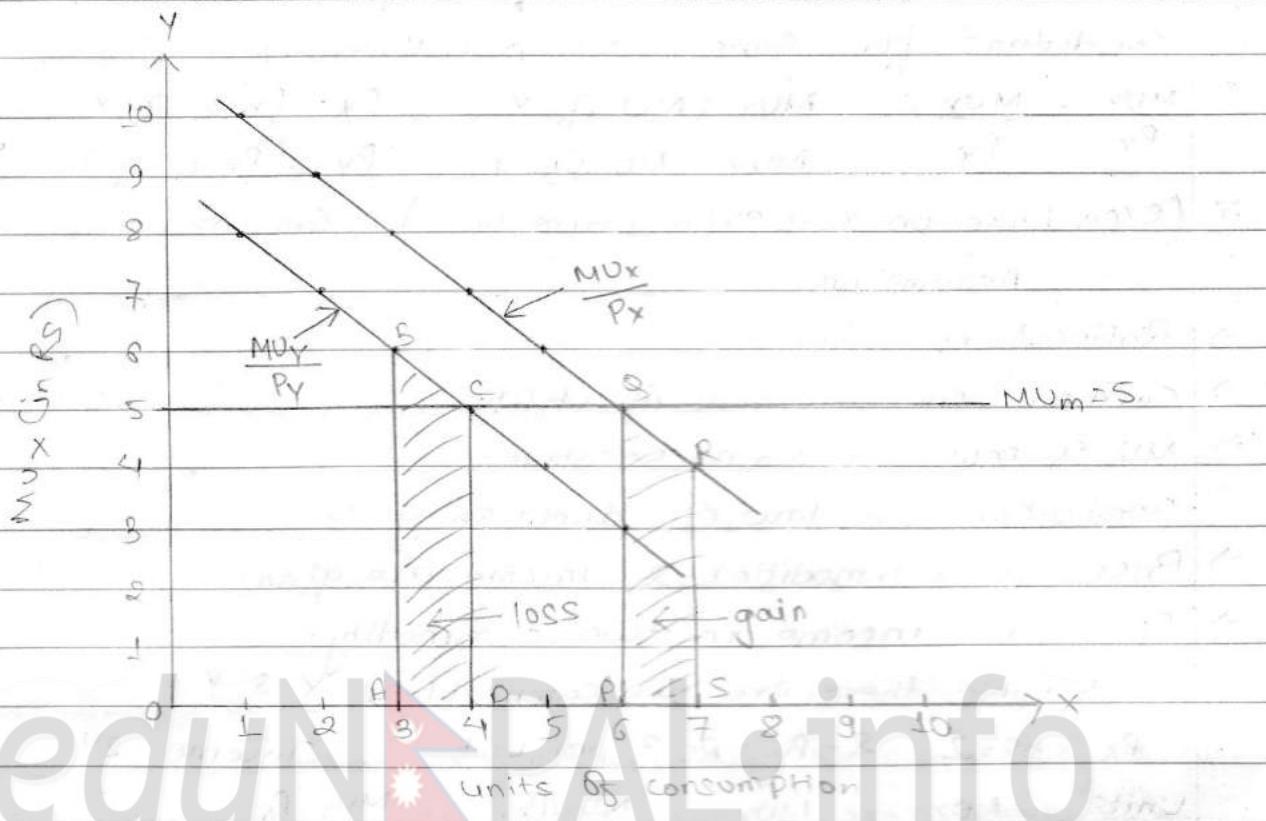
$$\text{At 4 units of } Y = \frac{MU_Y}{P_Y} = \frac{15}{3} = 5$$

$$\text{At 6 units of } X = \frac{MU_X}{P_X} = \frac{10}{2} = 5$$

$$\text{Exp. on } X + \text{Exp. } Y = \text{Income}$$

$$\text{Or, } P_X \cdot X + P_Y \cdot Y = \text{Income}$$

$$\text{Or, } 2 \times 6 + 3 \times 4 = 24$$



In the figure, MU of Commodities with their price ratio is measured along the Y-axis & units of consumption is measured along the X-axis. When the consumer consumes 4 unit of Y & 6 unit of X he gets the maximum utility that is $(20 + 18 + 16 + 14 + 12 + 10 + 24 + 21 + 18 + 15 = 168)$. In this situation, $\frac{MU_x}{Px} = \frac{MU_y}{Py} = MUM = 5$

So this is the equilibrium condition of the consumer. No other combinations with this money expenditure will provide him greater utility than this point. If consumer increase X for 7^{unit}, PQRS is the gain, for that he must reduce Y to 3 unit then ABCD will be the area of loss. Here, area of loss is greater than that of gain area i.e. $ABCD > PQRS$. So, consumer's equilibrium is there where, $\frac{MU_x}{Px} = \frac{MU_y}{Py} = MUM$

Ordinal Utility Analysis

Ordinal utility approach express, as a subjective phenomenon, utility only can be ranked and put in order not in cardinal number.

Assumptions

1. Immeasurability of utility → Utility or satisfaction from a commodity can't be measured cardinally but can be compared ordinally.
2. Ability to rank → The consumer has different preferences of the combinations of goods. These preferences can be ranked. The combination giving him highest satisfaction is assigned as the highest rank order. And the combination providing lowest satisfaction is assigned as the lowest rank order.
3. Weak ordering → The consumer can either prefer combination A or combination B or may be indifferent betⁿ them. It is said to be weak ordering. In the case of strong ordering there can only be relation of preference, not indifference.
4. Transitivity → If the consumer prefers combination A to B & B to C, he prefers A to C. Similarly, if he is indifference betⁿ A & B, B & C he is said to be indifference betⁿ A & C.
5. Diminishing marginal Rate of Substitution → As more & more units of commodity X is added to the combination, less & less units of commodity Y has to be satisfied for each additional units of X to get the same level of satisfaction.
6. Rational consumer → The consumer is rational he try to get the maximum satisfaction from the given budget constraint.
7. Non-Satiety → Non-Satiety means that the consumer has not reached the point of saturation in case of any commodity. Therefore, a consumer always prefers a larger quantity of all goods.

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Meaning of Indifference Curve

An indifference curve is a basic tool of Hicks & Allen, it is also known as ordinal analysis of demand. This shows different combinations of two goods that give the consumer same level of satisfaction. It is based on immeasurability of utility/satisfactions cardinally. Satisfaction can be compared ordinally.

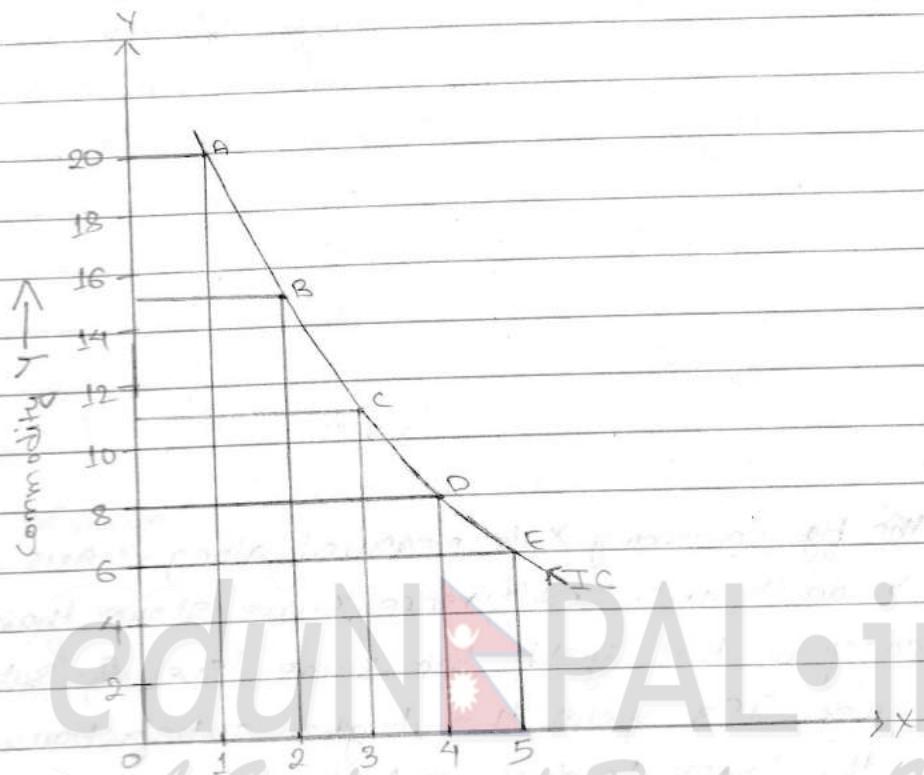
To understand an indifference curve it is based to begin with an indifference schedule. An indifference schedule is the list of combination of two goods arranged in such a way that each combination gives the consumer same level of satisfaction.

Indifference Schedule

Combination	Commodity X	Commodity Y	MRS _{XY}
A	1	20	5:1
B	2	15	4:1
C	3	11	3:1
D	4	8	2:1
E	5	6	

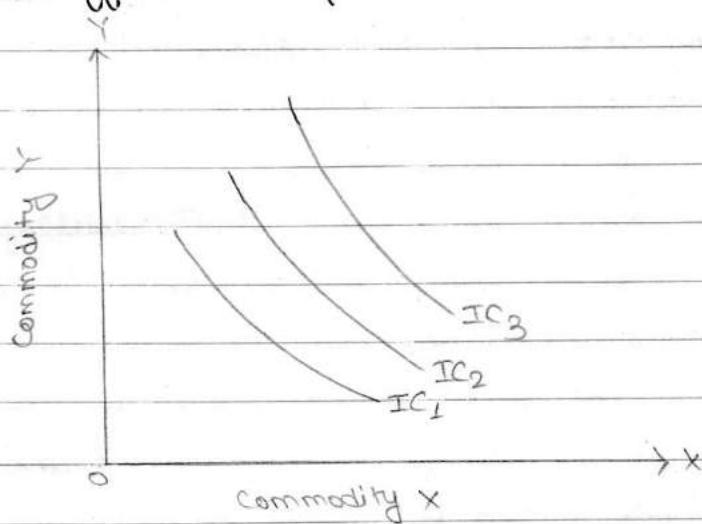
Consumer is indifferent among them in the indifference schedule. In the schedule the unit of X is increasing & that of Y is decreasing in decreasing rate. In the combination A there is $1x + 20y$, B, C, D & E combinations represent $2x + 15y$, $3x + 11y$, $4x + 8y$ & $5x + 6y$ respectively. All these combinations give the same level of satisfaction. Therefore, it is known as an indifference schedule.

Indifference Curve



In the fig, commodity X & commodity Y are measured along x -axis & y -axis respectively. The different combinations are plotted in a graph. The different points A, B, C, D & E are joined together to form an IC, that represent all combinations of two goods X & Y that provide the consumer same level of satisfaction. Locus of the point representing various combinations of two goods which yield same level of satisfaction. It is also known as Iso-utility curve.

Indifference Map



In the fig. commodity X is measured along x-axis whereas commodity Y on Y-axis. Indifference curve shows those combinations of two goods that yield the same level of satisfaction to the consumer. IC_3 yields the higher satisfaction whereas IC_1 yields the lowest level of satisfaction. A set of indifference curve is called indifference map.

The Marginal Rate of Substitution (MRS)

MRS is the rate at which one commodity can be substituted for another without affecting total satisfaction. The MRS is given by the slope of the Indifference curve.

Principle of Diminishing MRS

The MRS refers to the amount of one good that an individual is willing to give up for an additional unit of another good while maintaining the same level of satisfaction. For example, the marginal rate of substitution of good X for good Y (MRS_{XY}) refers to the amount

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of Y that an individual is willing to exchange per unit of X by maintaining the same level of satisfaction.

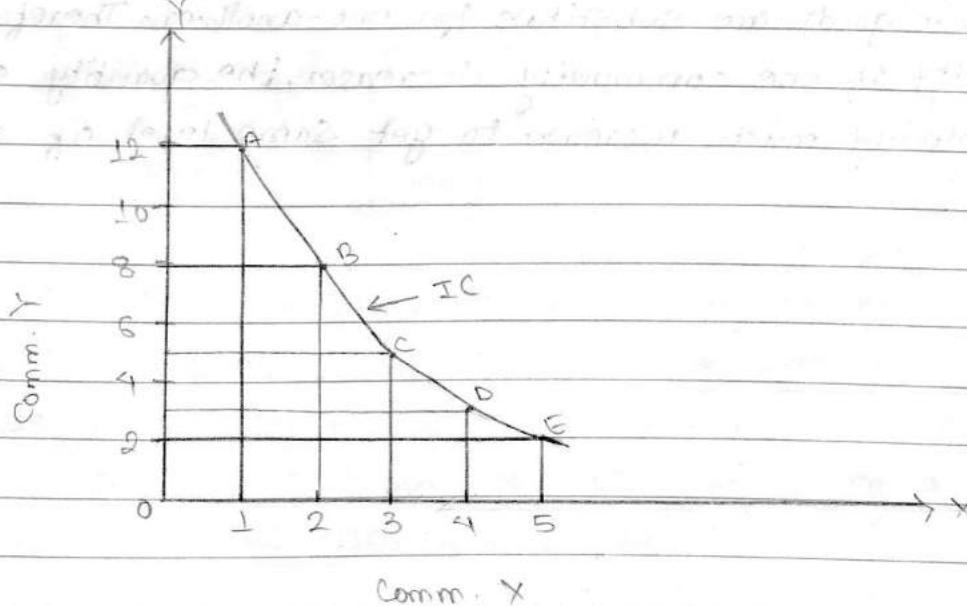
He is neither better off nor worse-off.

Combination Commodity X Commodity Y MRS_{XY}

A	1	12	-
B	2	8	4
C	3	5	3
D	4	3	2
E	5	2	1

In the schedule, the rate of substitution of good X for good Y are shown.

In the beginning, as the consumer moves from A to B he is ready to give up 4 unit of Y for the one extra unit of good X. In this process, his level of Satisfaction remains same. Similarly, when the consumer moves from combinations B to C, C to D & D to E, he is willing to sacrifice 3 unit, 2 unit & 1 unit of good Y for the addition one unit of X. Hence, MRS of X for Y is 3, 2 & 1 respectively. So, the table clarify that the rate of substitution is diminishing.



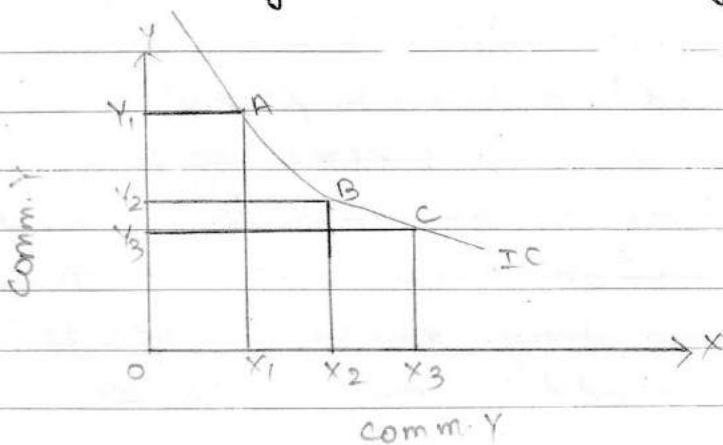
In the figure, starting at point A, the individual is willing to give up 4 units of Y for one additional unit of X & reaches point B on IC. Thus, $MRS_{XY} = 4$. Betⁿ points B & C, $MRS_{XY} = 3$, betⁿ C & D, $MRS_{XY} = 2$, betⁿ D & E, $MRS_{XY} = 1$. Thus, MRS_{XY} declines as the consumer moves down on the indifference curve. As a result IC is convex to the origin.

Cause of Diminish in MRS

- As more & more units of X are added to the combination the significance of X in terms of Y goes on diminishing. Hence, the lesser units of Y are given up for adding one more unit of X in the combination for getting same level of satisfaction.
- Commodities are imperfect substitute. Hence, MRS goes on diminishing.

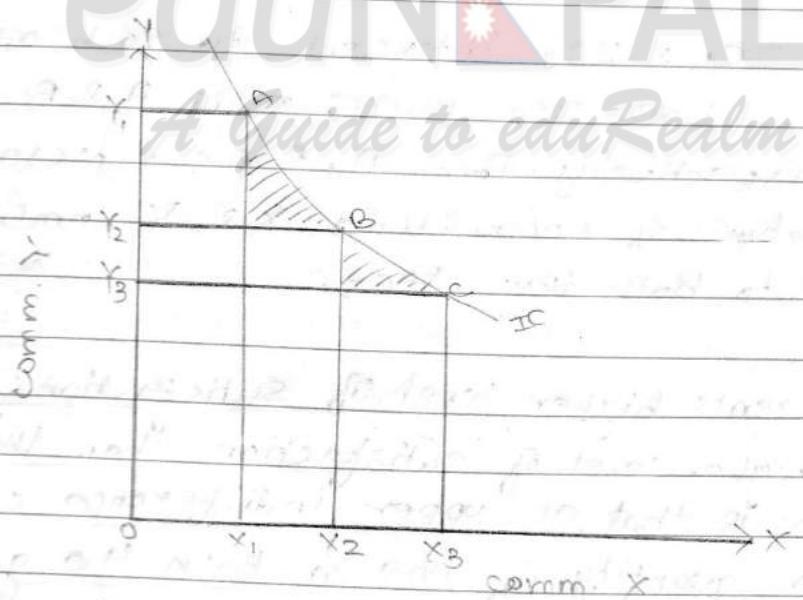
Properties of Indifference Curve

- IC has a negative slope: An IC slopes downward from left to right, i.e. it has a negative slope. Negative slopes shows that the two goods are substitute for one-another. Therefore, if the quantity of one commodity decreases, the quantity of the other commodity must increase to get same level of satisfaction.



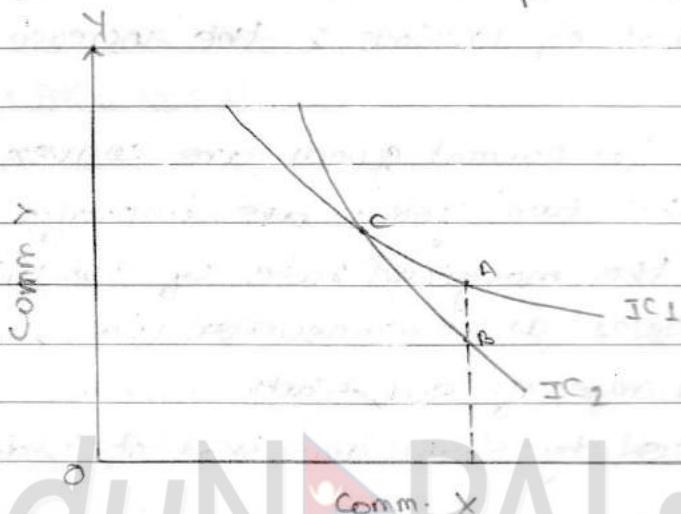
In the fig., when the consumer moves from point A to B, the quantity of Y is decreasing & the quantity of X is increasing. Keeping the level of satisfaction same, same thing happens as the consumers moves from point B to C but the decrease in Y is less than that of previous & the increase in X is equal.

2. Convex to origin: IC for normal goods are convex to the origin. This shows that the two goods are imperfect substitutes for one another & the marginal rate of substitution bet' the two goods decreases as a consumer moves along an IC. Diminishing marginal rate of substitution means that as the quantity of X increased by equal amt that of Y diminishes by smaller amount.



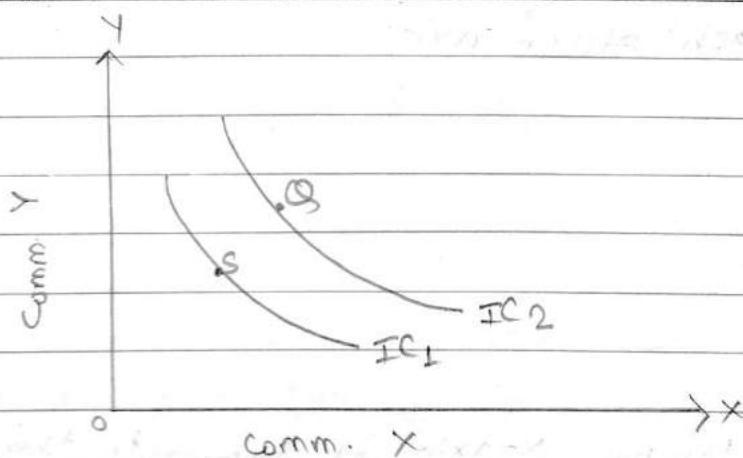
In the fig, IC is convex to the origin. Convexity of IC implies diminishing slope because consumer gives up less & less unit of Y in order to have equal additional unit of X. The slope of IC curve measures the MRS. Therefore, MRS also diminishes.

3. ICs never intersect each other or become tangent to one another: If two ICs interest or be tangent to each other it means that an IC indicates two diff. levels of satisfaction & which is not possible.



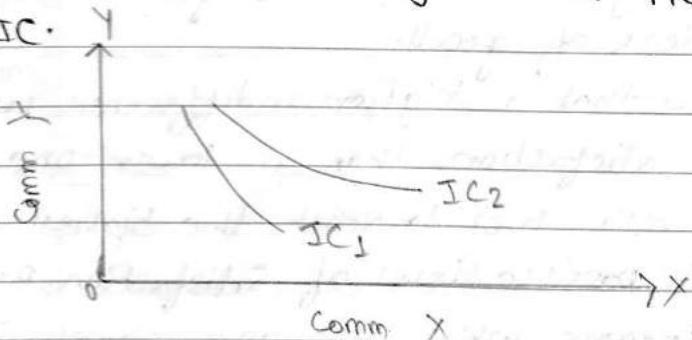
Two ICs, IC_1 & IC_2 intersect to each other at point C. C lies on both ICs where point A & B lie on IC_1 & IC_2 respectively. Point A, B & C represent three different combination of commodities X & Y combination. C is common to both the ICs.

- 4 Higher IC represents higher level of satisfaction: A higher IC represents higher level of satisfaction than the lower one. The reason is that an upper indifference curve contains larger quantity of one or both the goods than the lower one.



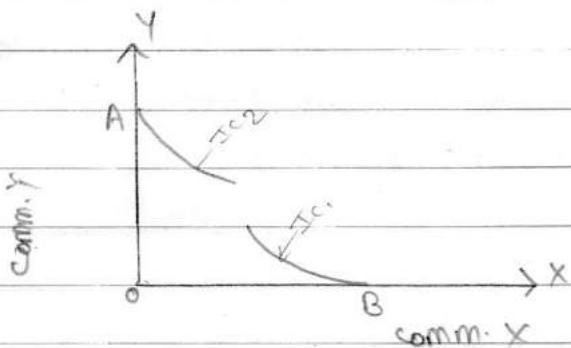
IC_1 & IC_2 are two diff. indifference curve. IC_2 is higher IC than IC_1 . Point Q lies on IC_2 & point S lies on IC_1 . Combination Q will give more satisfaction than combination S because the combination Q contains more quantity of both goods than combination S. Hence, the consumer prefers Q to S.

5 IC are not necessarily parallel: Though IC are falling negatively sloped to the right, yet the rate of fall will not be the same for all IC. In other word the diminishing MRS betⁿ the goods is not same in the case of all IC.



In the fig, the starting point of IC_1 & IC_2 is very near. ICs are nearer to X-axis & their gap becomes higher. The diminishing MRS betⁿ X & Y is not equal so IC_1 & IC_2 are not parallel.

6. IC doesn't touch either axis.



If IC_1 touches X -axis as shown in the fig. at B , the consumer will buy only commodity X & no Y . Similarly, if an IC_2 touches the Y -axis at A , the consumer will buy only commodity Y & no X . Such curves violate the assumption that the consumer buy two goods in a combination. Therefore IC do not touch either of the axes.

Price Line / Budget Line / Budget constraint

The budget line shows all those combination of two goods which a consumer can purchase by spending his given money income. A consumer can purchase any combination of two goods that lies on the budget line with his given money income at given market prices of goods.

We know that a higher indifference curve shows higher level of satisfaction than a lower one. Therefore, a rational consumer tries to reach the highest possible IC to get the highest possible level of satisfaction. But the consumer has limited income which acts as a constraint to his utility maximizing behavior. This is known as budget constraint. The budget constraint may be expressed as

$$M = P_x \cdot Q_x + P_y \cdot Q_y$$

$$\text{when, } Q_y = 0 \quad M = P_x \cdot Q_x$$

$$Q_x = 0 \quad M = P_y \cdot Q_y$$

where, P_x = Price of X Q_x = quantity of X commodity

P_y = Price of Y Q_y = quantity of Y commodity

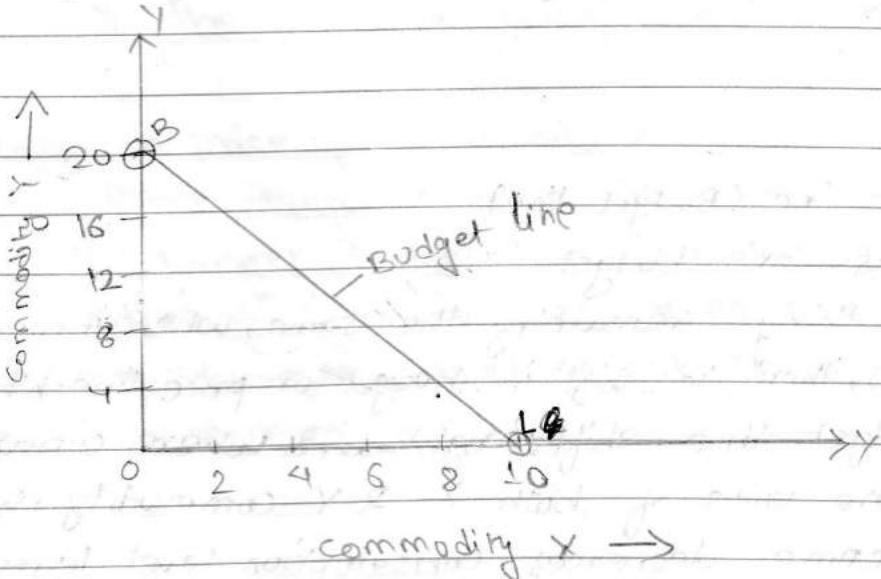
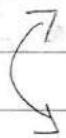
It is based on the following assumptions:

- i Consumer has to pay for the goods.
- ii A consumer has a limited income.

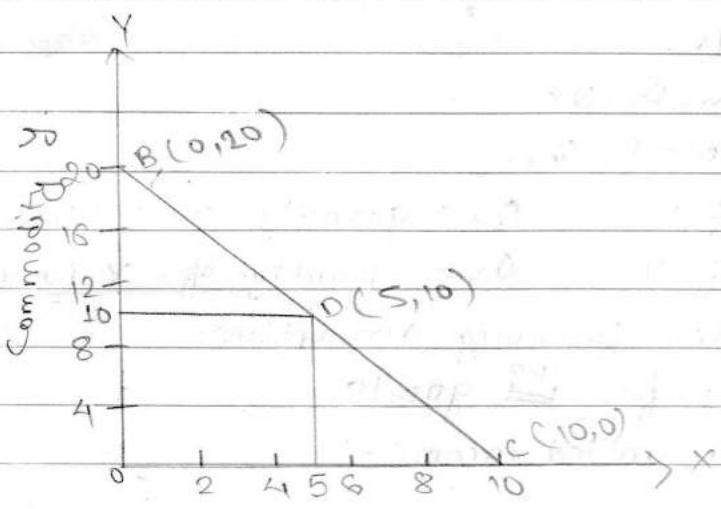
Suppose, $M = \text{Rs } 100$, $P_x = 10$, $P_y = 5$

$$Q_x = 10, Q_y = 20$$

Since, the consumer have Rs 100 budget if he spent all budget on X he buy 10 unit of X & if he spent all budget on Y he buy 20 unit of Y. Also he can get some other combination of Rs 100. The combination of X & Y are: B(0, 20) & L(10, 0) in the fig. BL is the budget line showing all possible combination of X & Y.







commodity $X \rightarrow$

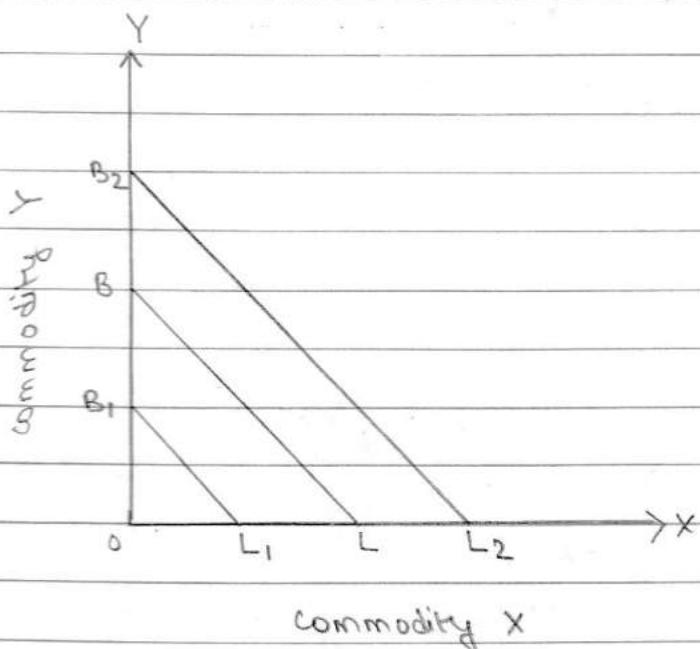
At the point D, 5 unit of X & 10 unit of Y can be purchase with RS 100. It can be noted that due to his limited budget he can't attain the combinations outside the budget line GL.

Combination of commodities, right on the budget line are ~~want~~ & unattainable because consumer's budget is not sufficient to buy the combination outside the budget line.

Shift in price line (Budget line)

1. Change in consumer's budget

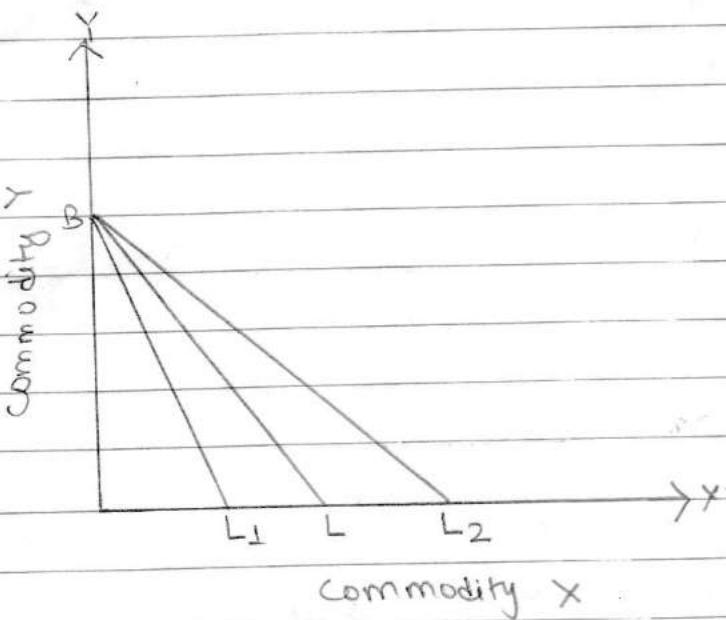
Other things remaining the same, when income of consumer changes, there is shift in budget or price line. When income increases, budget line shifts rightward, where consumer can consume more units of both X & Y commodity. On the other hand, if income decreases, consumption level decreases, which causes leftward shift in price line.



In the figure, original budget or price line is BL , when consumer's income decrease the price line shift downward to B_1L_1 where consumer consume less units of X & Y commodity. Similarly, when consumer's income increase the price line shift upward to B_2L_2 where consumer consume more units of X & Y respectively. In this case, all the slopes are parallel to each other because the prices of commodity are same.

2. Change in price of commodity X

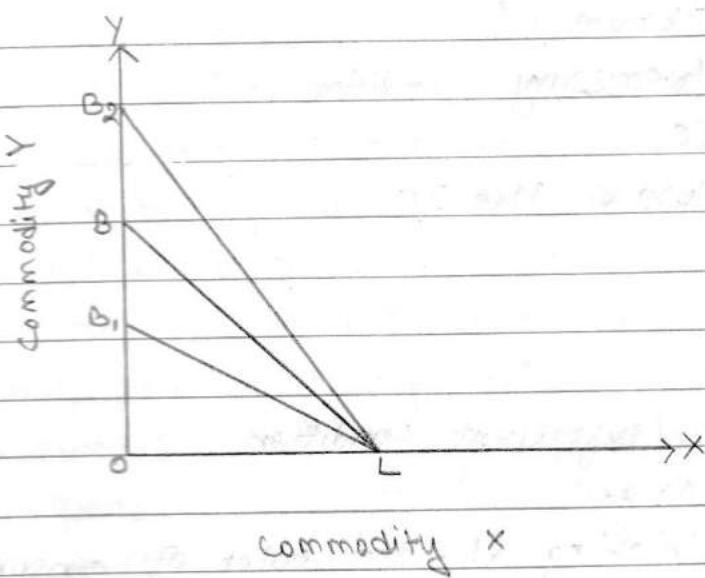
Other things remaining the same, when ^{Price} income of commodity X changes, budget line will swing upward or downward. When price of commodity X increases, purchasing capacity of consumer decreases, which causes the downward swing in price line & vice-versa.



In the figure, Original budget line is BL . Price of a commodity Y & consumer's income is constant. When price of commodity X increases, the purchasing capacity of commodity decreases which cause downward swing i.e $BB \rightarrow BL_1$. Similarly, when price of commodity X decreases, the purchasing capacity of commodity X increases which cause upward swing i.e BL_2 .

3. Change in price of commodity Y

Other things remaining the same, when price of commodity Y changes, budget line will swing downward & upward. When price of commodity Y increase, purchasing capacity of commodity decreases, which causes the downward swing in price line & vice-versa.



In the figure, original budget line is BL . Price of a commodity X & consumer's income is constant. When price of commodity Y increases, the purchasing capacity of commodity Y decreases which cause downward swing i.e. B_1L . Similarly, when price of commodity Y decreases, the purchasing capacity of commodity Y increases, which cause upward swing i.e. B_2L .

Consumer's Equilibrium on Ordinal Utility Approach

A consumer is said to be in equilibrium when he maximizes his utility (satisfaction) given his income & market prices.

Assumption

1. Indifference map with many ICS indicating different level of satisfaction (scale of preferences)
2. Rational consumer
3. Given budget which he spends on two goods.
4. Given prices of two goods x & y are constant
5. Homogeneous & divisible
6. Given taste & preferences of consumers.

Conditions for Equilibrium

1. 1st order condition / necessary condition

BL is tangent to IC

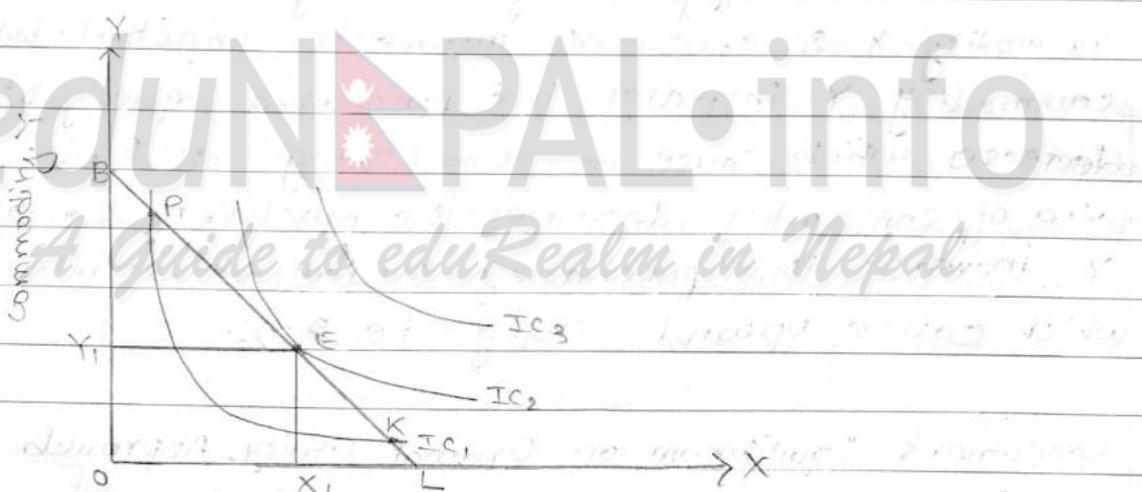
Slope of the BL = Slope of the IC

$$\frac{P_x}{P_y} = MRS_{xy}$$

2. 2nd order condition / sufficient condition

IC is convex to origin.

i.e. MRS_{xy} is diminishing at the point of consumer equilibrium.



In the fig. commodity X is measured along X-axis & commodity Y is measured along Y-axis. BL is the budget line. The consumer will derive maximum satisfaction or will be in equilibrium at point E of IC₂. At the tangent point E, the slope of budget line BL & IC₂ are equal & IC₂ is convex to the origin. It means that at point E both conditions of equilibrium are fulfilled. The slope of the

indifference curve shows the marginal rate of substitution of X for Y while the slope of the budget line indicates the ratio b/w the prices of two goods X & Y . Thus, at point E the MRS is equal to the ratio of the price of commodity. Any other points P & K which lie on the BL, yield lower level of satisfaction. Highest IC₃ is not attainable coz of his budget constraint. Hence, point E is equilibrium point & the consumer derives maximum satisfaction by consuming OX₁ quantities of good - X & OY₁ quantities of good - Y.

At point E,

$$MRS_{XY} = \frac{P_X}{P_Y}$$

$$\text{or, } \frac{MU_X}{MU_Y} = \frac{P_X}{P_Y}$$

$$\text{or, } \frac{MU_X}{P_X} = \frac{MU_Y}{P_Y}$$

Price effect on consumer's equilibrium (only price change)

P_X = decrease \rightarrow better off real income

P_X = increase \rightarrow worse off real income

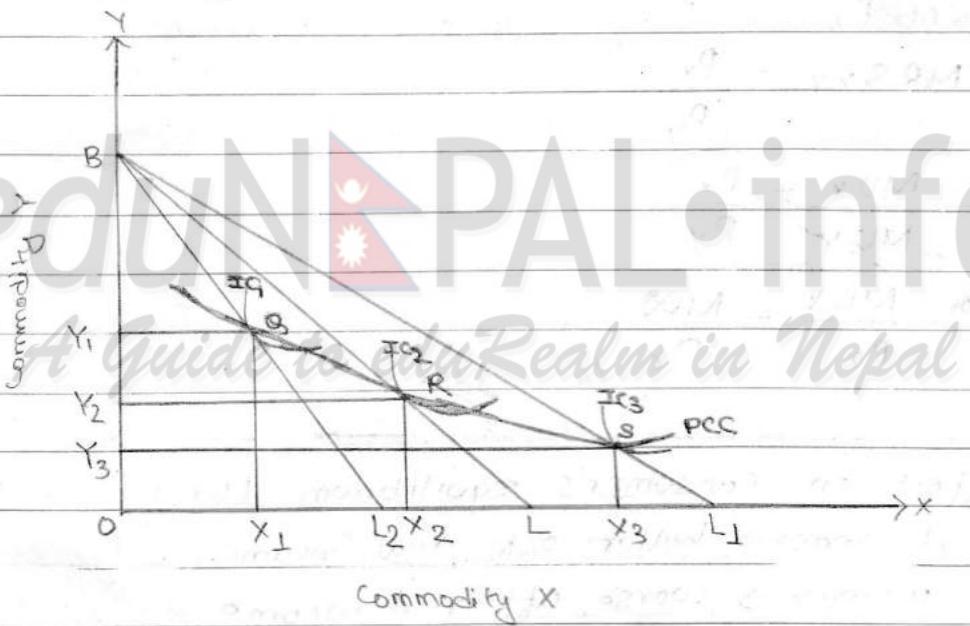
PCC - Price consumption curve

Price effect is the effect of the change in price of one commodity X on the purchase of two goods X & Y , price of another comm. Y , consumer's purchase taste & preferences unchanged.

When the price of the comm. falls the consumer is better off coz he can purchase more of the comm. X , his real income increases. He is worse off when the price of comm. X increases. He can purchase less of the comm. X . It can be explained with the help of PCC.

PCC is defined as the locus of various equilibrium point resulted from change in the price of a commodity, price of other commodity, consumer's budget, taste & preferences unchanged. When price of commodity X changes the equilibrium points also changes by joining all the equilibrium points we get a curve known as PCC. It shows the relationship between price of a commodity & purchase of two goods X & Y at different equilibrium position. PCC has different shapes.

Price effect is shown in figure.

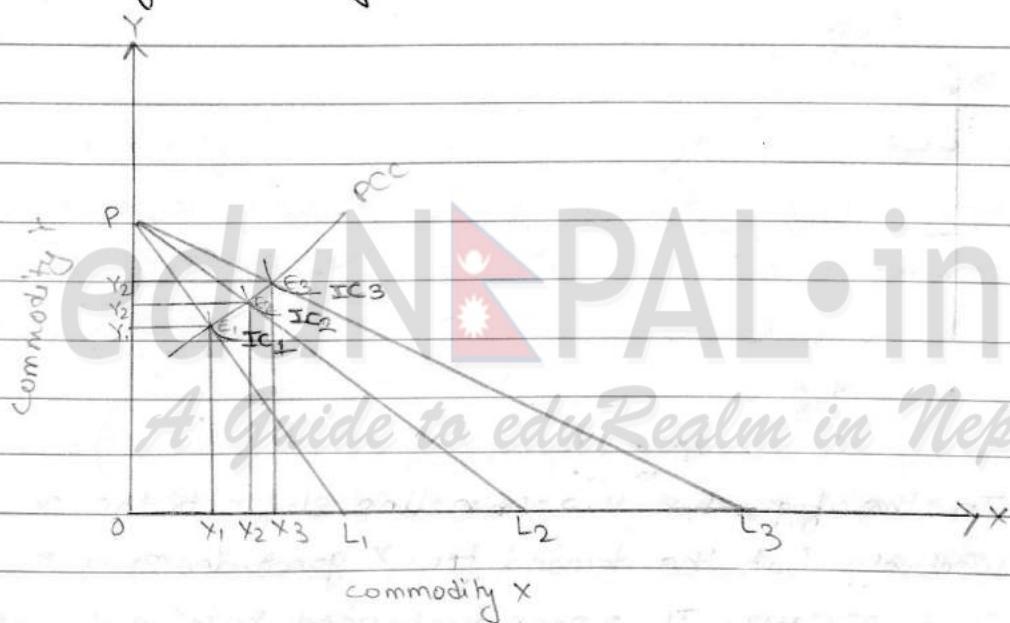


In the fig, initial budget line is BL where consumer is equilibrium in IC_2 at point R. Which determine OY_2 of commodity Y & OX_2 unit of commodity X. If price of X fall the budget line will swing rightward to BL_1 & new equilibrium points S will be obtained. Where consumer consume OX_3 & OY_3 units of X & Y commodity respectively. If the price of X increase, budget line will swing downward to BL_2 where consumer is equilibrium at point Q. If we join the

equilibrium points, we will get a curve called price consumption curve (PCC) which explain price effect on the consumer equilibrium. From the fig., we derive downward sloping PCC curve. The demand for goods is elastic.

Upward sloping PCC.

Upward PPC means as price of good X falls, the quantity demand for both goods X & Y increases.



In the fig., initial budget line is PL_1 & equilibrium is obtained at point E_1 . When price of X falls, the purchasing power of the consumer increases. The budget line shifts to the PL_2 . At that condition, the consumer is in equilibrium at point E_2 . In this equilibrium point, demands for both X & Y increases. Similarly, again budget line shifts to the position PL_3 due to fall in price & rise in purchasing power of the consumer. The consumer is in equilibrium to the higher Indifference curve IC_3 at point E_3 . By joining equilibrium points E_1 , E_2 & E_3 , we get an upward sloping PPC. The demand for goods is inelastic.

Backward Bending PCC

PCC slopes backward in case of Giffen goods. In case of these Giffen goods, the price & demand are positively related. Therefore, as the price of X falls, the demand for X decreases but the quantity demand for Y increases.

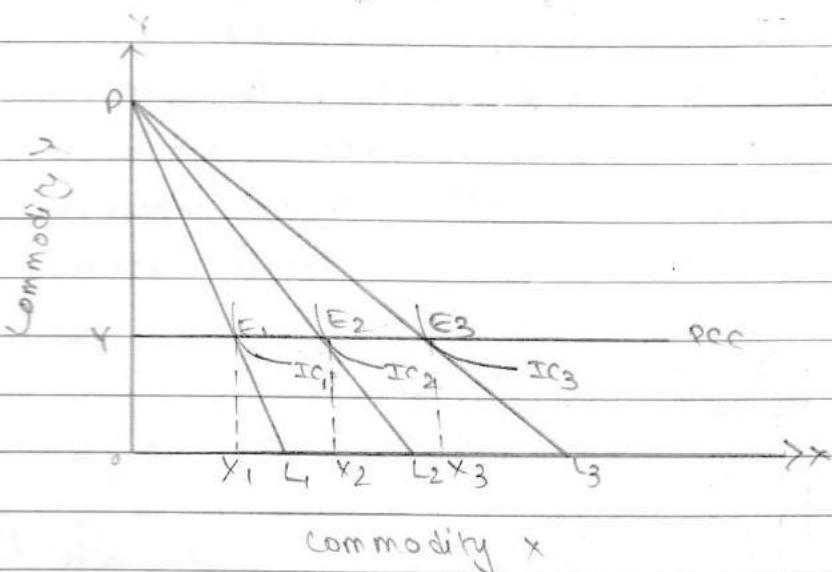


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In the fig., when the price line shifts to the positions PL_2 & PL_3 respectively. But the demand for X goods decreases & demand for Y good increases. It means that good X is giffen good. Therefore, PCC is backward bending.

Horizontal Straight line PCC.

Horizontal PCC means when the price of the good X falls its quantity purchased increases proportionately but quantity purchases of Y remain the same.



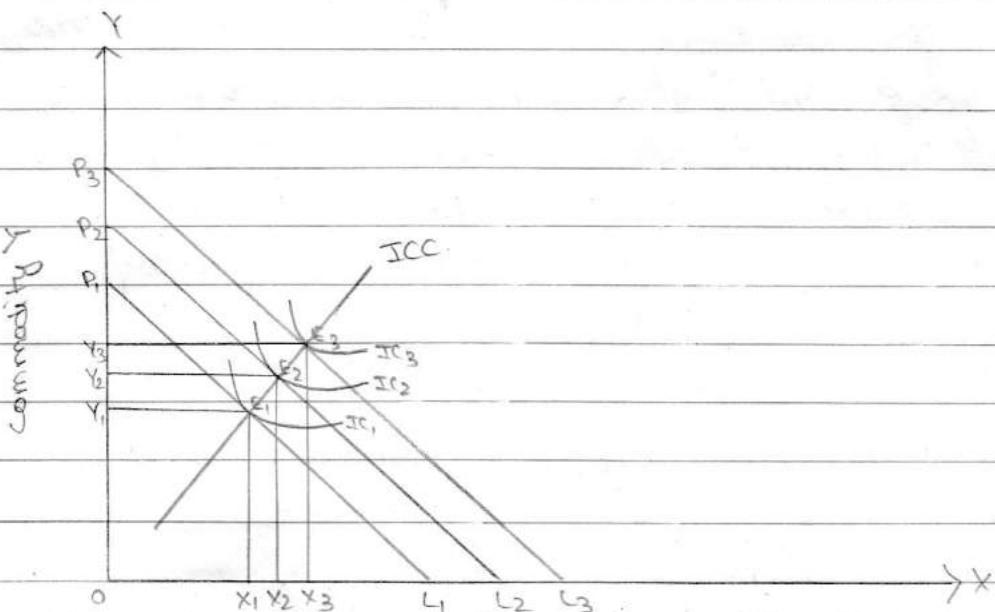
In the fig., PL_1 is the initial price line. With the fall in price of X , the line shifts to the PL_2 & PL_3 respectively. The Q_d for X increase proportionally from $0X_2$ to $0X_3$ but demand for Y remains same.

Income Effect (only income change)

Income effect is the effect on the quantity purchase as a result of change in money income, remaining all other things constant. When income of a consumer changes, his original equilibrium point will change. If money income increases, budget line shift upward where consumer can be equilibrium at higher Indifference Curve. & vice-versa.

I. Normal / Superior goods (positive income effect)

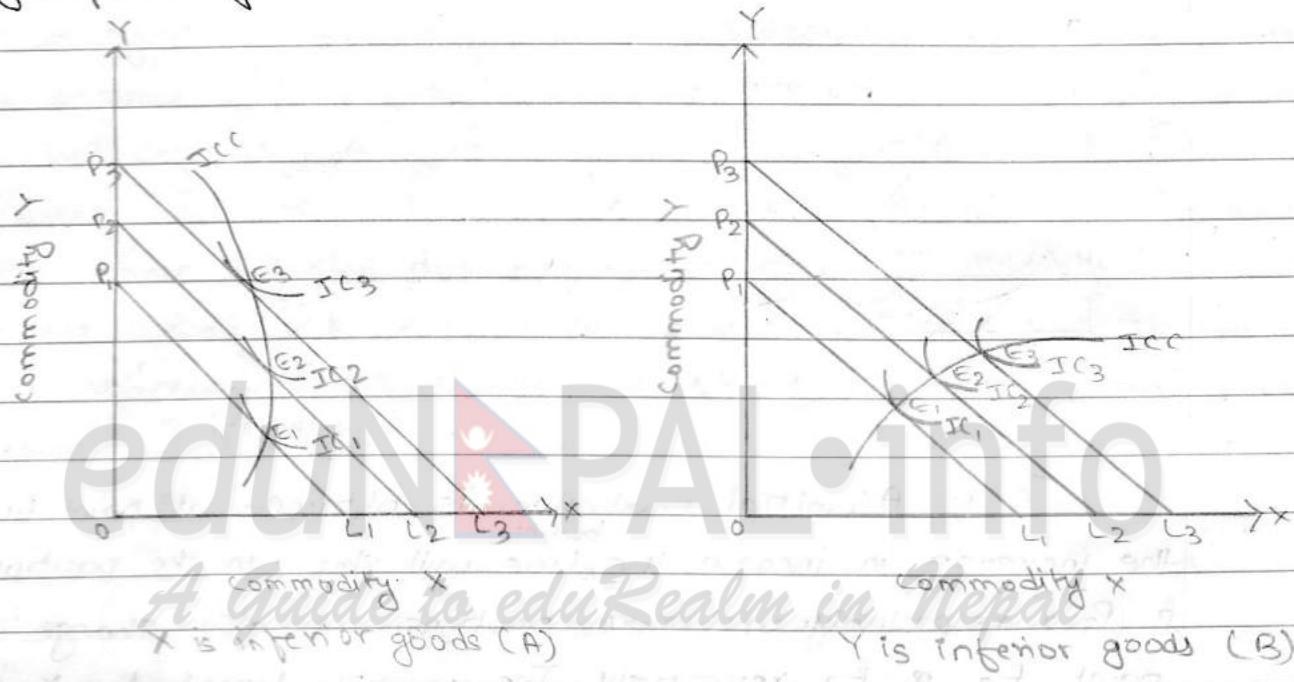
In case of normal goods, income effect is positive. It means that when income of a consumer increases, the quantity purchase also increases & vice-versa.



Income consumption curve is the locus of equilibrium points at different level of income. In the fig., P_1L_1 is the initial budget line & E_1 is the initial equilibrium point. Suppose the income of the consumer increases. As a result, the budget line will shift to the position P_2L_2 . With budget line P_2L_2 the consumer will be in equilibrium at point E_2 on indifference curve IC_2 by purchasing OX_2 amt of X & OY_2 amt of Y . If income increases still further, the budget line will shift to the position P_3L_3 . The equilibrium will be obtained at point E_3 on indifference curve IC_3 getting more satisfaction. If we join these equilibrium points E_1 , E_2 & E_3 then we get a line i.e. ICC , which shows the income effect on consumer's equilibrium.

2. Inferior goods (negative income effect)

In case of inferior goods, income effect is negative. It means that with the increase in income, the quantity purchase of inferior goods decreases because the consumer substitutes the inferior goods by superior goods.

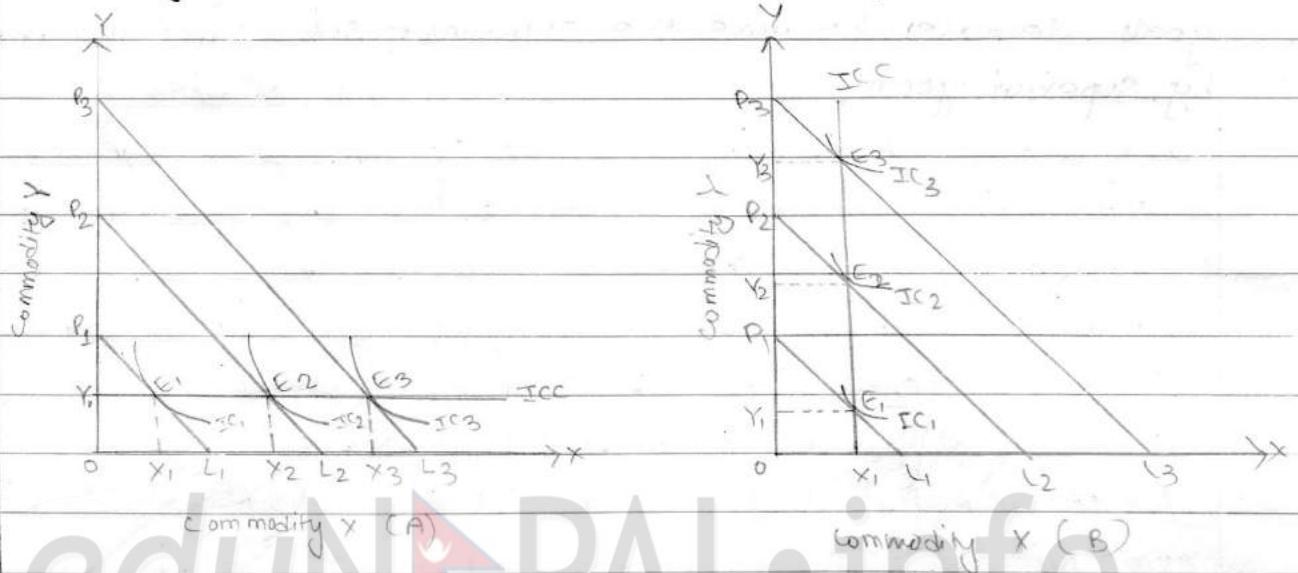


In figure A, X is inferior good. ICC slopes backward to left. In fig. B, Y is inferior good. ICC slopes downward to right. From the fig., it is observed that income effect becomes negative only after a point. It means that only at higher ranges of income, some goods become inferior goods & up to a point in their consumption behave like those of normal goods.

In fig. A, good X to be an inferior good after point E_2 . Therefore, the quantity demanded for good X decreases after point E_2 as income increases. In fig. B, good Y is inferior good beyond point E_2 . As a result, the qd for good y decreases as income increases.

3. Neutral Goods

When the quantity demand for a good does not change with the change in income, it is called neutral good.

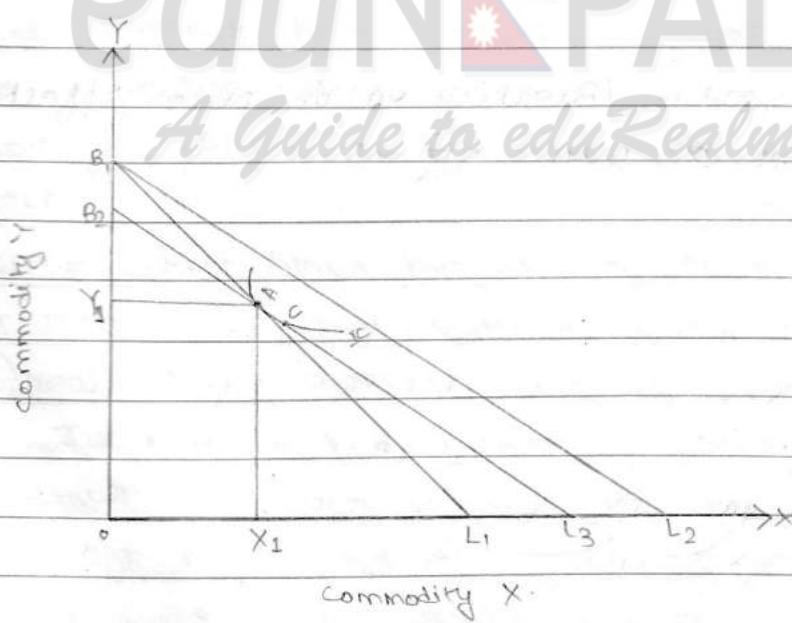


In fig. A, initial equilibrium is obtained at point E_1 . With the increase in income, the line will shift to the position P_2L_2 & P_3L_3 respectively. Equilibrium positions will also change to the point E_2 & E_3 respectively. The quantity demand for X increases with the increase in income & the demand for Y remains same. Therefore, Y is neutral good & hence ICC is horizontal st. line.

In fig. B, good X is neutral good. Therefore, with the increase in income the demand for good X remains same & demand for Y increases. Therefore, ICC curve is vertical st. line.

Substitution Effect (Hicksian Approach)

Substitution effect shows the change in purchases of a commodity as a result of a change in relative prices alone, real income remaining constant. When the price of a commodity changes, the real income or purchasing power of a consumer also changes. When there is prices effect, real income & substitution effect is simultaneously occurred. Rational consumer purchases more of the commodity whose price is fallen & less of the commodity whose price is unchanged. When the price of commodity X falls the real income of the consumer will increase. A substitution effect occurs when the increase in real income increase due to fall in price of a commodity X is withdrawn in such a way that he is neither better off nor worse off but he has to rearrange his purchase. This is the compensating variation in income.

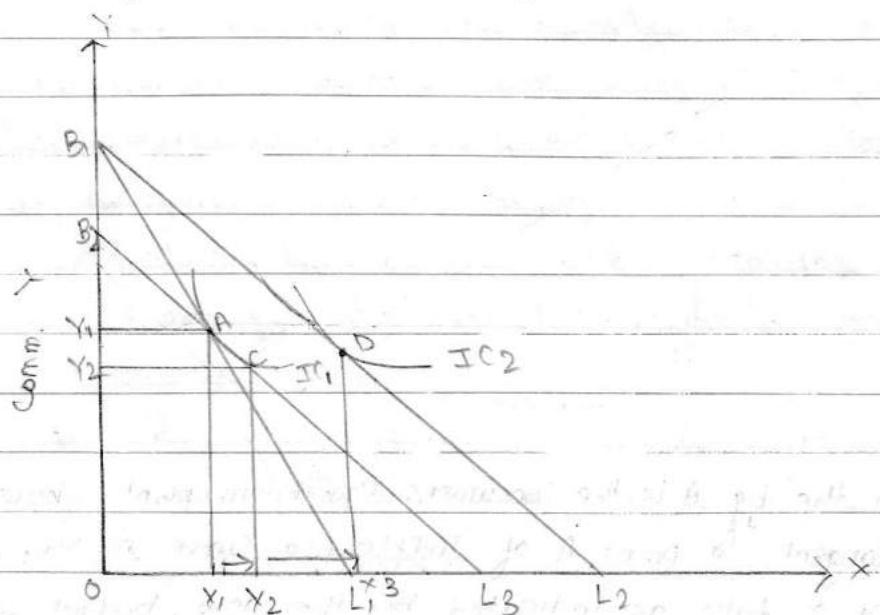


In the fig. A is the consumer's equilibrium point where the original budget line B_1L_1 is tangent to point A of Indifference Curve IC. Now, suppose the price of commodity X falls as indicated by the new budget line B_2L_2 , the consumer can purchase more units of X , his real income increase in order to

make consumer neither better off nor worse off the gain in the real income has to be reduced. By reducing money income, we have to draw a compensating budget line B_2L_3 which is parallel to B_1L_2 & tangent to IC at point C. He gets the same level of satisfaction because point A & C are on the same IC.

The reduction of consumers income by the amt of B_1B_2 in terms of commodity Y or L_2L_3 in terms of commodity X is made in order to keep him on the same IC i.e same level of satisfaction. B_1B_2 or L_2L_3 is the compensating variation income. He substitute X for Y by buying X_1X_2 more of X & Y_1Y_2 less of Y. The increase in the purchase of X by X_1X_2 is the substitution effect which involves the movement from A to C in the same indifference curve IC.

Price effect =
 Income eff. + Separation / Decomposition / Breaking up of price effect into
 Substitution effect & Income effect



Price effect studies the effect on the consumption of the commodity due to the change in the price of comm. X_{alone} , consumer's income & taste & preferences & price of another comm. Y remaining unchanged. In other words it can be defined as the change in the consumption combination containing two goods X & Y due to the change in price of commodity X .

The change in the price of a commodity effect the economic condition of consumer when the price of comm. falls he gets higher satisfaction than before & becomes better off when its price rises, he gets less satisfaction than before & become worse off. The price effect is composed of dual effect.

1. Substitution effect: When the price of comm. decrease it causes a change in the relative prices of comm. X & Y . It induces a rational consumer to substitute relative cheaper commodity for the expensive (dearer) one. (In other words, he purchase more of comm. X & less of comm. Y , it is substitution effect.)
2. Income effect: When the price of comm. X falls the consumer can get more units of it, with the same amt. of budget (money income) real income increases this is said to be income effect.

Increase in real income (purchasing capacity) has to be withdrawn in such a way that the consumer is neither better off nor worse off. He will remain on the same IC curve deriving same level of satisfaction. In the fig, the initial budget line is BIL_1 which is tangent to IC_1 at the point A which is the initial consumer's equilibrium point. The consumer is purchasing OX_1 of comm. X & OY_1 of comm. Y . The new budget line BIL_2 indicates the fall in the price of comm. X . It is tangent to Higher IC curve IC_2 at the point D. The consumer will

purchase ox_1 , amt of X & oy_1 , amt of Y the fall in the price of comm X is indicated by new budget line B_1L_2 which is tangent to higher IC_2 at the point D. D is the new consumer's equilibrium point. In order to make the consumer neither better off nor worse off, the gain in real income due to the fall in price of X has to be reduced, the required reduction in income to cancel out the purchasing power/real income due to fall in price of comm. is called compensating variation in income, which is equal to B_1L_2 in terms of comm Y or L_2L_3 in terms of comm. X .

We have to draw a compensative budget line B_2L_3 making it parallel to new BL B_1L_2 & tangent to the original Indifference curve IC_1 at the point C. At the points A & C he gets the same level of satisfaction coz they lie on the original IC_1 but he rearranged his purchase of X & Y . He substitutes X for Y by buying x_1x_2 more of comm. X & y_1y_2 less of comm. Y . The increase in the purchase of comm. X by y_1y_2 is substitution effect which involves movement from A to C on IC_1 due to the change in the relative price.

The movement from C on IC_1 to D on IC_2 is the income effect, the increase in the consumption of comm. X by x_2x_3 due to the increase in real income.

Both this analysis describe the consumer's behavior while buying goods with limited income. There are similarities & dissimilarity betw them.

Similarity

1. Rationality : Both the analysis assume that the consumer is rational. According to cardinal analysis the consumer try to get the maximum utility or satisfaction which is ltd budget in ordinal analysis the consumer try to get maxi possible satisfaction in the given income & price situation.
2. Diminishing Utility / Diminishing Marginal Rate of Substitution. Marshall's demand analysis is based on utility analysis. The demand curves slopes downward to the right coz of the application of law of diminishing utility. Cardinal Utility is based on the principle of diminishing Marginal rate of substitution due to that the IC slopes downward to right & convex to origin.
3. Proportionality Rule : Both analysis have adopted proportionality rule according to Marshalian analysis the consumer will be in equilibrium when the ratios of Marginal Utility of various commodities are proportional to their price ratios. i.e $\frac{MU_x}{MU_y} = \frac{P_x}{P_y}$. According to Hicksian analysis the consumer will be in equilibrium where $MRS_{xy} = \frac{P_x}{P_y}$.

4. Introspective (Psychological) Method.

Both analysis are based on psychological method. The law of diminishing marginal utility which is psychological in nature lies at the bottom of law of demand. The IC analysis too is based on inspection.

Dissimilarities or Superiority Utility-

1. More realistic measurement of utility : Marshall explain consumer behavior assuming that utility is measurable in cardinal number. It is unrealistic coz it is a psychological concept & can't be measured cardinally.
2. Two commodity model : Marshalian analysis assumed that utility derived from the consumption of one commodity is the function of that commodity alone. It is unable to analyze correctly the relⁿship of substitution & complementarity. On the other hand, IC approach can successfully analyze all such cases as it is based on two commodity model.
3. Dual effect of price effect : IC analysis is superior to the Marshalian analysis as it is able to draw a distinction betⁿ the income & substitution effect of a price change. Whereas Marshalian analysis has fail to distinguish betⁿ these two component of price effect.
4. Explanation of Giffen Paradox : Demand for giffen good has been consider as an exception as law of demand based on utility analysis. But according to Hicks on IC analysis, the negative effect of income is so powerful than its out weight, the positive substitution effect. Hence, when price of a giffen goods falls its demand also falls.
5. Better explanation of consumer's equilibrium : with fewer assumptions IC analysis arrive at the same equilibrium condition as the Marshalian analysis on the basis of proportionality rule. According to IC analysis a consumer is in equilibrium at a point where a budget line is tangent to the IC i.e $MRS_{xy} = \frac{P_x}{P_y}$. on the basis of utility analysis the consumer

is in equilibrium where, $\frac{MU_x}{MU_y} = \frac{P_x}{P_y}$.

6. Rehabilitation of consumer's surplus: Marshall has explain the validity of consumer's Surplus by assuming constancy of Marginal utility of money which is unrealistic in practice. Hicks explained it with the help of IC, independent of the assumption of constancy of marginal utility of money on the basis of cardinal analysis.
7. Cardinal analysis has adopted a large no. of unrealistic assumption to explain law of demand. The superiority of IC lies in the fact that even with less assumption, it gives more general demand theory with few assumption which is prefer to that with more assumption. Thus, IC analysis is superior to Utility analysis.

Criticisms/ Drawbacks:

1. Old wine in a new bottle : In the view of Robertson there is nothing new in IC analysis. It is just old wine in new bottle. The old concepts used in utility analysis has been replaced by new names in IC analysis. Utility, Cardinal no., law of diminishing MU have been replaced by satisfaction, preference, ordinal no. System & principle of Diminishing MRSxy respectively.
2. Only two-commodity model: The drawback of IC analysis is that it can analyze the consumer's behavior in only two goods. It is unrealistic because a consumer purchases a large no. of goods but in the case of more than two goods complicated mathematical analysis has to be used.
3. Rationality of the consumer questioned: The consumer is rational, he tries to get maximum satisfaction in a given income price situation but it may not be correct. He is influenced by legal, political, social & economical factors. Therefore, he may not get the maximum satisfaction in a given price situation.

4. Relation of transitivity questioned: IC analysis is based on transitivity. If a consumer is indifferent betⁿ the combination A & B, B & C he is obviously indifferent betⁿ A & C. But according to Armstrong the consumer is indifferent ^{betⁿ} A & B because the difference is too small to be noticed. In the difference betⁿ A & C is large, the relⁿ of indifference become intransitive & the consumer will remain indifference betⁿ them.
 5. Based on weak ordering: IC analysis is based on weak ordering, all points on the IC are equally preferred & the consumer is indifferent to all the combination of goods represent by the point. Samuelson have pointed out that when a consumer makes a choice it reveals his preference. He has given another demand theory, Revealed Preference theory based on strong ordering.
 6. Ridiculous Combination: IC analysis includes even the most ridiculous combination. For eg: 10 pairs of shoes & 1 shirt. No consumer will be sensible to choose such combination.
 7. Introspective method: Samuelson has to decide IC analysis as being predominantly introspective he has adopted behaviorism for analysis demand theory.
 8. Limited empirical natures.
ICs are imaginary curve, they are not realistic. Empirical evidences regarding IC is limited.
- However, inspite of these weaknesses IC analysis is largely considered superior to MU analysis.