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Wmin.

But then the supply of labour becomes greater than the ~~supply~~ ~~of~~ demand of labour which results in unemployment of an amount $L_2 - L_1$. and a deadweight loss given by triangles B & C.

CONSUMER THEORY

Economists assume that the consumer chooses the best bundle of goods they "can afford".

* The Consumer's Budget Constraint

Consumer can afford to purchase a bundle if its cost is less than her income:

More formally, the bundle is affordable if:

$$p_1 x_1 + p_2 x_2 \leq M$$

And exhausts the consumer's income if costs strictly equal income (M).

This is ~~con~~ the consumer's budget constraint.

$$\text{Total expenditure} = p_1 x_1 + p_2 x_2$$

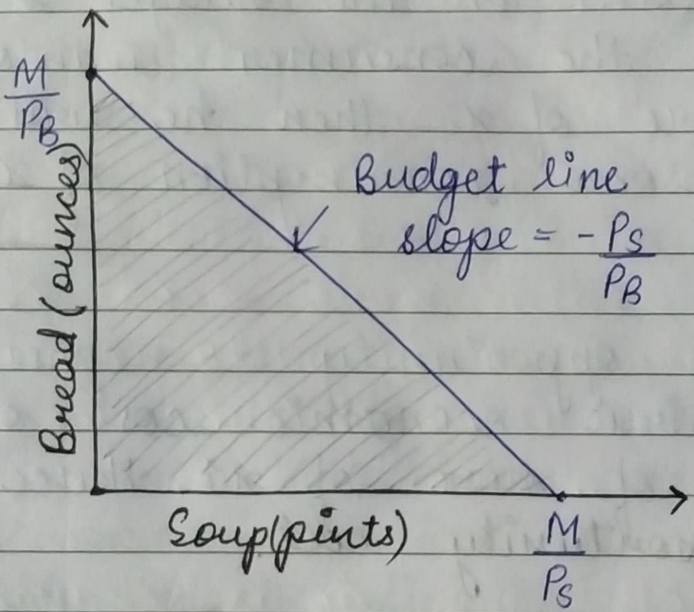
We assume that

$$p_1 x_1 + p_2 x_2 = M$$

i.e. there is no saving.

$M \rightarrow$ income.

Budget set: The set of all affordable consumption bundles at prices p_1 & p_2 and ~~quantity~~ ~~x_1 & x_2~~ income M.



Equation of the Budgent line:

$$x_2 = \frac{M}{P_2} - \frac{P_1}{P_2} x_1$$

If all the income is spent on good 2, then the maximum units of good 2 that can be consumed is the vertical intercept, similarly, the horizontal intercept

Slope of the Budget line = Rate at which the market is willing to substitute good 1 by good 2. = Relative price $= \frac{P_1}{P_2} = \frac{-P_S}{P_B}$.

~~Opportunit~~

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~~Slope represents the opportunity cost of x_1.~~

Because from the slope (dx_2/dx_1) we can find the change in quantity consumed of x_2 by x_1.

Slope of the ~~bug~~ budget line represents the opportunity cost of good x_1.

From any point on the budget constraint, if the consumer wants to consume more of x_1 then he will have to sacrifice some consumption of x_2 & vice-versa.

Giving up the opportunity to consume x_2 is the true economic cost of consumption of more of x_1. Hence, it is called opportunity cost.

Bundles in the shaded area are affordable but do not exhaust income.

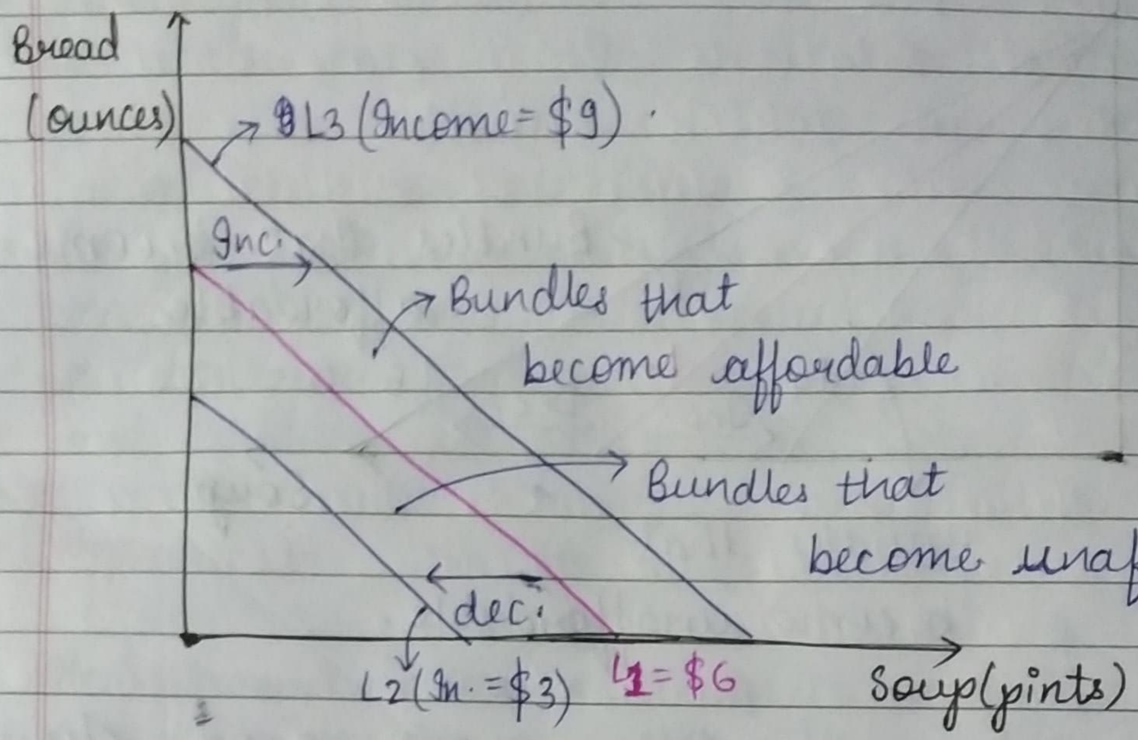
Bundles on the budget line exhaust income.

* Properties of Budget line

- Change in income alters intercepts of the budget line but does not change its slope
- Reduction in income shifts budget line

in.

- Increase in income shifts budget line out.



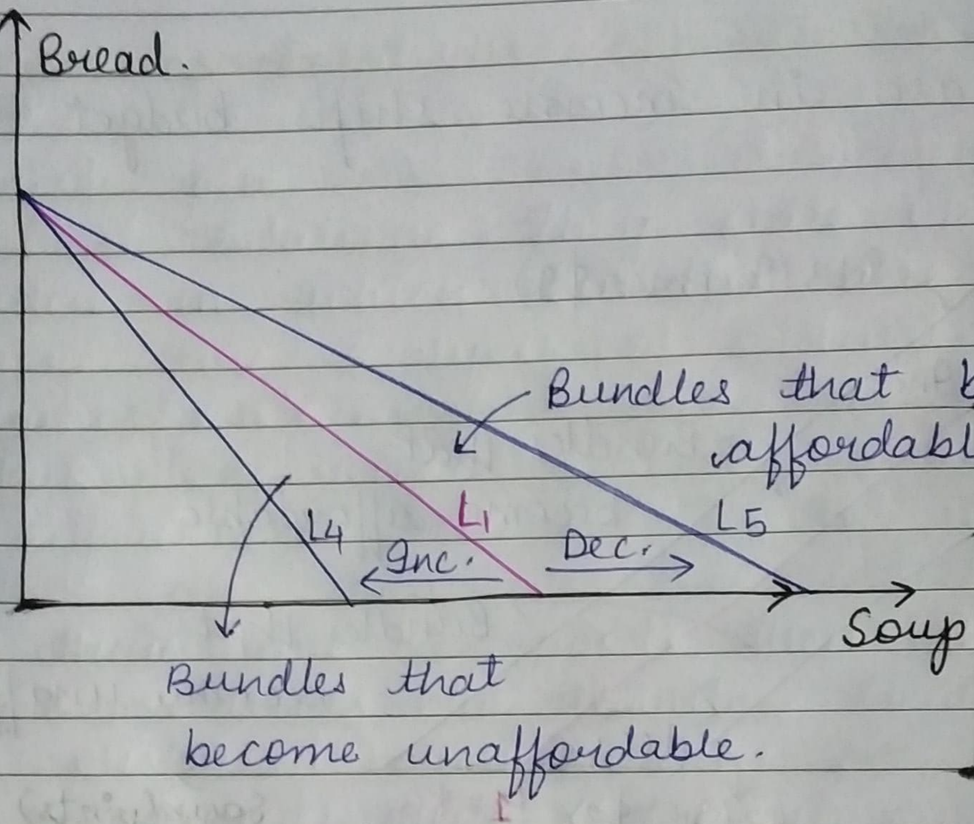
$$\text{Slope} = -\frac{P_1}{P_2} \text{ remains same.}$$

Change in price of a good pivots the ~~bio~~ budget line at the intercept of the good with the unchanged price.

- Outward for a price decrease
- Inward for a price increase.

$$\text{Slope} = -\frac{P_1}{P_2} \text{ will change.}$$

Intercept(s) of the line can change depending upon the good whose price is changing.



If price of only one good changes then the budget line will rotate about the intercept of the good whose price remains ~~tinct~~ unchanged.

If price of both the goods change, then the intercepts and slope both will change.

★ If there are n goods then

$$P_1x_1 + P_2x_2 + \dots + P_nx_n \leq M$$

In order to draw graph in this case, and to do other analysis, ~~the price of~~ all other goods leaving one, are taken together as a composite good, so it becomes $P_1x_1 + P_cx_c \leq M$

↳ Composite good.

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* Rationality in Economics

• **Behavioral Postulate:**

→ A decisionmaker always chooses its most preferred alternative from its set of availiable alternatives.

• So to model choice we must model decision-maker's preferences.

• A consumer always maximizes ~~ut~~ utility and the expected pay-off.

* Preferences

How ~~many~~ consumers choose the "best" bundle or the "most preferred bundle" (MPB)?

Suppose that given any two consumption bundles $X = \{x_1, \cdots, x_n\}$ and $X' = \{x_1', \cdots, x_n'\}$ the consumer can rank them according to their ~~des~~ desirability.

The idea of preferences is based on consumer's behaviour ... how a consumer behaves in choice situations involving 2 bundles.

Note: In two bundles $X = \{x_1, \cdots, x_n\}$ and $X' = \{x_1', \cdots, x_n'\}$, goods are the same, only the quantities of different goods is different.

* Preference Relations

~~Strict~~ ~~pre~~
Ordinal Relations : They state only the order in which bundles are preferred
There are 3 types of ordinal relations:
(i) Strict preference
(ii) Weak preference
(iii) Indifference.

If there are 2 goods, then there can be 3 relations b/w them:
X' preferred over X, or
X preferred over X' or
X & X' are indifferent ~~to~~ ~~ea~~

$\succ$ denotes strict preference.
~~$x \Rightarrow$~~ $x \succ y$ means bundle x is preferred strictly to bundle y.

$\sim$ denotes indifference.
$x \sim y$ means x and y are equally preferred.

* Fundamental Axioms of Consumer Theory

- **Completeness**

Any two bundles can be compared.
either $X I X' \Rightarrow X \sim X'$
or $X P X' \Rightarrow X \succ X'$
or $X' P X \Rightarrow X \succ X'$

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- Reflexivity

A bundle is atleast as good as itself.

$$XIX \Rightarrow X \sim X$$

Implies that the indifference set is non empty.

Indifference set: Set of all bundles in ~~which~~ which the consumer is indifferent to all the bundles.

- Transitivity:

If x is atleast as preferred as y, and y is atleast as ~~prop~~ preferred as z, then x is atleast as preferred as z, i.e.

$$x \succsim y \text{ and } y \succsim z \Rightarrow x \succsim z$$

$$XRX', X'RX'' \Rightarrow XRX'' \quad R \in \{P, I\}$$

$PP \Rightarrow P$ $\quad XPX', X'PX'' \Rightarrow XPX''$

$PI \Rightarrow P$ $\quad XPX', X'IX'' \Rightarrow XPX''$

$IP \Rightarrow P$ $\quad XIX', X'PX'' \Rightarrow XPX''$

$II \Rightarrow I$ $\quad XIX', X'IX'' \Rightarrow XIX''$

This axiom helps to put any bundle in any one of the 3 sets:

(i) A better set $B(X)$ is $\exists$ $\forall$ elements $Y \in B(X)$ such that YPX.

(ii) A worse set $W(X)$ is $\exists$ $\forall$ elements $Z \in W(X)$ such that XPZ.

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Implication: Indifference sets are disjoint.

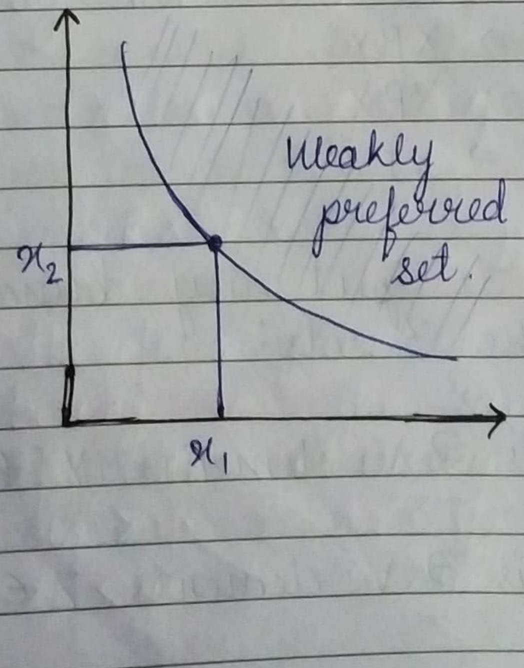
iii) Indifference set $I(X)$ is $\exists$ $\forall$ elements $Y \in I(x)$ we have $X I Y$.

Indifference curves (ICs) cannot intersect each other in two good world.

An IC is the locus of all bundles among which the consumer is indifferent to.

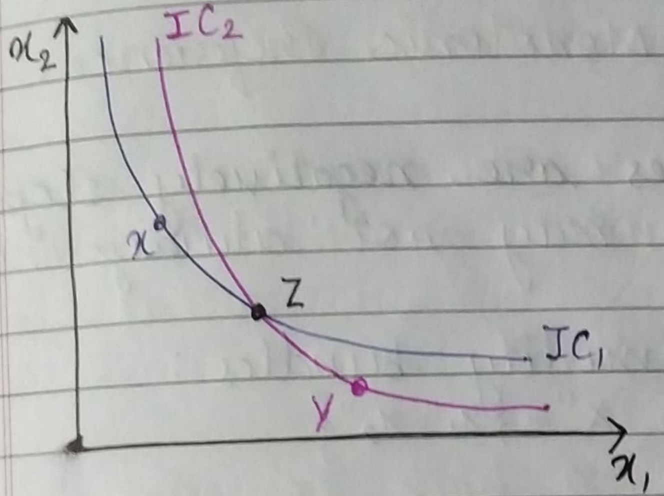
Weakly preferred set: All the consumption bundles that are weakly preferred to (x_1, x_2) is called the weakly preferred set.

The bundles on the boundary of this set for which the consumer is indifferent to (x_1, x_2) is called the IC.



Indifference curves cannot intersect.

Proof:



By assumptions ICs represent distinct levels of preferences.

Assuming XPY.

XIZ , ZIY

By transitivity XIY.

But this contradicts the assumption XPY.

★ Well-Behaved Preferences

A preference relation is "well-behaved" if it is:

- Monotonic
- Continuous
- Convex

• Monotonicity: More of any commodity is always preferred (i.e. no satiation and

every commodity is good).
"More is preferred to less".

Implication of Monotonic Preference.

i) **Indifference curves are negatively sloped.** But monotonicity may not always hold.

Consider 2 commodity bundles:
$X' = \{x_1', x_2'\}$ & $X'' = \{x_1'', x_2''\}$.

Let $x_1' = x_2'$ (Amounts).

Then by monotonic preference

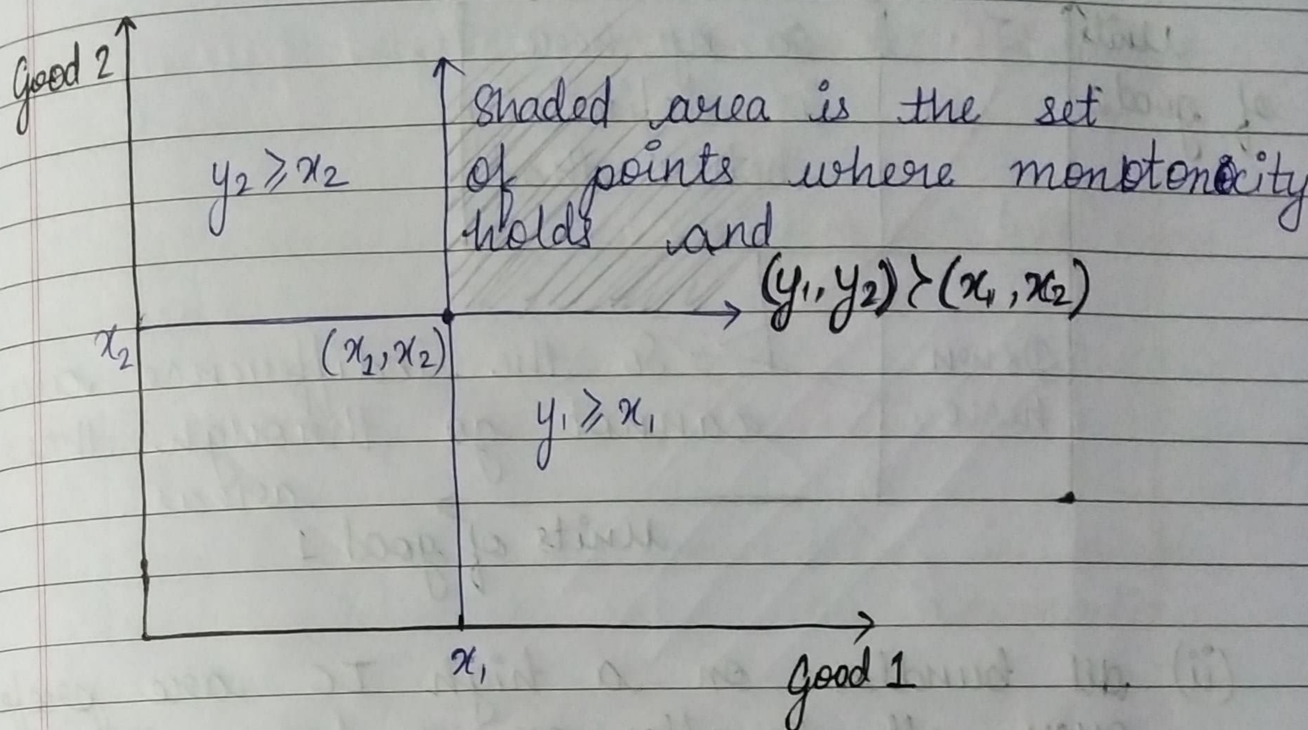
$X'' P X'$ if $x_2'' > x_2'$
$X' P X''$ if $x_2' > x_2''$
$X' I X''$ if $x_2'' = x_2'$

By the same ~~logic~~ logic

$X^h P X' \ \forall \ x_j^h > x_j', \ x_j^h \in X^h$

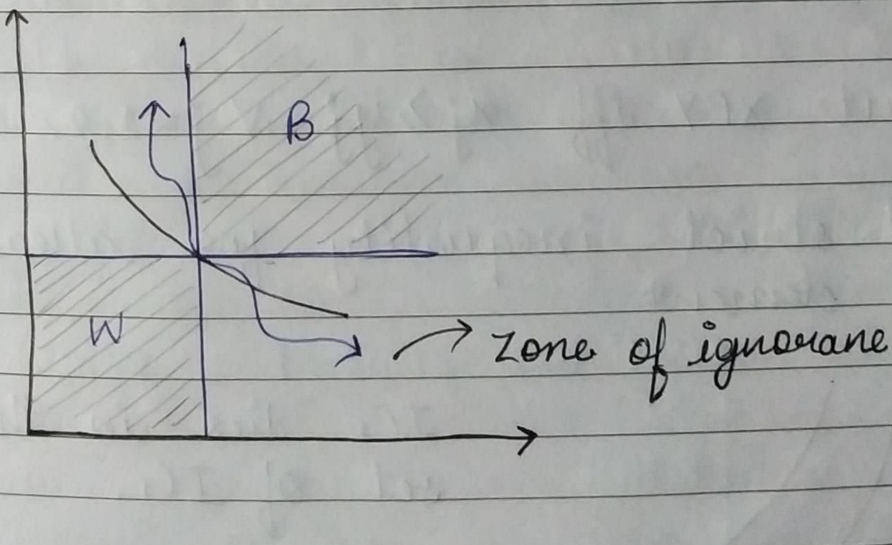
$X' P X^h \ \forall \ x_j^h < x_j', \ x_j^h \in X^h$

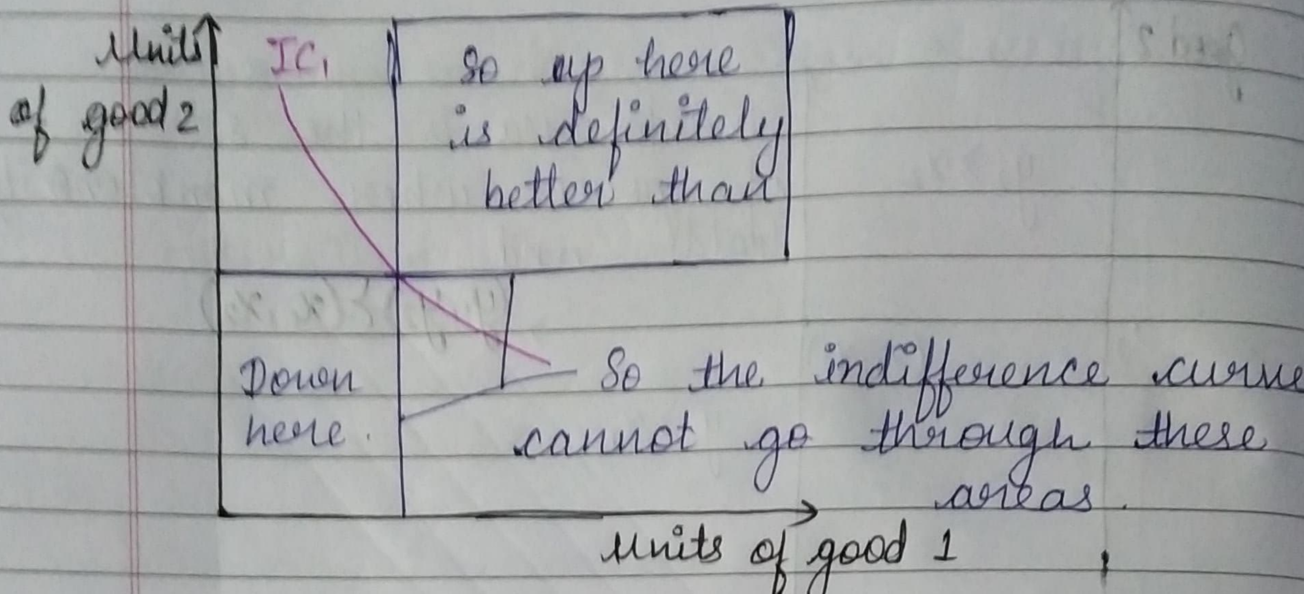
Therefore, pair of bundles X' and Y' can belong to the same indifference set $I(X')$ if the following conditions hold:
(i) $x_1' > y_1'$ & $x_2' < y_2'$
(ii) $x_1' < y_1'$ & $x_2' > y_2'$



∴ Shaded region ~~is~~ consists of all bundles that are strictly preferred over (x_1, x_2)
∴ It is the better set of x.

The bundles in the lower left quadrant is strictly ~~not~~ less preferred over (x_1, x_2). ∴
It is the worse set of x.





(ii) All bundles on a high IC are preferred over all bundles on a lower IC.

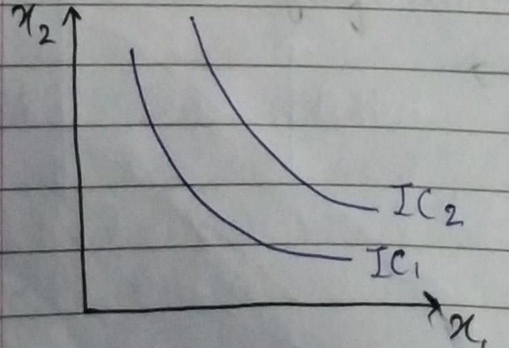
consider two indifference sets I_1 & I_2.

Let $X \in I_1$ & $Y \in I_2$

since by transitivity, I_1 & I_2 are non overlapping sets, so either XPY or YPX.

But XPY iff $x_j \geq y_j \ \forall \ j = 1, 2, \dots$

and strict inequality for atleast one element



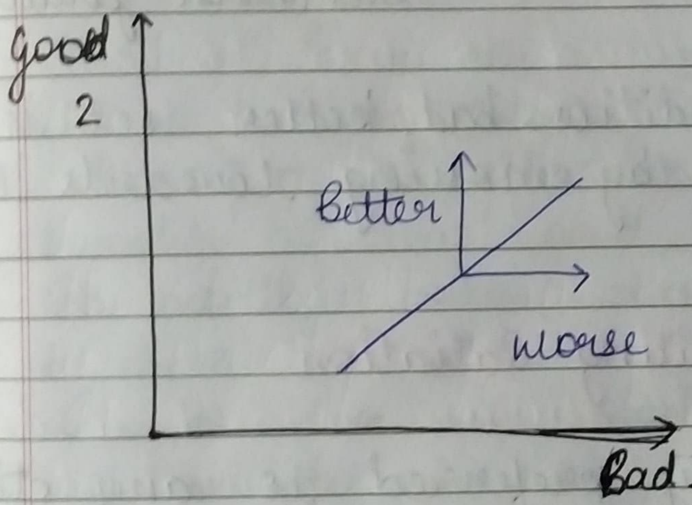
IC_2 lies in the better set of IC_1.

~~IC_2~~ ~~is~~ IC_1 lies it the worst ~~st~~ ~~a~~ set of IC_2.

∴ Now, the zone of ignorance has been shrunked.

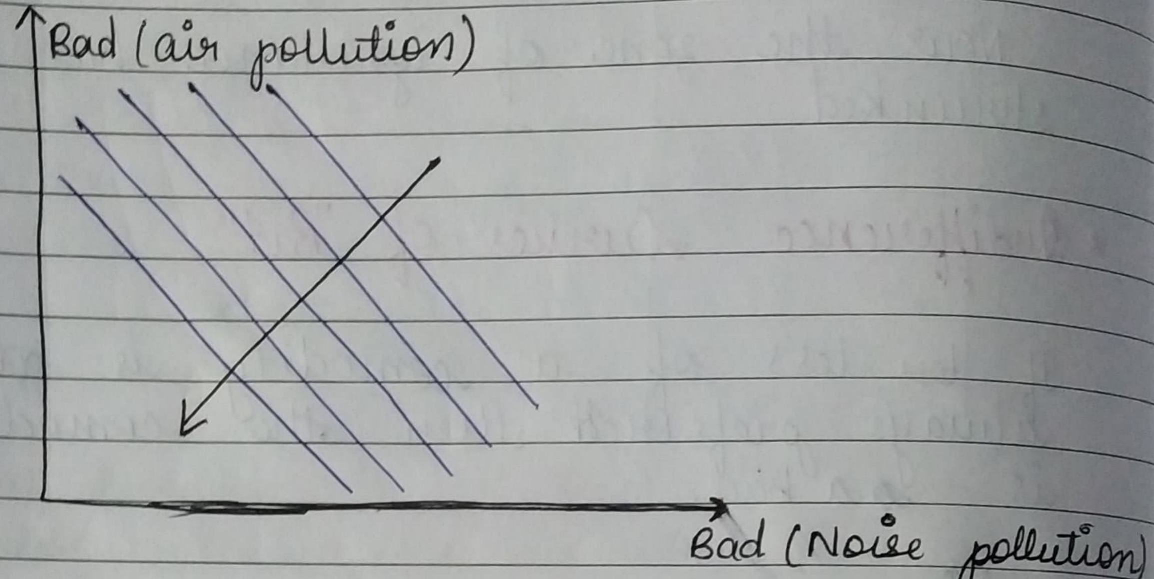
* Indifference Curves of "Bad"

If ~~less~~ less of a comodity is ~~also~~ always preferred then the comodity is ~~a~~ a bad.



One good and one bad ⇒ a positively sloped indifference curve.

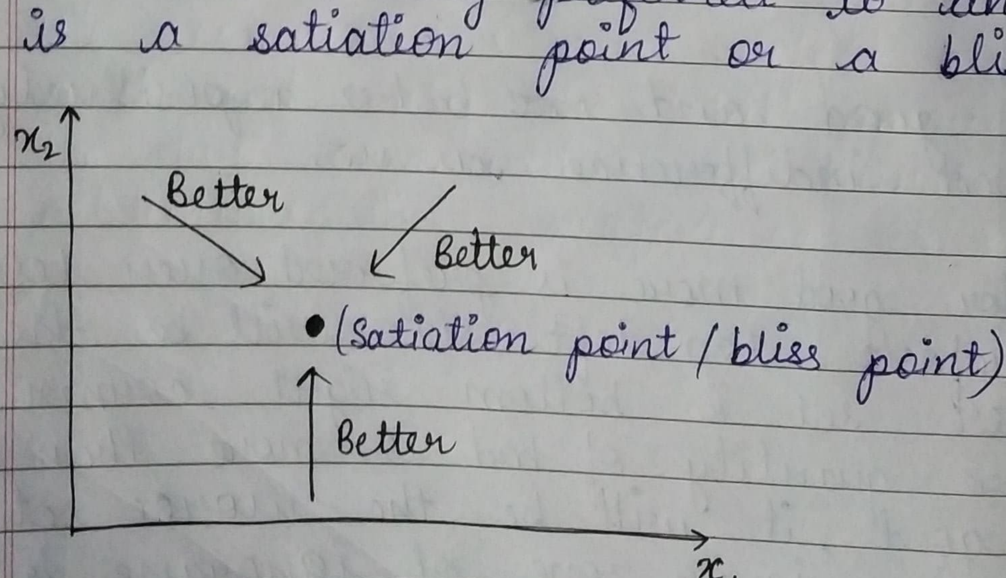
If for good, more is preferred over less, therefore, top left side will be the better set & bottom right corner, where quantity of bad is more than that of good, it will be the worse set ∴ the ~~inc~~ ~~ignor~~ zone of ignorane is the bottom right & top left ∴ indifference curve is positively sloped passing through the zone of ignorance.



For both comodities bad, better set is ~~when~~ obtained by moving towards the origin.

Preferences Exhibiting Satiation

A bundle strictly preferred to any other is a satiation point or a bliss point.



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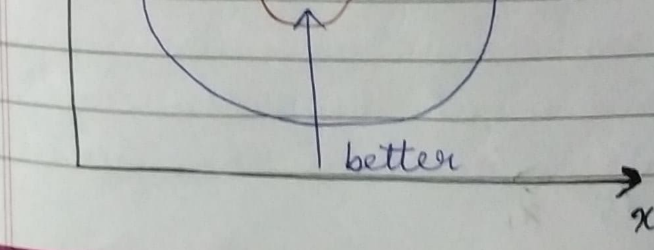
when the ratio is greater than the optimum ratio, then also the indifference curve is -vely sloped but the direction of better set is towards the bliss point.

when the quantity of both the goods is more or the quantity of both the goods is less, then the indifference curve is -vely sloped & the direction of better set is towards the bliss point. ∴ In the bottom left & top right, indifference curve is -vely sloped.

when the quantity of any one ~~commodity~~ commodity is greater than the preferred quantity of that good, then the ~~quantity~~ commodity whose quantity is greater becomes a bad good. ∴ The indifference curve for one good & one bad commodity is +vely sloped. ∴ In top left & bottom right, indifference curve is +vely sloped & the direction of better set is towards the bliss point.



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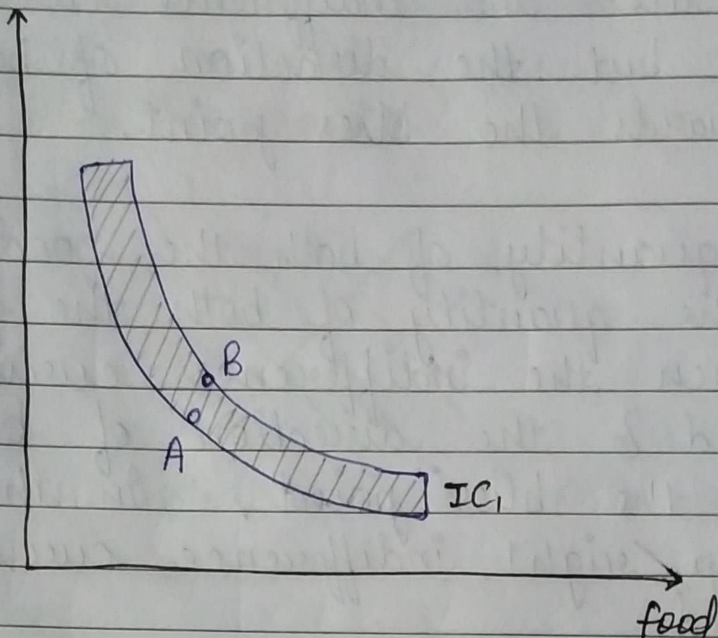
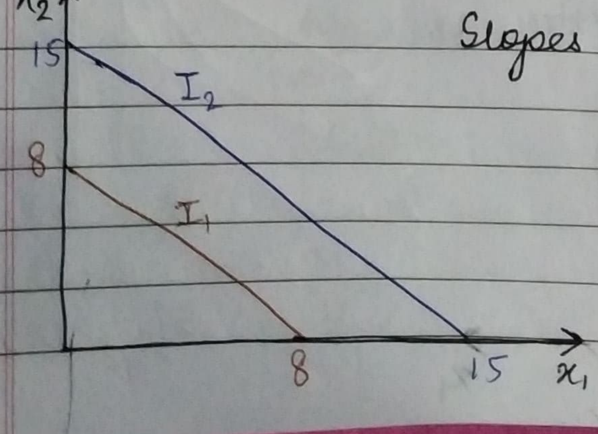
* Clothing



If more is preferred to less, IC cannot be thick. B would be preferred to A, so could not be on same IC.

* Perfect Substitutes

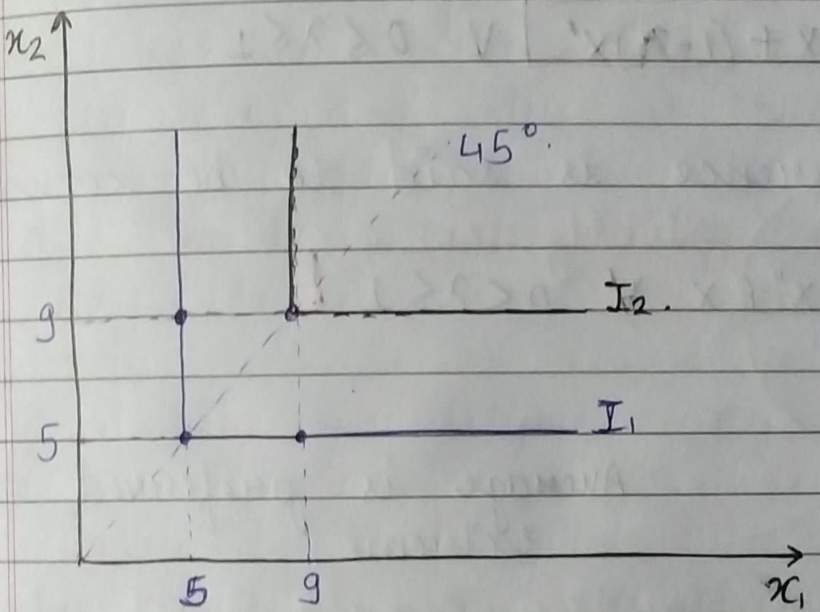
If a consumer always regard units of commodities 1 & 2 are equivalent, then the commodities are perfect substitutes ~~and~~ and only the total amount of the two commodities in bundles determines their preference rank-order.



Slopes are constant at -1.

Bundles in I_2 all have a total of 15 units and are ~~strictly~~ strictly preferred to all bundles in I_1, which have a total of only 8 units ~~of~~ in them.

★ Perfect complements



Each of (5,5), (5,9) & (9,5) contains 5 pairs so each is equally preferred.
This the case when the goods can be consumed only in a fixed ratio.

Here I_2 is in the better set of I_1. When there is more of both quantity in that particular ratio then it is more preferable.

- Convexity

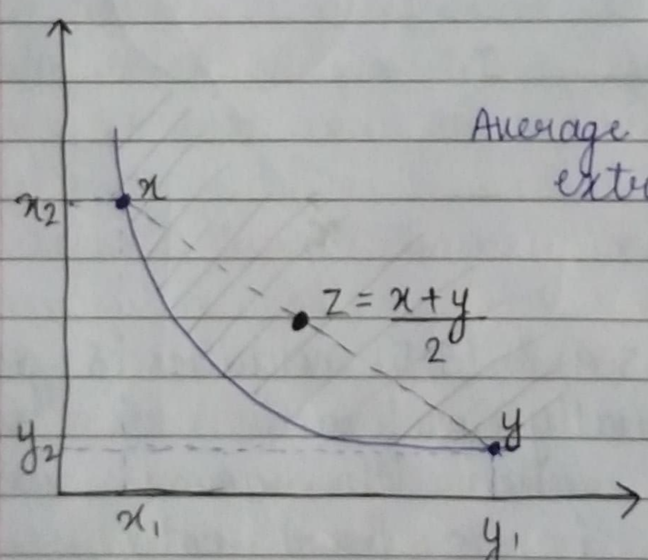
Consider any two ~~comod~~ commodity bundle X & X' ∋ ∋ $X I X'$.

Let X'' be another bundle such that

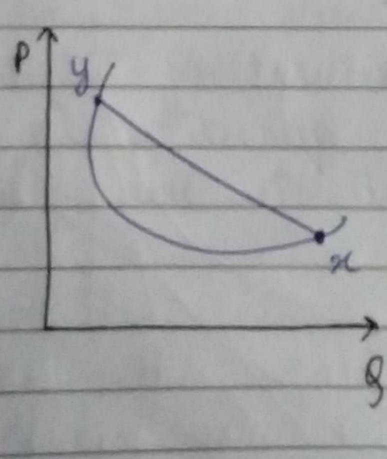
$$\boxed{X'' = \lambda X + (1-\lambda)X'} \; \forall \; 0 \leqslant \lambda \leqslant 1.$$

Then preference is said to be convex if

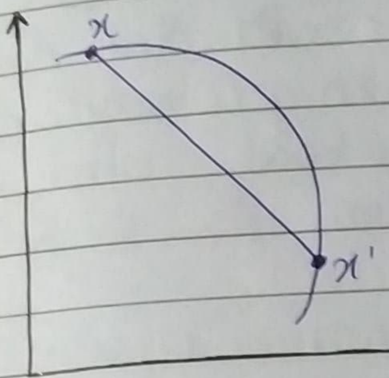
$$\boxed{X'' P X \; \forall \; 0 < \lambda < 1}$$



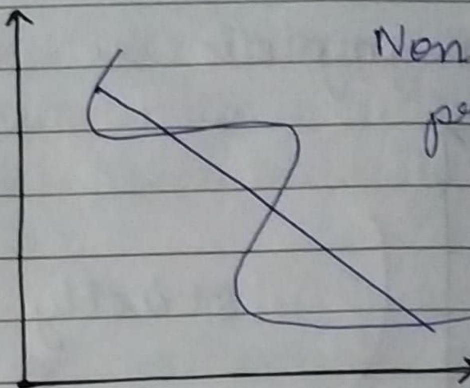
Average is preferred over extreme.



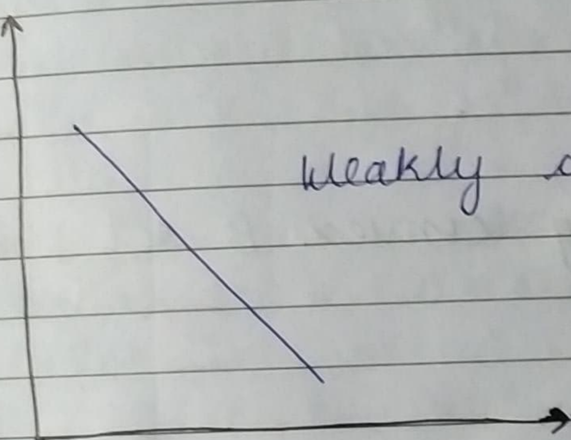
Strictly convex
Convex to the origin.



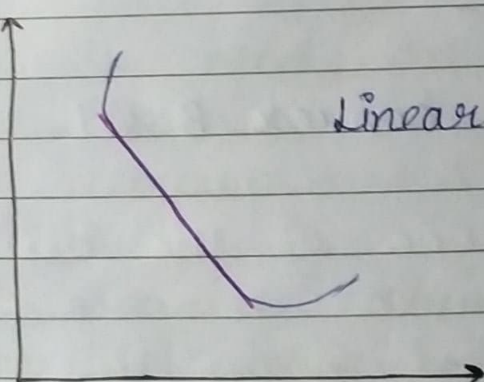
concave.



Non convex preference

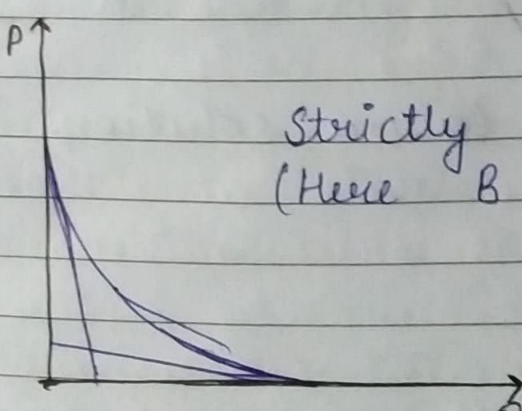


weakly convex.
x'' is weakly preferred over x.



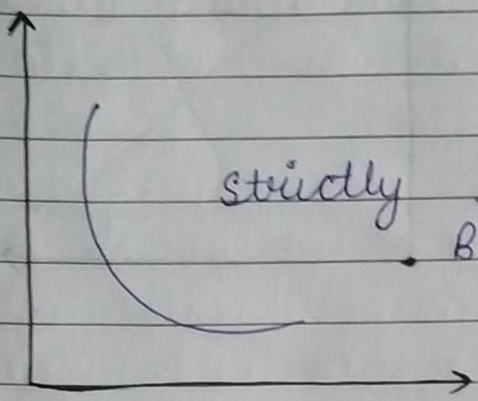
Linear stretch in IC

weakly convex.

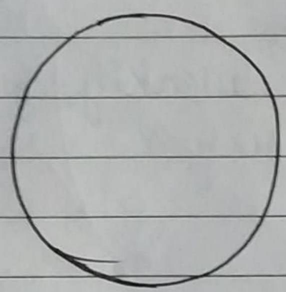


Strictly convex
(Here B set is weakly convex).

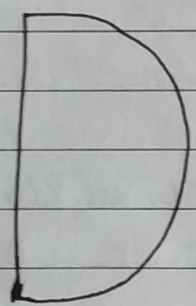
Moreover, we require strict convexity of the better set to any bundle. Here IC is asymptotic to the axis



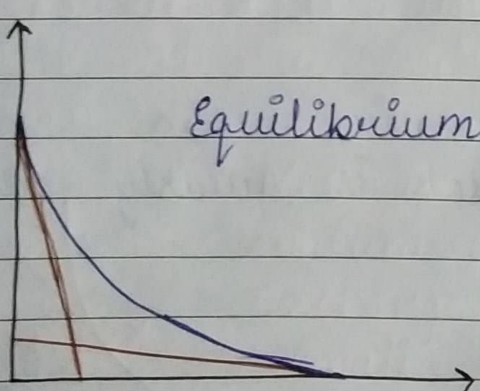
strictly convex B set.



Strictly convex B set



weakly convex B set.



Equilibrium corner solution

In this case, we will also get some corner solution, where the consumer will not be able to consume one good at all. ∴ If that combination is taken as the optimum combination then the consumption of one good will become absolutely zero which is not likely.

∴ Along with strict convexity of indifference curve, we also need strict convexity of preference i.e. strict convexity of better set.

But in the above the better set also includes the axis, ∴ there will be a linear stretch in the better set & we will not be able to rule out the corner solutions

∴ We need an interior optimum i.e. a solution in which the consumer is able to consume +ve quantity of both the goods.

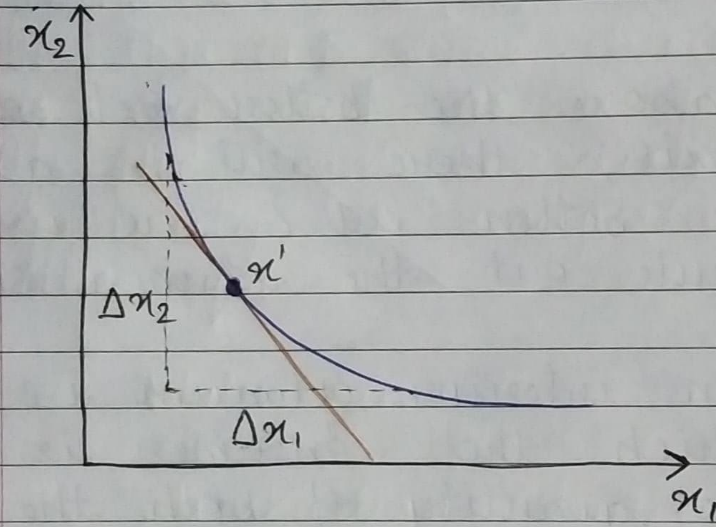
We require strict convexity of the better set to any bundle. Here IC is asymptotic to the axis.

Examples of non-convex indifference set: Perfect substitutes, perfect complements, Bads, neutrals,

Optimum solution is the point where the budget line is tangent to the indifference curve, ∴ if there is a linear stretch in the indifference curve & the budget line coincides with the linear stretch, then there will not be a unique optimum sol^n.

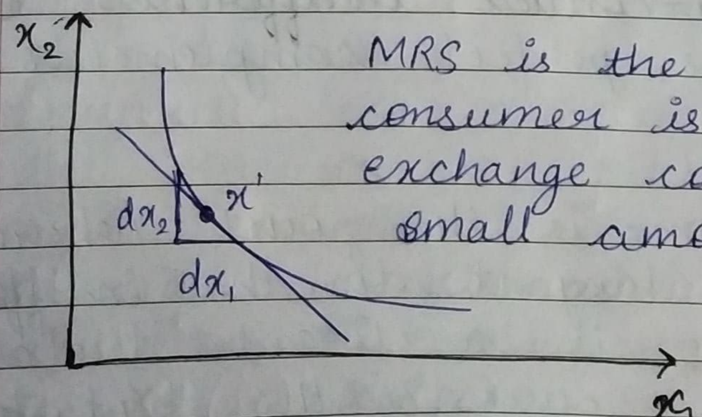
Marginal rate of substitution

The slope of an indifference curve is its marginal rate-of-substitution (MRS).



MRS at x' is the slope of the indifference curve at x'.

MRS at x' is $\lim\limits_{\Delta x_1 \to 0} \left\{ \frac{\Delta x_2}{\Delta x_1} \right\} = \frac{dx_2}{dx_1}$ at x'.



MRS is the rate at which the consumer is only willing to exchange commodity 2 for a small amount of commodity 1.

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When ~~MRS~~ monotonicity holds, MRS involves reducing consumption of one good to get more of another. Hence MRS is negative number.

With strict convexity, MRS is diminishing as good 1 consumption increases, i.e., the rate at which we want to substitute good 1 for good 2 falls as good 1 consumption increases.

Perfect substitutes : MRS = -1.

Perfect complements : MRS = 0 or ∞

Neutral = infinity.

As ~~the~~ we move downward in the IC, the consumer is willing to substitute more quantity of x_1 by x_2 ∴ slope is decreasing.

* Two approaches of Equilibrium

Walrasian :
A price $P_e \geq 0$ is a Walrasian equilibrium price if for such a price buyer's plan match seller's plans i.e. $x_d(P_e) = x_s(P_e)$, i.e., $E(P_e) = 0$ (ED quantity function). If eq. is disturbed then the ~~quantity~~ price is readjusted to reestablish the eqm. In this, the quantity is represented as a function

of price. ED quantity func^n is the difference b/w quantity demanded & quantity supplied in terms of price.

Marshallian:
A quantity $x_e \geq 0$ is a Marshallian equilibrium quantity if for such a quantity buyer's plan match seller's plans, i.e., $P_d(x_e) = P_s(x_e)$, i.e., $F(x_e) = 0$. ~~In this~~ (ED price function). In this, price is expressed as a function of quantity. If the eqm is disturbed, then the quantity is readjusted to reestablish the eqm.

Walrasian: Price adjustment

Marshallian: Quantity adjustment.

No difference in Walrasian & Marshallian equilibrium price and quantity.

∴ Mathematically, eqm is the cond^n when excess demand is zero.

Example: $x_d = a - bp$
$x_s = c + dp$

At eqm in Walrasian approach:

$x_d(P_e) = x_s(p_e)$