Theory of Consumers' Behavior

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Meaning of Utility

- The term utility is needs satisfying capacity consisting in the goods and services. It is also known as the pleasure or satisfaction that fulfils human desire and needs.
- All those goods and services which can satisfy the human wants because they have utility.

In the perspective of moral aspect, alcohol and cigarette may be harmful but they have utility and people consume such goods who enjoys and gets utility. Therefore utility may be both good or bad.

Types of Utility

1. Total utility

• Total utility is the total satisfaction obtained from the consumption of all the units of commodity with in a given period of time. In other words , it is the sum of all marginal utilities obtained from the consumption of different units of a commodity.

where,

$$TU = \sum_{n=1} (MUi) \qquad TU = AU\ X\ TQ$$

TU = total utility

n = 1, 2, 3,…. nth unit

MU = marginal utility

Δ = rate of change

AU = average utility

Q = quantity consumed

2. Average Utility

Au is the per unit utility that a consumer derives from the consumption of goods.

$$AU = TU/Q$$

Where Au = Average utility

TU = Total Utility

Q = Quantity consumed

Contd….

3. Marginal utility

Marginal utility is an additional utility in total utility obtained from consuming one more unit of a goods. In other words, marginal utility is the rate of change in total utility by the change in consumption of units of good (an additional unit of a commodity).

$$MU = \frac{\Delta TU}{\Delta Q} \qquad MUn = TUn - TUn - 1$$

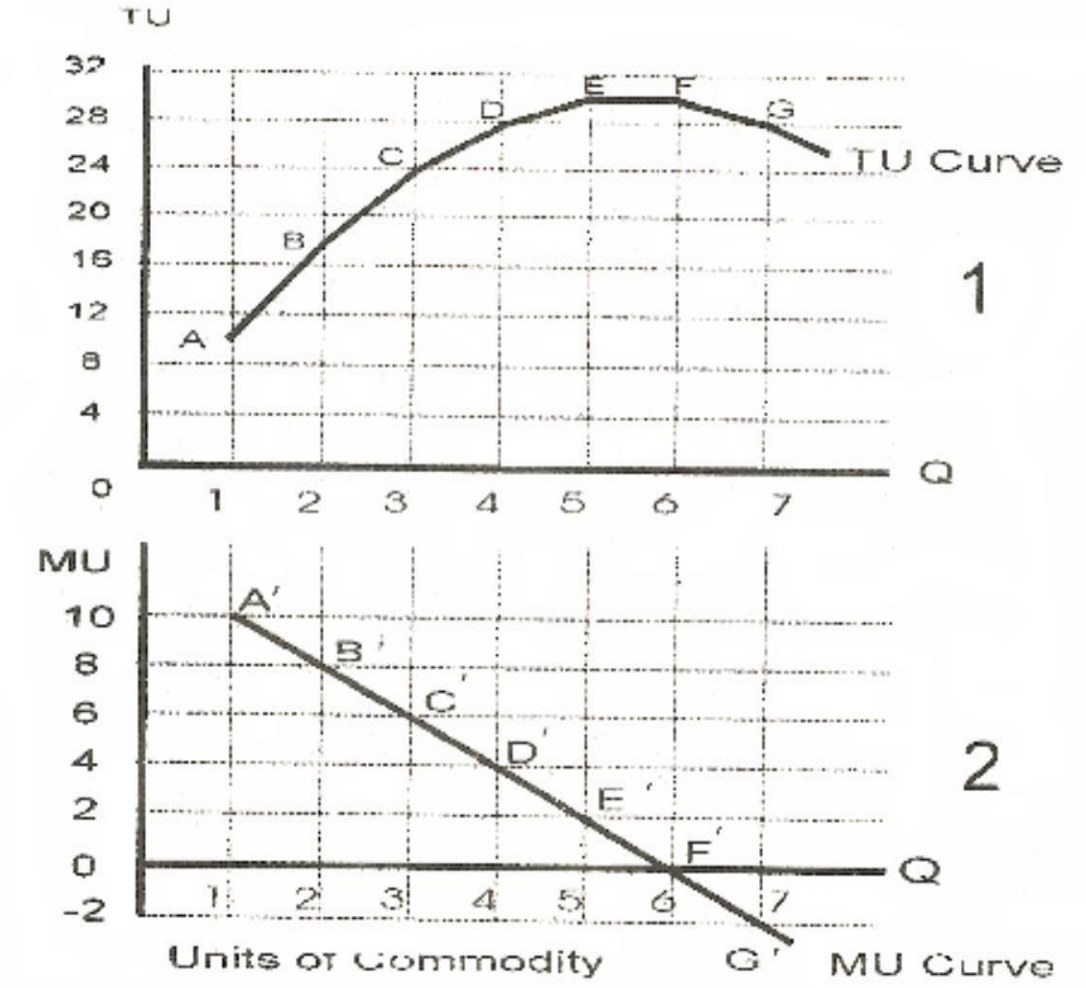
where,

TU = total utility
MU = marginal utility
AU = average utility
n-1 = (n-1)th unit
n = nth unit
Δ = rate of change
Q = quantity consumed

Relationship between TU and MU

- The relationship between TU and MU can be better explained with the help of following table and graph.

Units of consumption	TU	MU
0	0	-
1	10	10
2	18	8
3	24	6
4	28	4
5	30	2
6	30	0
7	28	-2


TU
32
28
24
20
16
12
8
4
0
A
B
C
D
E
F
G
TU Curve
1
Q
1 2 3 4 5 6 7
MU
10
8
6
4
2
0
-2
A'
B'
C'
D'
F'
F'
Q
1 2 3 4 5 6 7
Units of Commodity
G'
MU Curve
2

Contd…..

• In the above figure, TU is increasing but it increases by smaller and smaller amount for each o f additional units. In other words, TU is increasing at decreasing/diminishing rate.

MU curve is downward sloping because of the fact that consumption of successive units of same commodities gives less satisfaction.

Symbolically,

- When MU>0, TU is increasing
- When MU=0, TU is maximum and constant
- When MU<0, TU is decreasing

Utility Analysis

- Utility analysis is a study of consumer behavior related to maximization of utility (satisfaction) while consuming goods and services with limited income of the consumer.
- There are two approaches to study the consumer behavior.

1. Cardinal utility analysis

The cardinal utility analysis was developed by neo-classical economist Prof. Alfred Marshall.

- This theory deals with a rational consumer who attempts to maximize utility while consuming goods and services subject to their limited income.

According to cardinal utility approach, the utility obtained by a consumer from the consumption of goods and services can be measured in number like 1,2,3,4,……., etc.

2. Ordinal utility analysis

- Ordinal utility analysis was developed by Pareto, W.F. Johnson, Slutsky, J.R. Hicks and R.G.D Allen.
- It is based on the order of measuring utility or satisfaction.
- This approach does not measure the utility quantitatively but in order or rank.
- According to this utility approach the consumer ranks the alternative combinations available for him/her by a simple comparison of the satisfaction obtained from the given combination of goods and services.

Assumption of cardinal utility analysis

1. Rational consumer

Under a cardinal utility analysis, a consumer is assumed to be rational. Rational in the sense that a consumer always tries to maximize his/her utility while spending their limited resources.

2. Cardinal utility

Utility is a cardinal concept i.e. the utility of each commodity is measurable. The most convenient measure is money. Thus, utility can be measured quantitatively in cardinal units.

3. Constant marginal utility of money

Money is treated as a measuring rod under this theory. So utility of money is considered as constant. It is expressed as MU = k (constant).

Contd....

4. Independent utilities.

It means utility received from a good does not affect to the utility received from another good. Therefore, the total utility received by a consumer is the sum of the separate utilities of goods consumed by him/her.

5. Diminishing marginal utility of goods.

Marginal utility of a commodity declines successively for each additional unit of consumption of a commodity.

Law of Diminishing Marginal Utility

- The law of diminishing marginal utility analysis was propounded by **Herman Heinrich Gossen** in **1854 A.D.** So, it is also called **First Law of Gossen.** It was further explained by Prof. Alfred Marshall.
- According to this law, **when a consumer consumes additional units of a particular goods, then he/she derives less and less utility from every successive unit of goods. It means additional units give lower utility than the previous one.** Thus, if a consumer successively consumes more units of goods, the marginal utility continuously declines but total utility increases at decreasing rate.

Assumptions of the theory

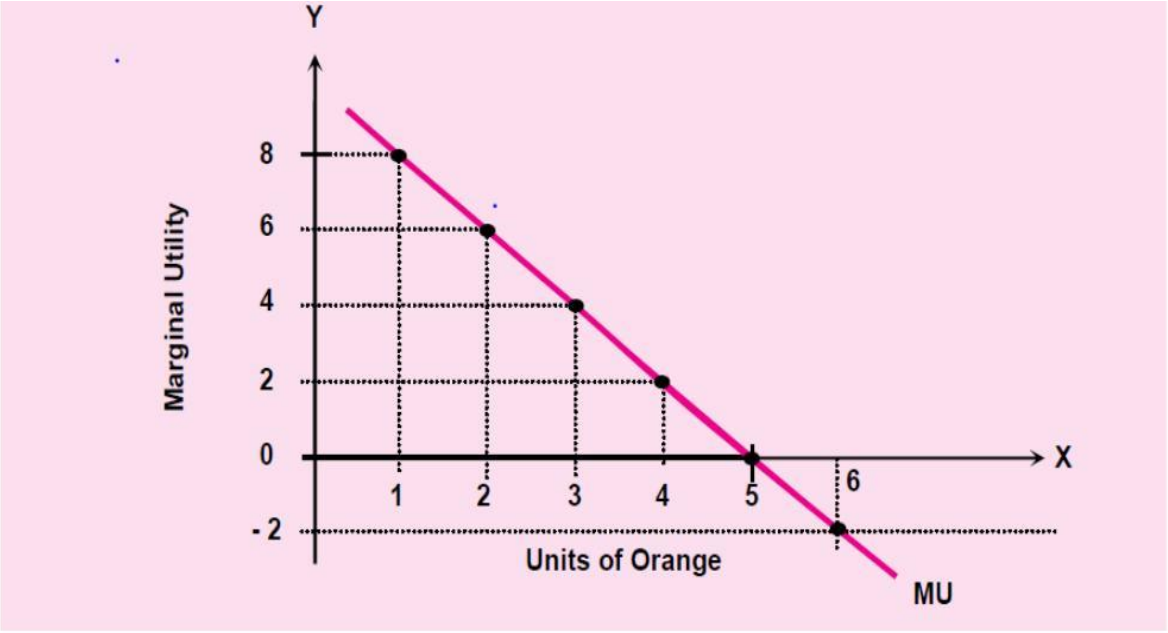
- Consumer should be rational
- All the units of goods must be Homogenous (identical).
- Consumption of goods should be continuous.
- Size of goods must be suitable.
- There is no change in taste, fashion and habits of the consumer.
- Price of each units are constant
- Marginal utility of money is constant.

The concept of Law of diminishing marginal utility theory can be better explained with the help of following table and graph.

Contd….

This table shows that the first unit of orange gives 8 utils of marginal utility to the consumer. Similarly, if he consumes second unit, he receives less marginal utility i.e. 6 utils. The third unit still gives less marginal utility 4 utils to the consumer. In the same way, the forth units gives just 2 utils of satisfaction and the fifth units gives 0 satisfaction and if he doesn't stop and goes for sixth he receives negative (– 2) satisfaction. This example verifies that, if a consumer consumes more and more units of a particular goods, he receives less and less marginal utility from each successive units of goods.

Units of goods	Marginal utility (MU)
1st	8
2nd	6
3th	4
4th	2
5th	0
6th	-2



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In the above figure, the units of goods is measured in X axis and marginal utility is measured in Y axis. The marginal utility obtained from every successive units of goods are plotted in the graph. We have obtained downward sloping MU curve having the negative slope which proves that the if we consume more and more units of goods, the marginal utility goes on diminishing.

Limitations/Exceptions of the Theory

The law of diminishing marginal utility doesn't apply in the following conditions.

- • Collection of rare goods.
- • Changing taste and preference.
- • Unequal size and quantity.
- • Time gap in consumption.
- • Not applicable in the case of abnormal person.
- • Not applicable in public and basic goods.

Remember & Apply in Your Life

Life is XXX

Yesterday – is X-perience.

Today – is X-periment.

Tomorrow – is X-pectation.

So, use your experience in your experiment to achieve your expectation:

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Ordinal Utility Analysis

ordinal utility analysis is an alternative but superior to cardinal utility analysis. **J.R. Hicks** and **R.G.D. Allen** developed this theory. the main proposition of this theory is that utility being a subjective/ psychological phenomenon, it can't be measured in terms of numbers, instead it can be ranked.

Assumptions;

1. Rationality

A rational consumer is assumed in this theory rational in the sense that s/he always attempts to achieve higher level of satisfaction while purchasing goods with his limited income.

2. Ordinal measurement of utility

- Since utility is a phenomenon. It can't be measured in numbers but the utility can be ranked.

3. Consistency and transitivity

- If A>B, then A is always preferred than B, which refers consistency in choice.
- If A>B and B>C then A>C, this is transitivity in choice.

4. Non satiety

- It means a consumer never reaches to the point of saturation. S/he always remain less than full satisfaction

5. Introspection

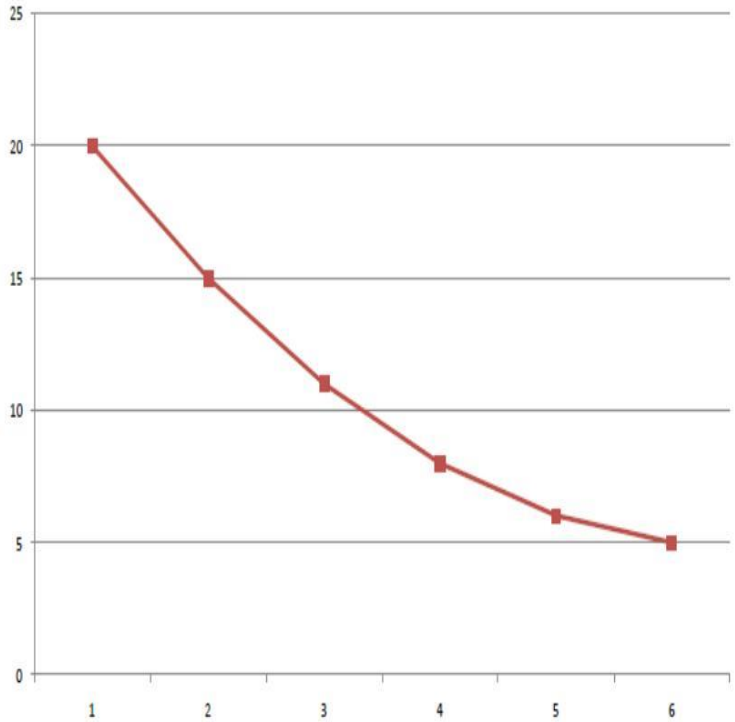
- It is the ability of the observer to reconstruct events which go in the mind of another person with the help of self observation. For convenience, it means that whatever is the true for a consumer is always true for others.

Indifference Curve

- Indifference curve is the locus of various combination of two commodities which gives same level of satisfaction to the consumer. A rational consumer is always indifferent in choosing the combinations because each combinations give same level of satisfaction. Indifference curve is also known as ISO-utility curve (equal utility curve). A collection or set of two or more than two indifference curves is called indifference map.

Combinations	X goods	Y goods	$MRS_{X,Y}$
A	1	20	-
B	2	15	5:1
C	3	11	4:1
D	4	8	3:1
E	5	6	2:1
F	6	5	1:1

if we plot this indifference schedule in the graph, we obtain indifference curve. we have plotted these combinations in the graph and joined each of them and derived indifferencev curve.


25
20
15
10
5
0
1
2
3
4
5
6

Contd…

- In the figure, we could also see that MRSxy is diminishing, which is also noticed by the shaded region. Mathematically, In simple words, MRS is the slope of indifference curve.

- **Why MRS diminishes?**
  - The want for a particular goods can be satisfied.
  - Goods are imperfect substituted of each other.
  - The increase in the quantity of one goods doesn't increase the wants satisfying power of the other goods.

Marginal Rate of Substitution

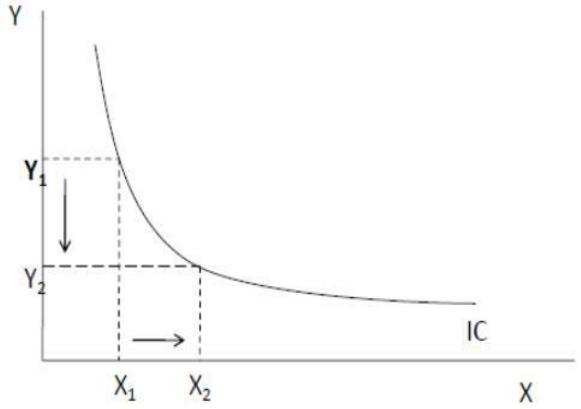
MRS is defined as the rate of sacrificing one commodity for another commodity but the consumer attains at the same level of satisfaction. Above table and graph describes MRSxy . As a consumer moves from A to B or B to C or any other successive combination. A consumer is reducing the unit of Y at slower rate continuously for additional consumption of X. From A to B, a consumer leaves 5 units of Y for 1 more unit of X. this is MRS . In the above figure, shaded regions of the IC curve shows the MRSxy

Combinations	X goods	Y goods	$MRS_{X,Y}$
A	1	20	-
B	2	15	5:1
C	3	11	4:1
D	4	8	3:1
E	5	6	2:1
F	6	5	1:1

Properties of Indifference Curve

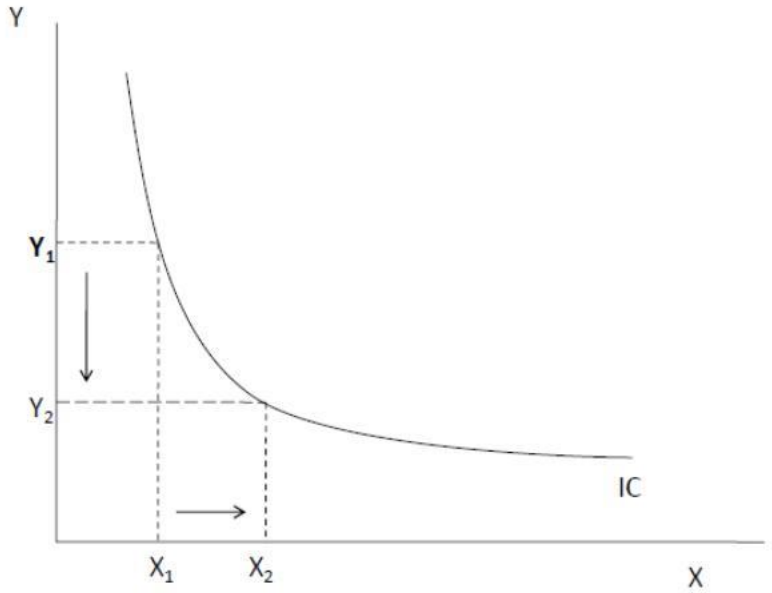
1. Indifference curve is downward sloping from left to right.

Due to the MRS , slope of IC is negative that's why IC curve is downward sloping.

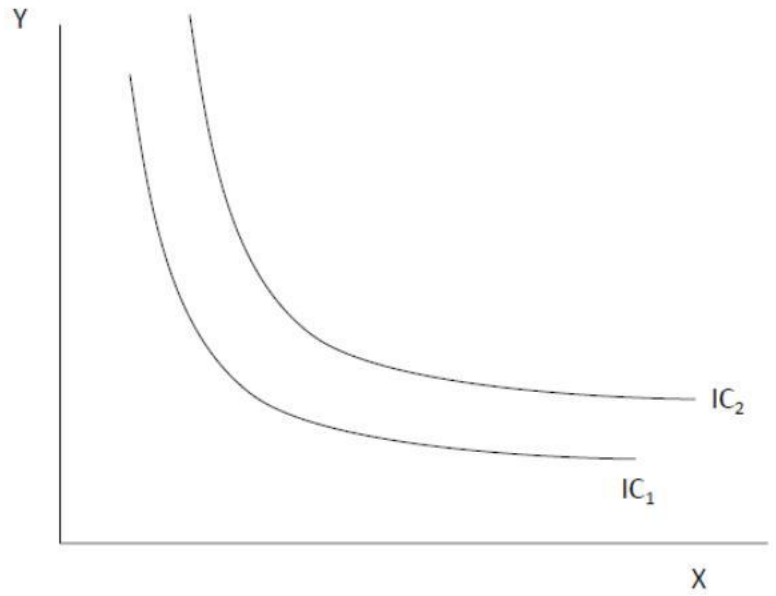


2. IC curve is convex to the origin

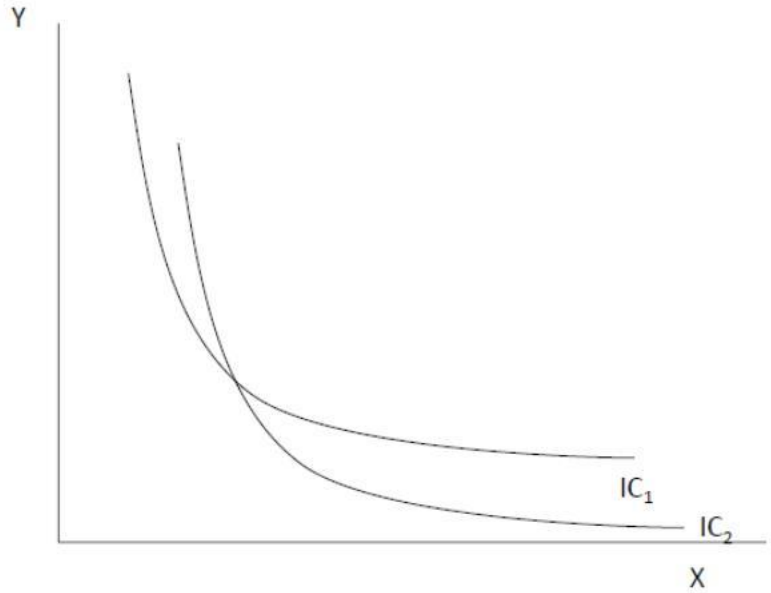
Due to diminishing MRS, IC curve is convex to the origin.



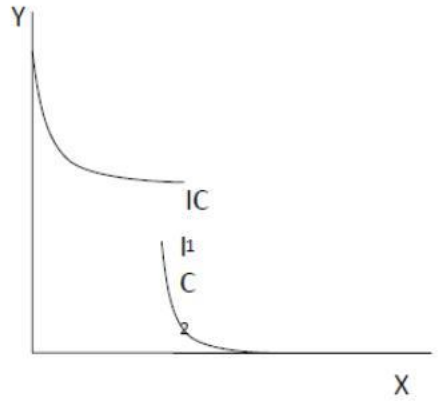
3. Higher the IC curve represents higher level of satisfaction.



4. IC curve never intersect each other.



5. IC curve never touches any axis.



6. Indifference curves needn’t be parallel to each other

Price Line (Budget Line)

Budget line is defined as the locus of the various combinations of two commodities which shows the same level of expenditure. While consuming goods and services, income always plays the role of constraint, due to which it is also called budget constraint. While constructing budget line, it is assumed that price of the commodities are given (constant).

$$B = P_X Q_X + P_Y Q_Y$$

Units of X good	Units of Y good	Budget line (Expenditure in Rs.) $B = P_X Q_X + P_Y Q_Y$
0	10	10×0 + 5×10 = 50
1	8	10×1 + 5×8 = 50
2	6	10×2 + 5×6 = 50
3	4	10×3 + 5×4 = 50
4	2	10×4 + 5×2 = 50
5	0	10×5 + 5×0 = 50

Let the consumer's income (M) = Rs. 200

Two goods say X and Y are purchased.

Price of X goods (P_X) = Rs.10

Price of Y goods (P_Y) = Rs.8

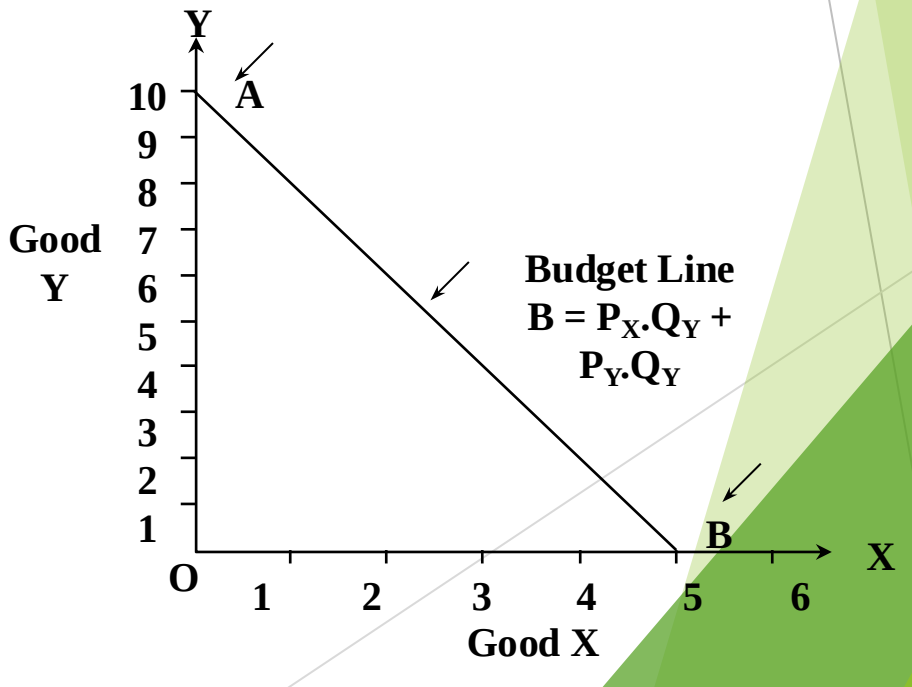
Let he spends all his income on X, he can purchase quantity of X goods only;

$$X = \frac{B}{Px} = \frac{200}{10} = 20$$

Similarly, if he spends all income on Y goods, then quantity of Y good then the quantity of Y is;

$$Y = \frac{B}{Py} = \frac{200}{8} = 25$$

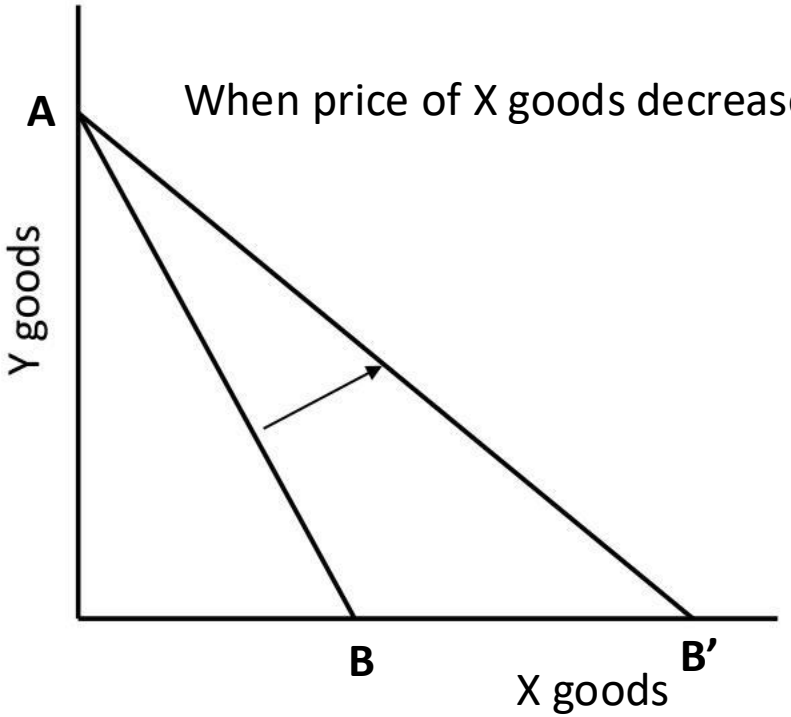
Now, By plotting these two extreme values we get budget line.

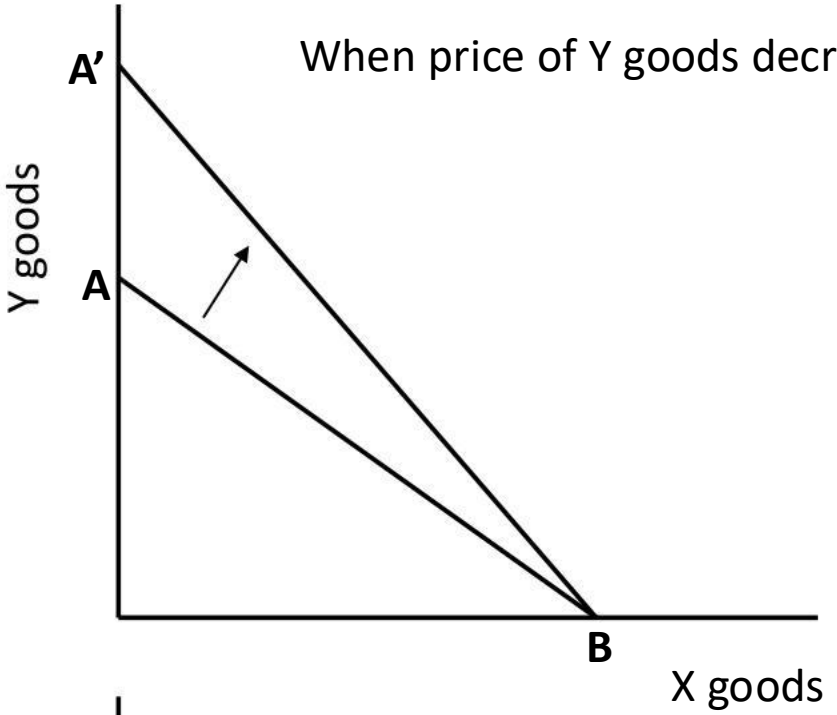


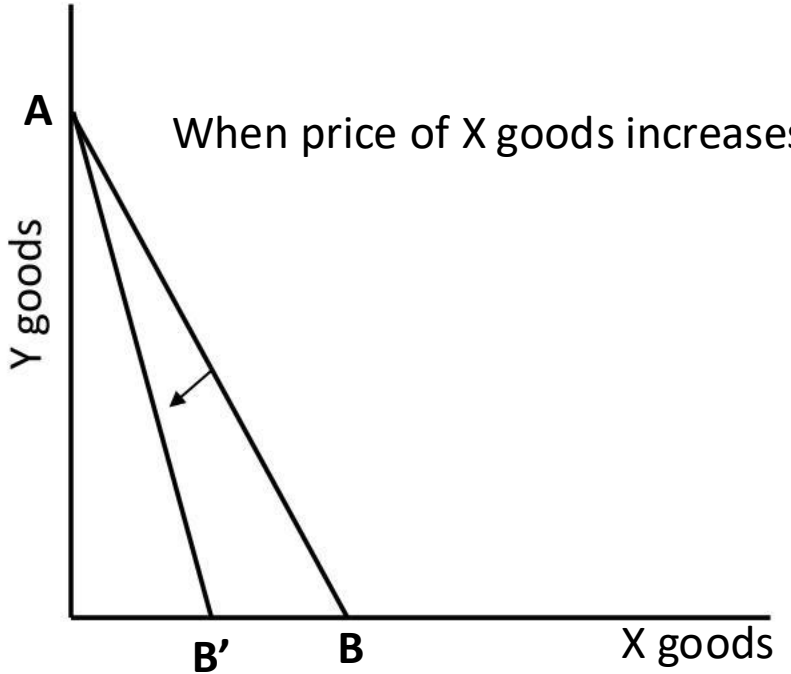
Shift in Budget line

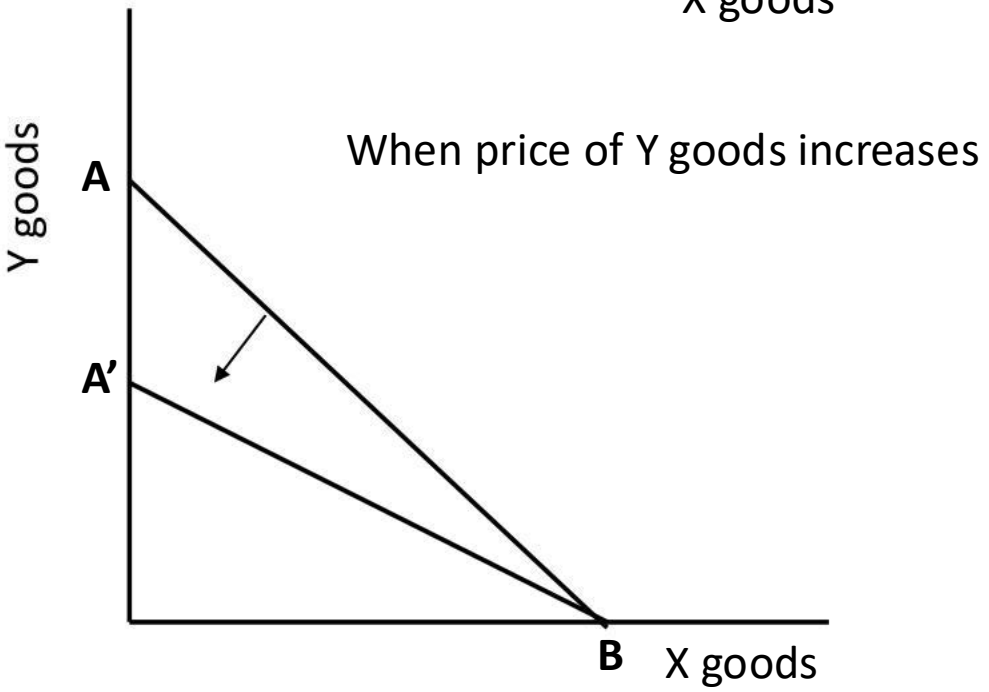
- **Budget line shifts due to the following two reasons.**

1. When price of one commodity changes (when real income changes)
2. When money income of the consumer changes.

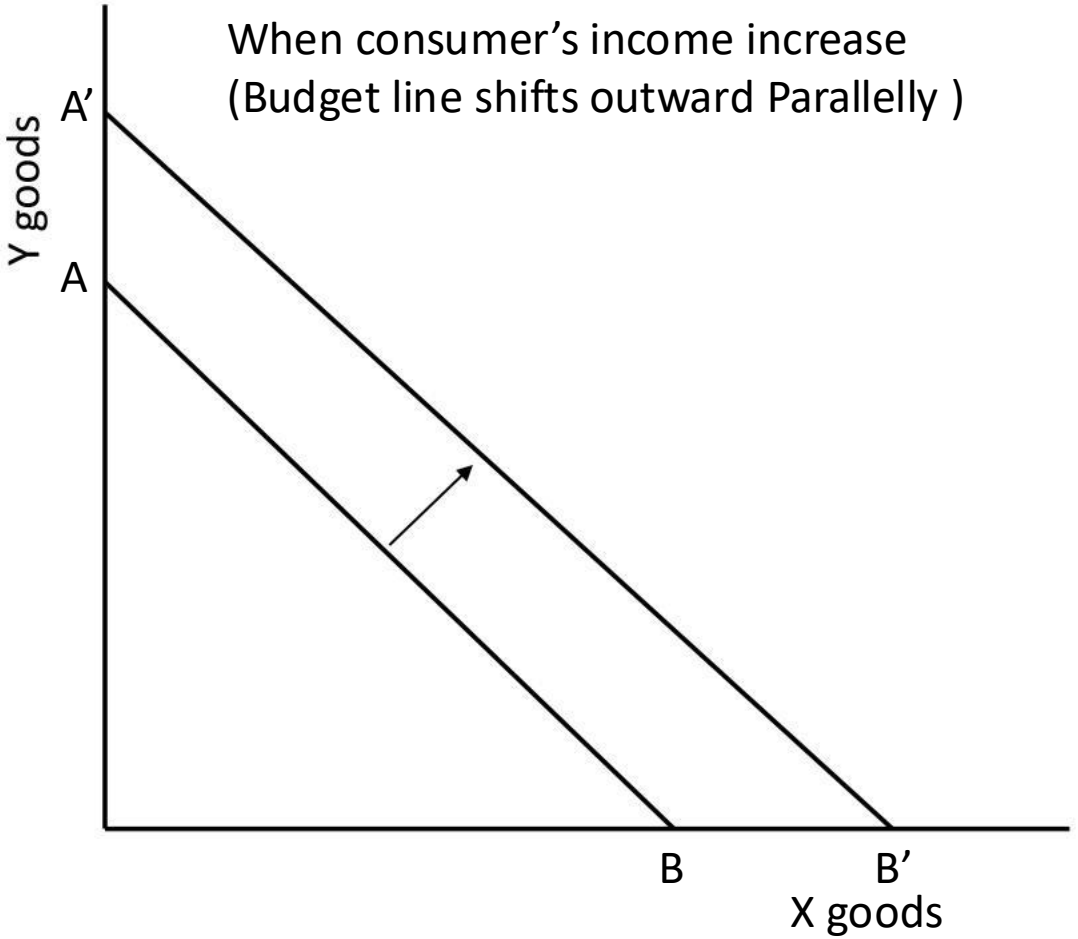

When price of X goods decreases
A
Y goods
B
B'
X goods


When price of Y goods decreases
A'
Y goods
A
B
X goods

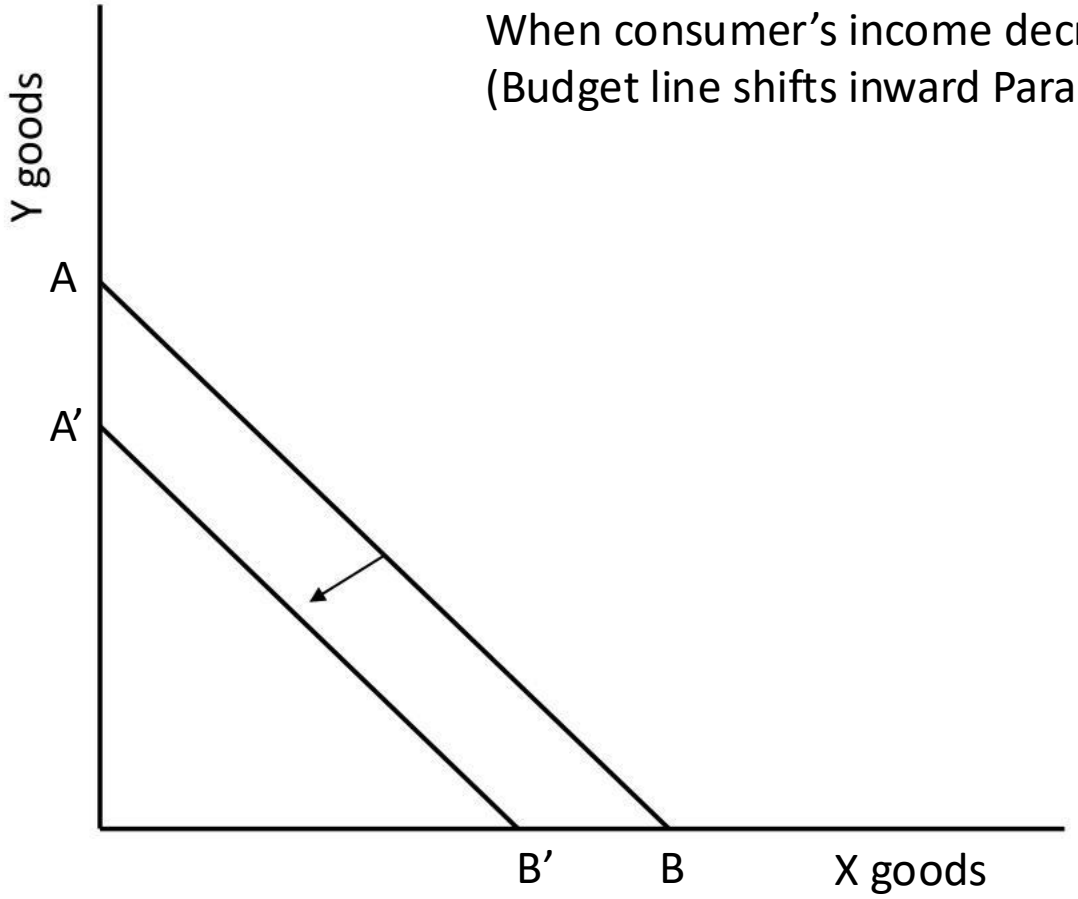

When price of X goods increases
A
Y goods
B'
B
X goods


When price of Y goods increases
A
Y goods
A'
B
X goods

When consumer's income increase
(Budget line shifts outward Parallelly)



When consumer's income decrease
(Budget line shifts inward Parallelly)



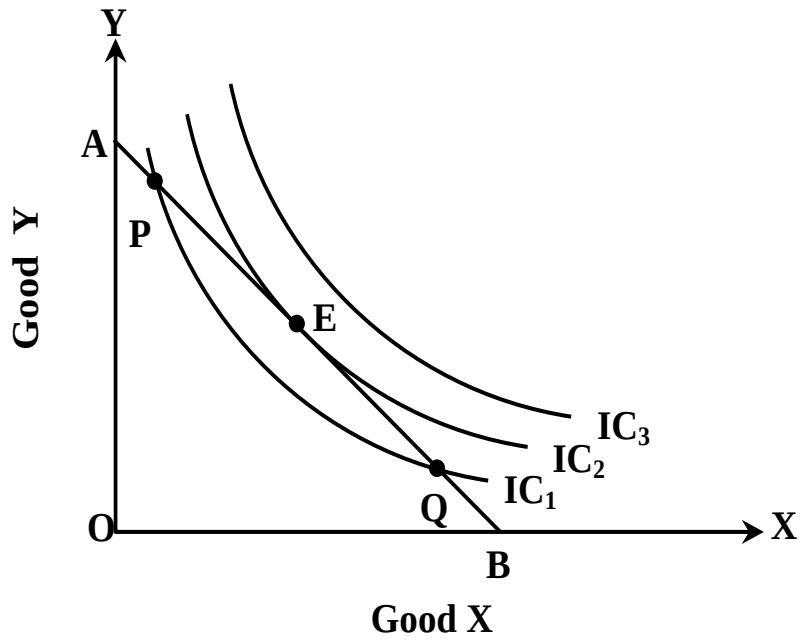
Consumer’s equilibrium

- Consumer equilibrium is defined as a situation in which a consumer with his limited income maximizes his level of satisfaction while consuming goods. A consumer always calculates the appropriate units of various goods that can maximize his level of satisfaction subject to his limited income.
- For this, a consumer constructs various preference schedules and choose one which gives the maximum utility. After attaining this situation, a consumer doesn’t move to any other preference if price and income remain unchanged.

First Order or Necessary Condition; Slope of budget line must be equal to the slope of IC curve

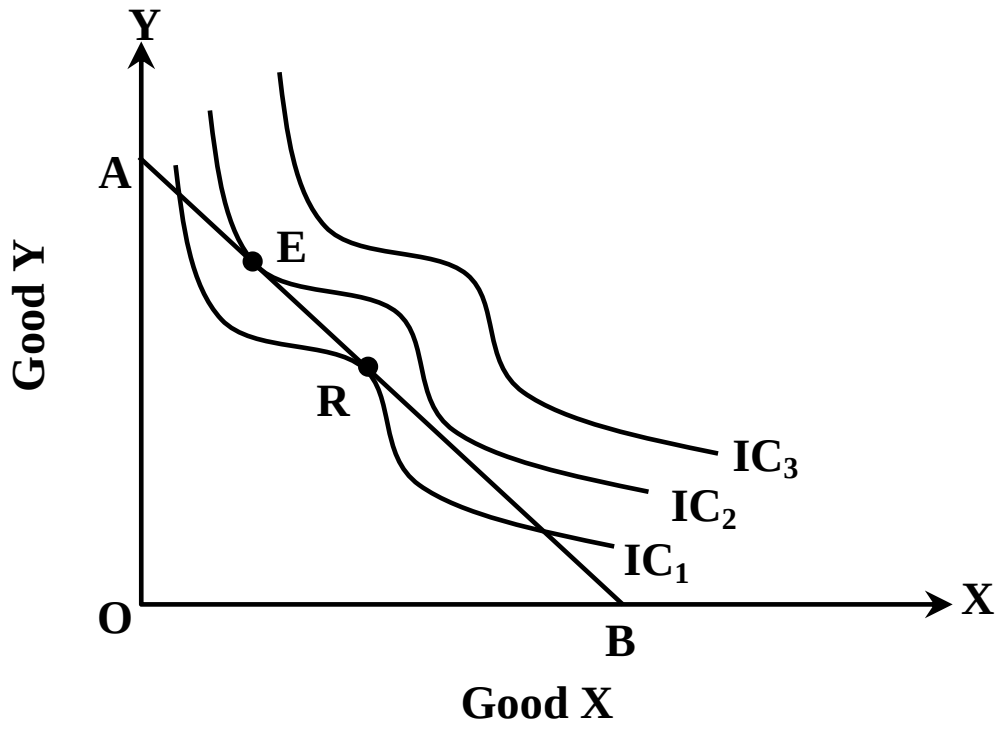
Indifference curve must be tangent to the price line Slope of IC = Slope of Budget line

$$\text{MRS xy} = \frac{Px}{Py}$$



Second Order or Sufficient Condition

At the point of tangent indifference curve must be convex to the origin. i.e. $MRS_{X,Y}$ is diminishing.



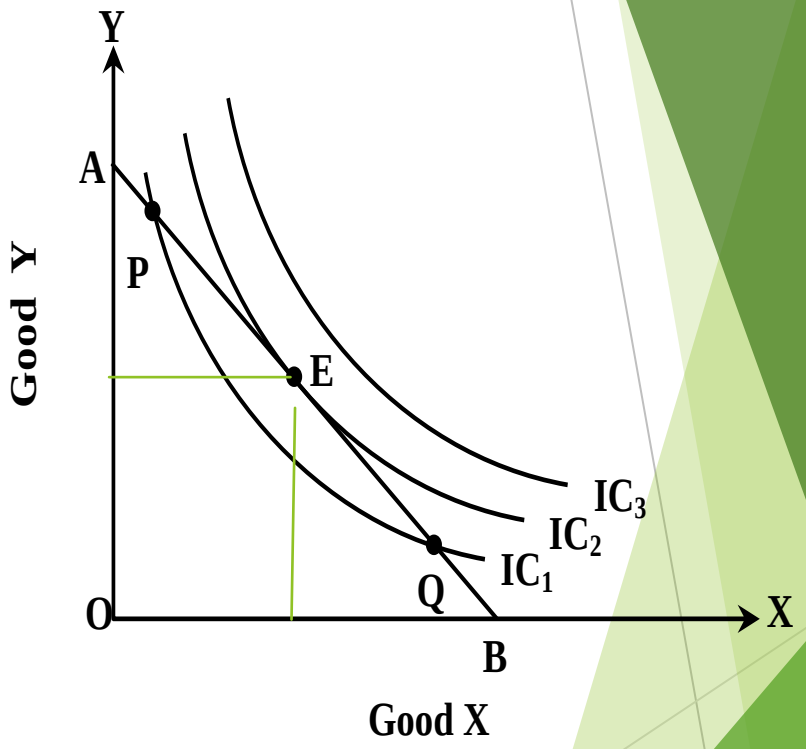
Graphical Analysis

- A consumer always seeks to maximize his utility by choosing higher indifference curve.
- In the figure, IC seems to be highest but it is unreachable with the limited given income.

So, consumer looks at point ‘M’ and ‘N’ and ignore them because both of these points give lower satisfaction indicated by IC as compared to IC .

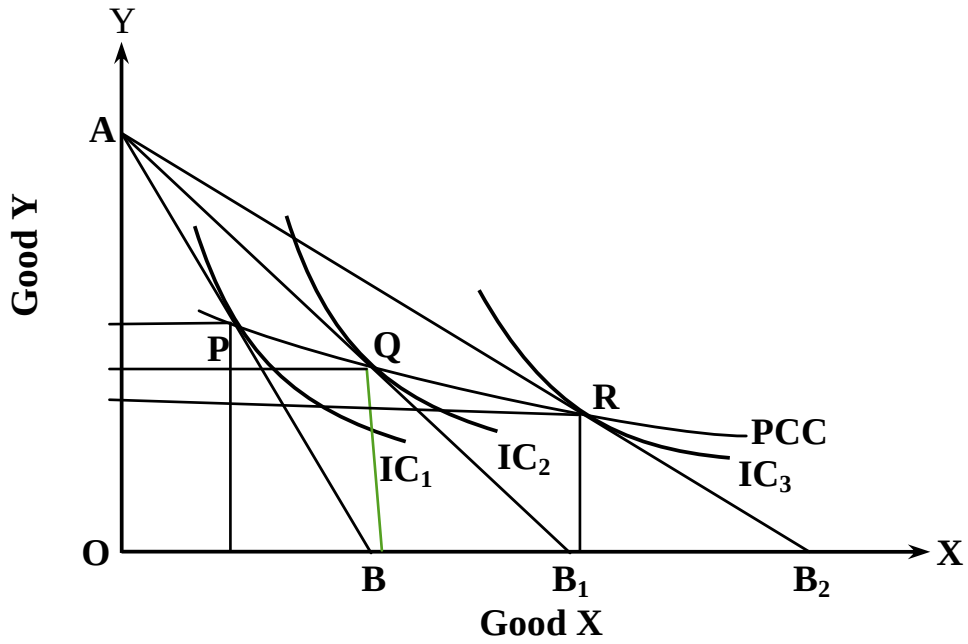
So, he leaves these points and choose point ‘E’ which is highest possible point which shows maximum level of satisfaction.

- So, a consumer maximizes his utility by consuming X of X goods and Y of Y goods where both conditions are fulfilled.



Price Effect

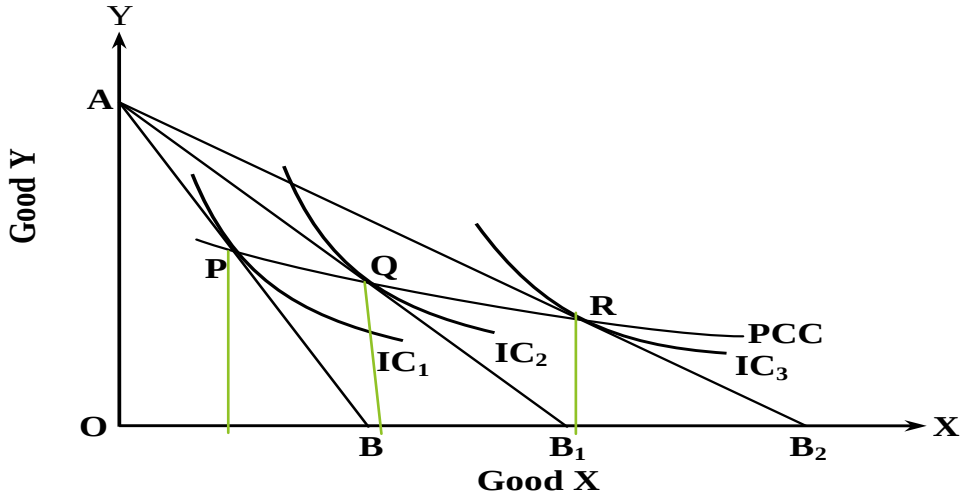
Price effect is the change in consumption of a commodity due to the change in price of the commodity. The change in price leads to change the consumption of commodity is called price effect.. In other words, When price of the goods changes, a consumer will be either better off or worse off than before depending upon whether the price falls or rises and can purchase more at lower & less quantities at higher prices. Price effect varies on the basis of the nature of the goods.



Types of PE on the basis Price Consumption Curve

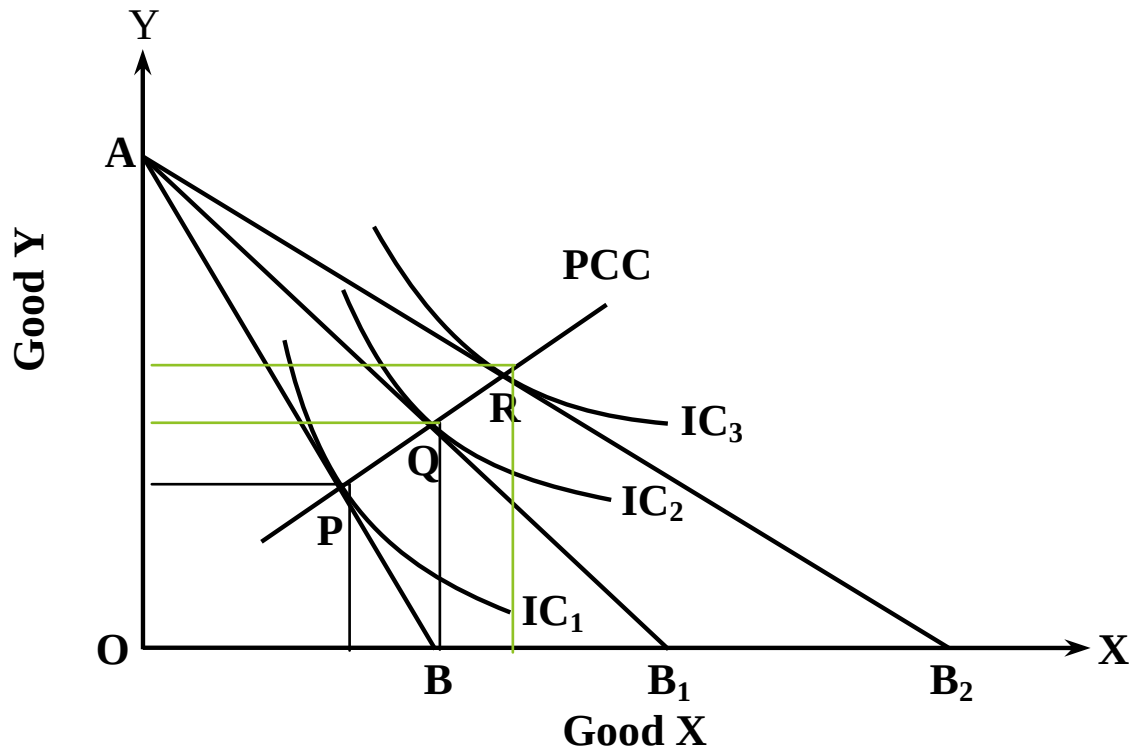
[A] downward sloping PCC (PE on substitute goods)

- Let us assume price of X goods falls other things remaining the same. The purchasing power of the consumer increases. He is now better off than before so that he can purchase more of X.
- Since the goods are substitutable, quantity demand of X goods is increased with the decreases in quantity of Y goods because the price of Y goods is constant and the price of X goods is decreased.



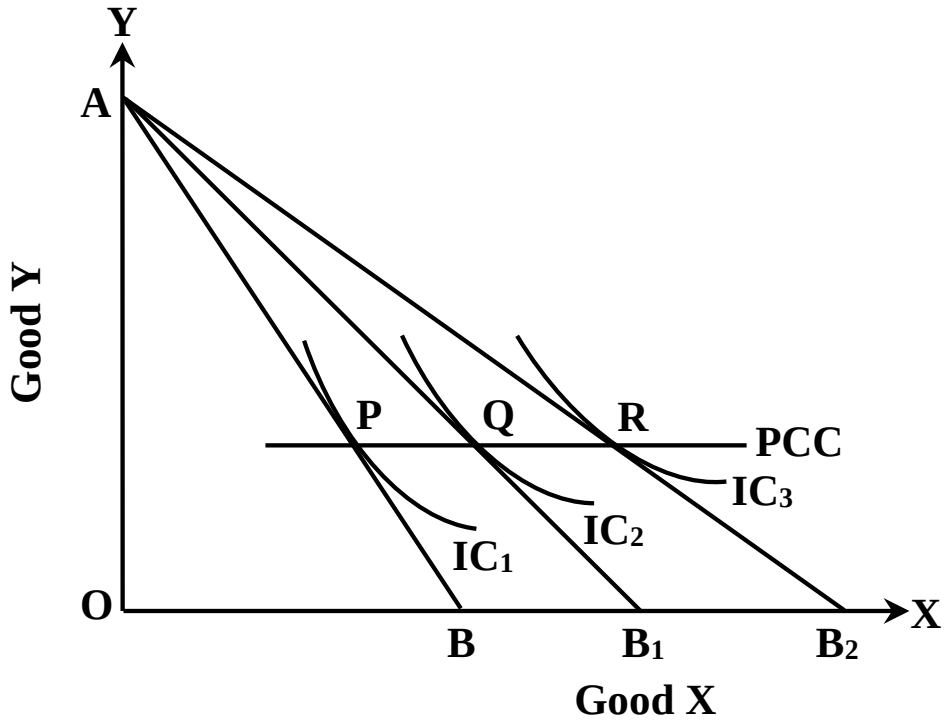
[B] Upward Sloping PCC (PE on complement goods).

Upward sloping price consumption curve for X mean that when the price of good X falls, the quantity demanded of both goods X and Y rises.



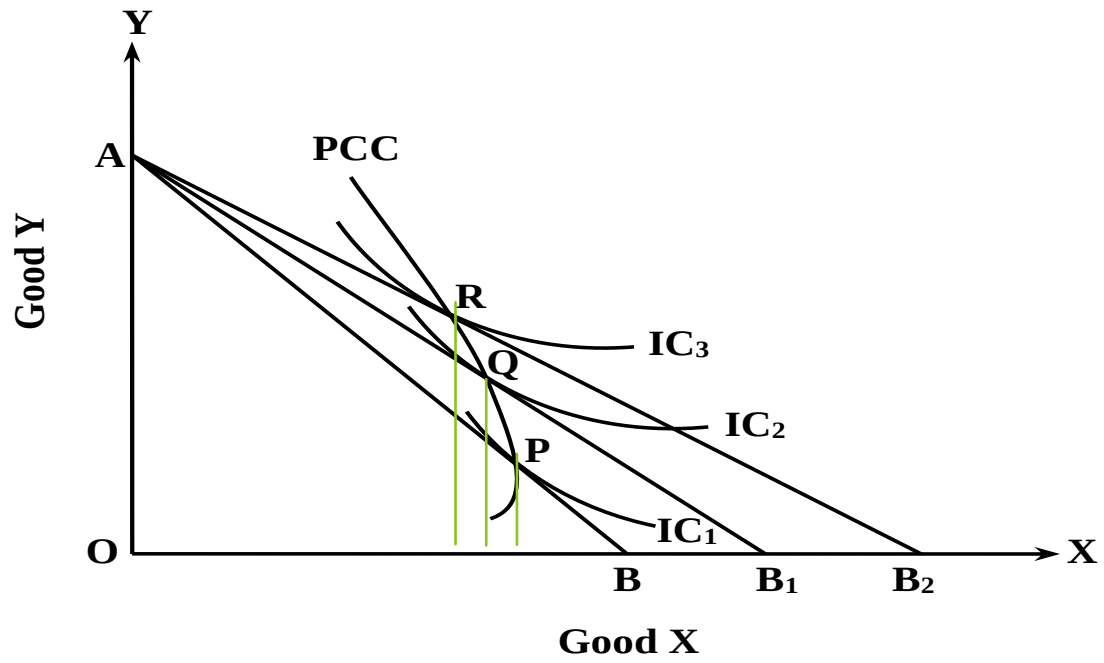
[C] Horizontal PCC

When price of good X falls, its quantity purchases rises proportionately but quantity purchased of Y good remains the same.



Backward bending/sloping PCC (PE on Giffen Goods)

Price consumption curve can also have a backward sloping shape, when price of X falls, smaller quantity of it is demanded. This is true in case of exceptional types of goods called Giffen goods.



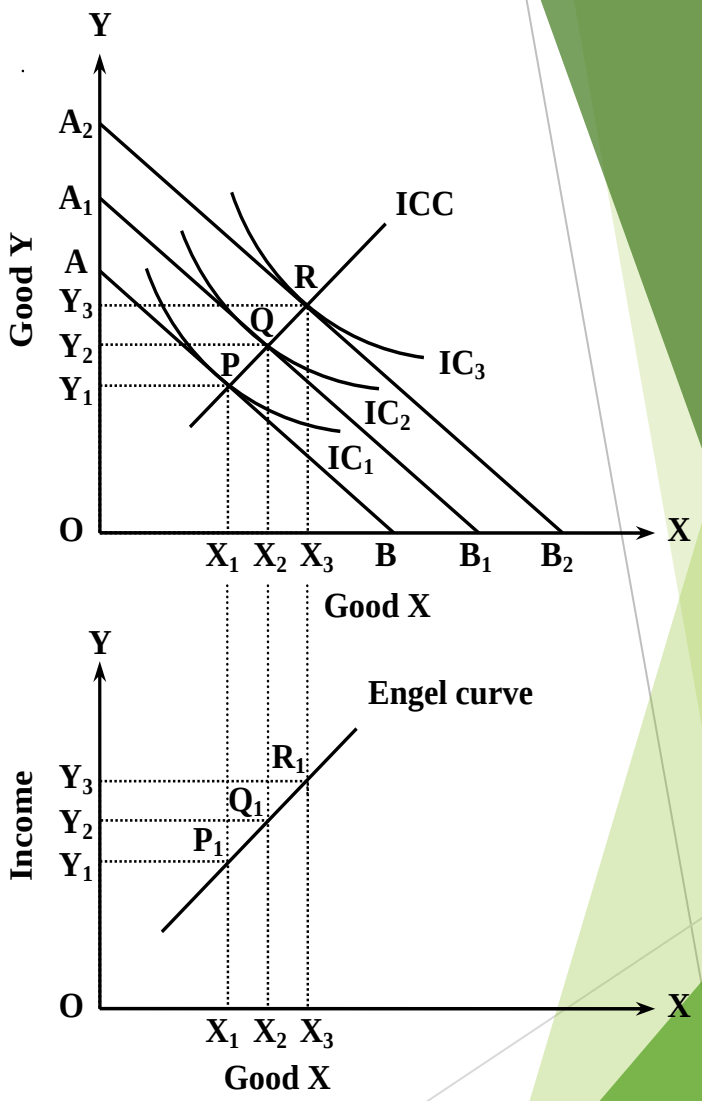
Income Effect

When consumer 's income increases, a consumer is able to increase the consumption of goods due to increase in his real income and vice versa. IE can be best understood with the help of ICC.

Income effect shows total effect on demand for goods due to change in income of the consumer. But price of goods and consumers preferences remain constant.

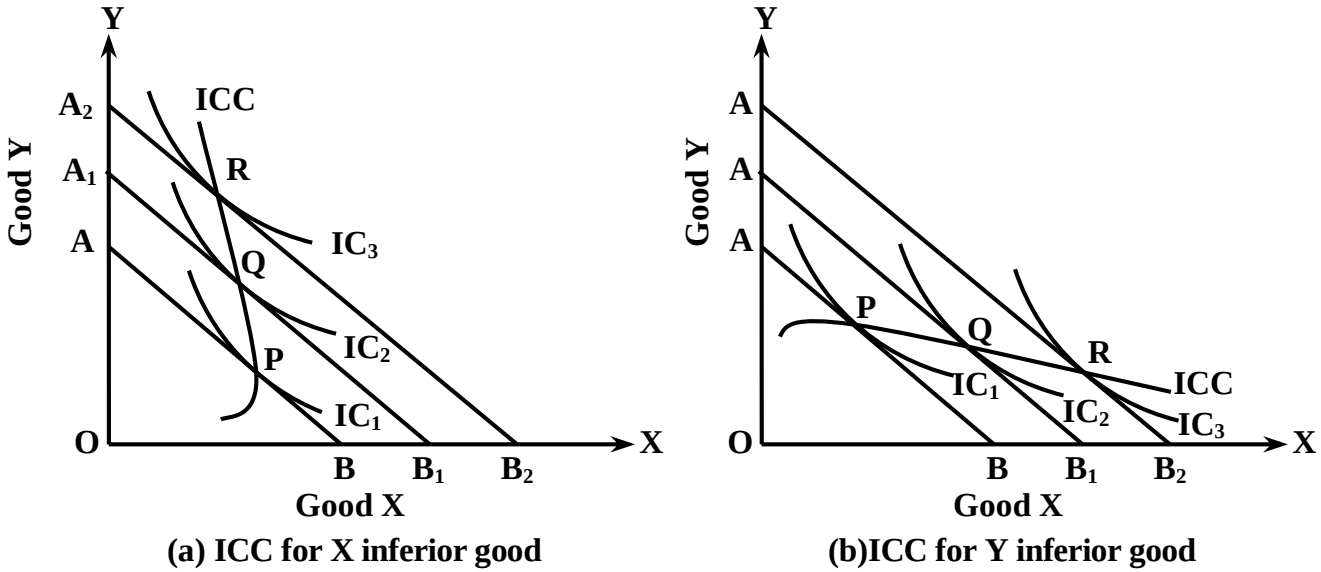
a. **Positive income effects (normal goods)**

Where there is an increase in the income, the budget line shifts upward. In case of normal goods, the income effect is positive, in which the consumer buys more of it when his money income increases and consumer buy less when his money income decreases.



b. Negative income effect (Inferior Goods)

Inferior goods are goods that decrease in demand when consumer income rises and increases in demand when consumer income falls. In other words, inferior goods are those goods which consumer buys less when income increases and buys more when income decreases. So, income effect is negative on inferior goods.



“Success”

‘Demands Hard work’

Not Excuses

You May Have

hundred friends, is not a miracle

The miracle is that

making a single friend

Who Will stand by your side even

when hundreds are against you.

Substitution Effect

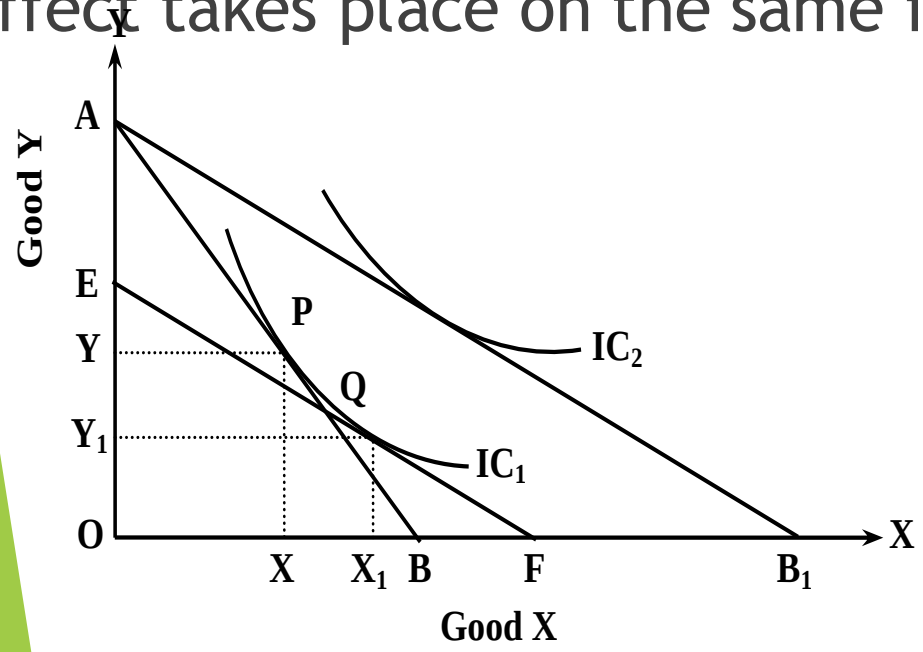
- SE is the change in quantity demanded of a commodity due to the change in relative price of the commodity keeping real income constant.
- Substitution effect occurs when a change in the relative price of goods, makes a rational consumer induce to substitute a relatively cheaper good for the expensive one.
- To put it simply, a consumer will tend to buy more of a good, the price of which has fallen and less of the good of which price is unchanged.
- When the price of a good changes, the purchasing power of the consumer also changes. To keep the purchasing power constant, income is compensated accordingly. So, SE is the effect in change in consumption of a good when its price changes and purchasing power of the consumer is compensated as per the initial level.

Substitution Effect

The substitution effect relates to the change in the quantity demand resulting from a change in the price of goods due to the substitution of relatively cheaper goods for a dearer one, while keeping the price of other goods and real income of the consumer as constant.

Hicksian approach

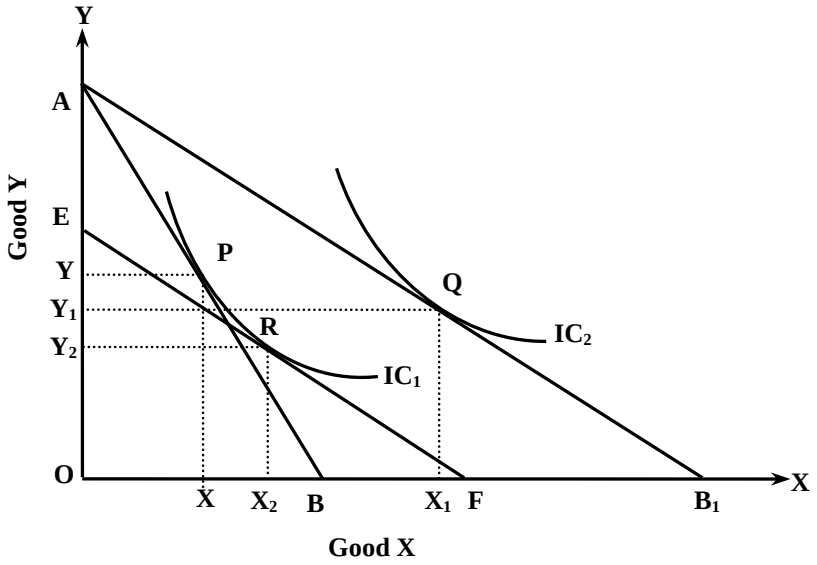
Prof. J. R. Hicks has explained the substitution effect independent of the income effect through compensating variation in income. In Hicksian approach substitution effect takes place on the same indifference curve.



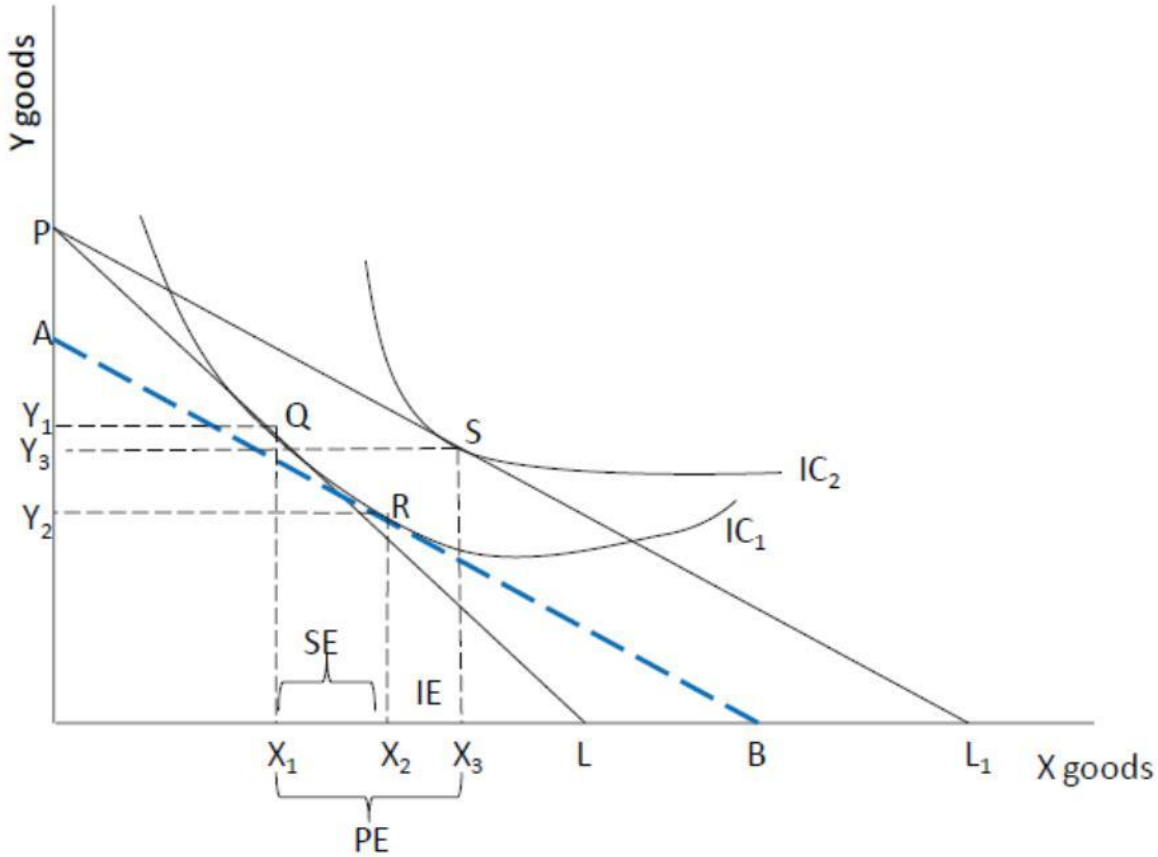
In the figure, point P is the initial equilibrium position of the consumer, where the budget line AB is tangent to IC_1. This shows that consumer buy OX of X good and OY of Y good. When price of X good falls, the budged line shifts upwards from AB to AB_1 due to the increasing in purchasing power of consumer for X good.

Decomposition of Price Effect into Income and Substitution Effect: Fall in Price of Normal Goods Under Hicksian Approach

Hicks has separated the substitution effect and the income effect from the price effect through compensating variation in income by changing the relative price of a goods while keeping the real income of the consumer constant. In this method, increase in real income has to be decreased in such a way that consumer is neither better off nor worse off or is in the same IC.



In fig., the initial budget line is represented by AB and consumer is in equilibrium at point P purchasing OX units of X good and OY units of Y good. Let, price of X falls and price of Y good and consumer' income remain constant as such budget line swings outward to AB_1. After the fall in price, consumer's purchasing power increases.


Y goods
P
A
Y_1
Y_3
Y_2
Q
S
R
IC_2
IC_1
SE
IE
X_1
X_2
X_3
L
B
L_1
X goods
PE

Decomposition of PE into IE and SE

PE = movement from Q to S = $X_1 X_3$…….(equation I)

IE = movement from R to S = X_2X_3…….(equation II)

SE = movement from Q to R = X_1X_2……(equation III)

PE = SE + IE

Taking L.H.S.,

$$PE = X_1X_3 \text{ from (equation I)}$$

$$= X_1X_2 + X_2X_3 \text{ from figure}$$

$$= \text{SE + IE}$$

- Thus we conclude that PE includes both SE and IE. In this explanation, we have considered that both goods are normal.

- In the figure, Q is the initial equilibrium point where consumer is maximizing his satisfaction as shown by IC_1 by consuming X_1 and Y_1 units of X and Y goods respectively.
- When price of X falls, the consumer moves to IC_2. With the shift in price line from PL to PL_1. So that, new equilibrium point is found at point S.
- In this equilibrium point a consumer has purchased more units of X goods i.e. X_3 and less units of Y goods i.e. Y_3 because X has become relatively cheaper than Y. Movement from Q to S is the Price Effect (i.e.X_1 X_3).

- In order to find SE, consumer money income is reduced in such a way that he could attain same old indifference level IC_1.
- In this situation, new budget line AB (after compensation) touches the old IC_1 at point R. Similarly movement from S to R is IE.
- At R consumer consumes X_2 units of X goods and Y_2 units of Y goods. Finally movement from Q to R is required SE. when the consumer equilibrium shifts from Q to R, which are different points of same IC_1.
- If the reduced income is returned to the consumer, than the consumer returns to the point ‘S’. So, R to S movement is IE.

Superiority of ordinal over cardinal approach

1. **Measurement of utility:** According to cardinal utility analysis, utility can be measured quantitatively. But according to ordinal utility, utility is psychological phenomena. So, utility cannot measure quantitatively.
2. **Free from the assumption of constant marginal utility of money:** Cardinal utility analysis assumes constant marginal utility of money. Such an assumption is not necessary in ordinal utility analysis.
3. **Separation of price effect into income effect and substitution effect:** Cardinal utility analysis cannot separate price effect into income effect and substitution effect. But, it is possible under ordinal utility analysis.
4. **Ordinal utility analysis explains the Giffen's goods:** Cardinal utility analysis does not explain Giffen paradox of effects on consumer's demand for inferior goods due to change in income whereas ordinal analysis explains this phenomenon with the help of negative income effect.
5. **Ordinal utility analysis explain with few assumptions:** Cardinal analysis is based on some unrealistic assumption such as cardinal measurement, utility is independent. Whereas, ordinal analysis is based on some realistic assumption such as ordinal measurement, diminishing marginal rate of substitution etc.


Any
Questions


THANK
YOU