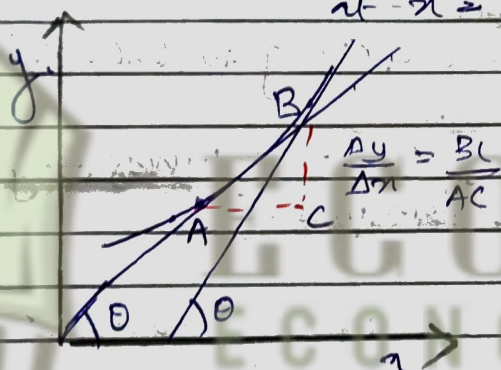


29-11-2021.

C1 & C2

First derivative refers to the instantaneous rate of change of a variable (say y) w.r.t another variable (say x) when change in x is very small (in other words $\Delta x \rightarrow 0$ but concept of limit deliberately avoided in the definition).

Working defn :- Slope of tangent of the curve is the first derivative of y w.r.t x at $x = A$ (in fig).



Things to remember

Slope = $\frac{\Delta \text{vertical}}{\Delta \text{horizontal}} = \frac{\Delta y}{\Delta x}$

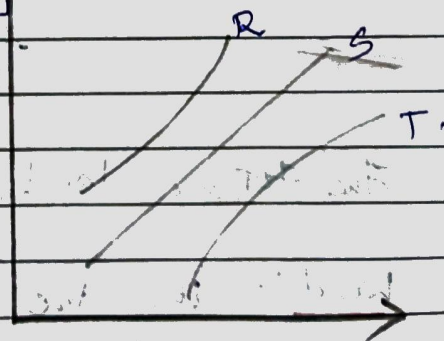
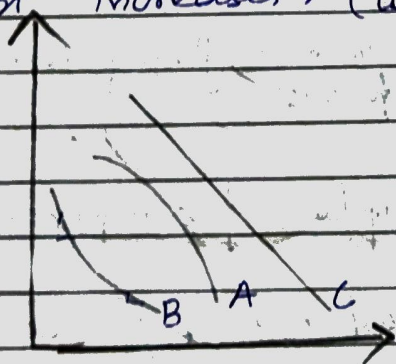
$\tan \theta$ increases from 0 to 90

$\tan(90)$ is not defined

$\tan \theta$ decreases from 90 to 180

$\therefore$ measured in absolute terms - possible

What happens to the following curve's first derivatives as ' x ' increases. (Curves being A, B, C and RST).



A - first derivative increases as x changes (slope though -ve)

B - first derivative decreases as x changes (slope though -ve)

C - slope is -ve - first derivatives remain constant

R - first derivative increases as x changes (slope is +ve)

T - first derivative decreases as x changes (slope is +ve)

S - slope is +ve - first derivative remain constant

30-11-2021,

The concept of 'choice'

For a choice to be exercised,

→ there must be multiple alternatives -
i.e. alternatives available > 1 .

→ Can't acquire all alternatives i.e. a choice exists
won't be a choice if the person choosing has a
preference and/or is able to choose all alternatives
at once

i.e. no of choice $\leq$ no of available alternatives.

→ Scarcity of resources :- constraining us from
acquiring all alternatives.

To be noted that for choices to be made we also
need relevant information about alternatives -

01-12-2021

Factors of production

There are certain aspects that help in the production
process known as FOP.

raw material $\xrightarrow{\text{production process}}$ final goods and services.

The FOP are: land, labour, capital and entrepreneurship.

land :- it is the non-produced natural gift used for
production process

labour - it is the human effort used in production

Capital :- refers to the human-made goods, plants &
machinery, factories etc. in production
process.

Entrepreneurs :- They are those who organise all the factors of production, assumes risk and anticipates future.

Additional things for a better picture

» All the mentioned FOP are by default stock variables.

» Capital refers to capital stock.

However investment is different from capital.

i.e. Investment (in economics) - change in stock.

$\Delta K_s = K_t - K_{t-1}$ - flow variable.

» Raw materials are not included in 'capital' as a FOP because they get 'subsumed' in the production process.

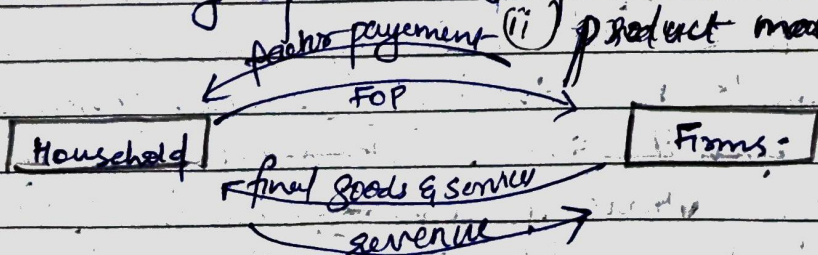
» It is to be noted that labour is human effort and labourer is the person doing the job.

» Land doesn't come under labour/capital (generally) as it is not a produced good.

» Entrepreneur is not simply a 'specialised labourer' rather he is the one who makes him/herself different is that an entrepreneur takes risk (anticipates future). Why? because production takes time so as to gain profit (i.e. in economics defined as $TR - TC$).

Markets can be divided on the basis of what are these markets trading upon into (i) factor market.

(ii) product market.



Note Behavior of an economy cannot be determined by mere aggregation of the behaviour of individual units.

06/12/2021

Idea of correlation

Correlation ~~is~~ measures the degree of and direction b/w two variables.

Correlation doesn't necessarily mean causation or in other words it is not true to say causation is always true. Even if x and y are correlated, it doesn't always indicate that x causes y to change or vice versa i.e. there is no creation of dependent/independent variable.

Theory formation - a summary

The thing that we first have is observations with which we frame a hypothesis for which we test certain propositions to check if its true or not (with data collection and experimentation). If the ^{propositions} ~~hypothesis~~ ^{hypothesis} turns true, then it is not rejected. If any of the propositions has not to be true, then the hypothesis is rejected.

Note: that the terminology used when the proposition was True is 'not rejected' rather than 'accepted' because we keep the proposition open to debate in the future to test its validity.

② that two theories can be contradicting even if ~~there~~ both are logical because the value judgement / theory of mind backing each ~~theory~~ theories are different.

Positive and Normative Statement

Positive statements are factual no matter even if it is wrong.

eg: The sun rises in west.
Delhi is the capital of India.

Normative statements suggest value judgement and generally contains words like 'ought to' or 'should' etc.

eg: The govt ought to ensure successful vaccination rate.

Let us imagine hypothetically a situation

There are two goods X and Y needed to be produced. The factor of production is 'Labour' only.

2 units of labour required for per unit production of X and 4 units that for good Y.

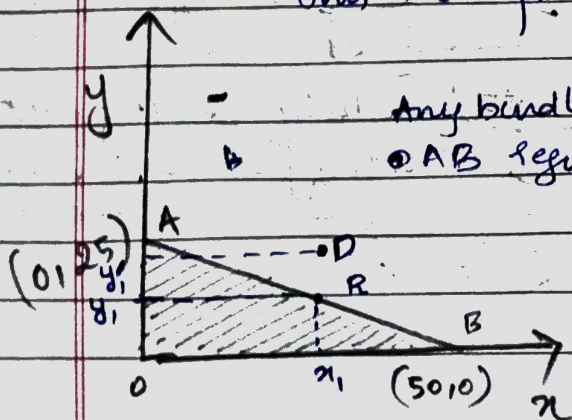
Q. What are the bundles (x, y) which the economy can produce?

Here, we assume let 'x' be the number of units of good X which is produced and 'y' be the number of units of good Y which is produced.

then total labour required for production is $2x + 4y$

Thus the eqn is $2x + 4y \leq 100$. It can be less than 100 because the eqn is what the economy 'can' produce. Thus even (0,0) is a possible bundle but no unit is not possible.

Thus the eqn is $2x + 4y \leq 100$
 $x \geq 0, y \geq 0$



Any bundle in

the AB region can be produced by economy.

Now consider a point 'R' on AB, i.e. $R(x_1, y_1)$

By defn, x_1 units of good x is produced if the bundle taken is R.

Thus if the economy produces x_1 units of good x then the line AB suggests that the maximum unit of good y that can be produced will be y_1 units.

But - keeping x_1 units of production unchanged, we can't increase the production of good y from y_1 to say y_2 and make the bundle $D(x_1, y_2)$ possible.

Why? graphically speaking $D \notin [OAB]$

or 'D' is a bundle which is beyond the capacity of the economy.

Several points/implications that we can draw from 'AB' are

① If we fix the unit of good x to be produced, then the line AB shows what would be the maximum amount of commodity y which the economy can produce and vice versa. (consider example of R)

② AB tells us those bundles of x and y which the economy can produce (on AB) is when all its resources (here labour) is fully utilized (employed)

AB tells us all the bundles (on AB) satisfy $2x + 4y = 100$ where the economy is using all its labour resources.

Consider a similar yet slightly different situation where:

OAB region shows all possible bundles that the economy can produce.

* Given :- People comprising the economy find both goods X and Y desirable.

Q which are the bundles that the economy will produce?

The answer is all bundles on the line AB.

Now, why can't we take a point beneath AB?

Consider, a point R where x_1 unit of good X and y_1 unit of good Y is produced.



But earlier we learnt that if we fix the unit of good X to be produced, then using the line AB we can find what is the maximum amount of commodity Y which the economy can produce. [Ex. 11]

So in this case at x_1 being fixed y_1 is the maximum amt of good Y that the economy would produce. Of course y_1 is beneath the line. It is quite clear that

$y_1 > y_1$. Given that people prefer both goods.

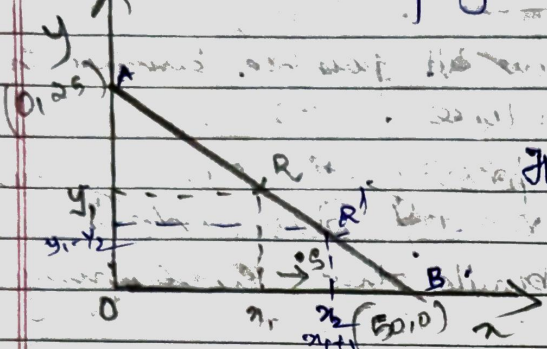
It is sure that people'd prefer (x_1, y_1) over $R(x_1, y_1)$.

$R(x_1, y_1)$ becomes ^{more of} at least one of the commodities can be produced keeping the other commodity's production constant (possible only because at $R(x_1, y_1)$ free labour is present).

Thus the bundles on AB will be produced by the economy.

On this case the slope of the curve = $\frac{-25}{50}$

$$= -\frac{1}{2}$$



This line AB is PPC/PPF.

Let us consider a point R in AB, which produces x_1 units of good X and y_1 units of good Y.

Now in order to move from x_1 to any point in the right i.e. to increase the production of good X from say x_1 to x_2 , then we need to reduce the production of good Y.

Why? Because since the bundle $R(x_1, y_1)$ is on the PPC (AB), labour is fully utilized and there is no free labour. So production of good X can't be ^{increased} ~~done~~ without ~~decreasing~~ Y's production.

But if the point we considered was S, then we could have increased the production of X without necessarily reducing Y's production. Because the unemployed labour can be taken to produce more of good X keeping production of good Y constant.

07-12-2024

Consider the point $R(x_1, y_1)$ on AB again!

For production of X to increase by 1 unit i.e. $x_1 + 1$, it requires 2 units of labour (L). Since the resource is fully

PDC is a curve that shows the various possibilities of bundles of 2 goods that can be produced at a pt in time when they are fully employed. classmate
Page _____

employed (x_1+1) unit of production can be achieved only by transferring the 2 units of labour which are employed in the production of good Y i.e. by sacrificing some unit of producing Y. Next, in this example production of Y reduces by 2 units. Thus (x_1+1, y_1-2) will be R_1' .

Slope of the PPC shows what amt of commodity Y (com) that the economy has to give up to produce add unit of commodity X (or Y), when resources are fully utilized. It is called the marginal rate of product transformation (MRPT_{X-Y}) of com X to Y.
 * why 'has to' because of full employment of resources.
 ** means movement along PPC.

Let us consider the same example with a slight change in the nature of resources.

Consider an economy producing two goods X and Y. The resource available is Labour (L). However unlike earlier Labour is not homogenous here. 100 units of Labour consists of 40 units of skilled labour and 60 units of unskilled labour. It requires 2 units of skilled labour and 4 units of unskilled labour to produce one unit of X and 4 units of skilled and unskilled labors to produce one unit of good Y.

100 L
 40 60
 S U

1X = 2L^S
 1X = 4L^U

1Y = 4L^S
 1Y = 4L^U

What would be possible bundles?

Consider all unit of labour is used for production of good Y.

$$\begin{array}{rcl} \text{ie } 40L^S & \Rightarrow & 10X \\ 60L^U & \Rightarrow & 15Y \\ \hline 100L & & 25Y \end{array}$$

The first pre definite pt in the bundle is (0, 25).

Now in order to produce 1 unit of X, production of Y needs to fall cuz resources are fully employed. Labour needs to go from Y to X. It takes $2L^S$ and $4L^U$ for producing 1 unit of X.

If we take $2L^S$ from Y, production of Y becomes $24.5Y$ (1)

If we take $4L^U$ from Y, production of Y becomes $24Y$ (2)

(1) will lead to the pt (1, 24.5) and

(2) will lead to the pt (1, 24)

A rational economy will choose (1) over (2) i.e. skilled labour over unskilled one.

This next pt would be (1, 24.5), then (2, 24), (3, 23.5) so on. This trend would continue until all the skilled labour is used for producing X i.e. $40L^S$ for X till it is (20, 15).

$$\begin{array}{rcl} \text{ie } 40L^S & \Rightarrow & 20X \\ 60L^U & \Rightarrow & 15Y \end{array}$$

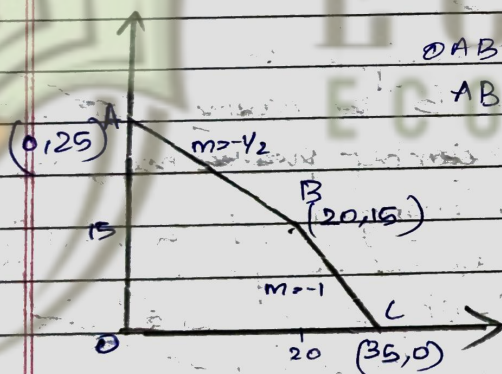
afterwards for further production of X, unskilled labour is taken from Y this reduces Y's production (not by 1/2) 1 unit for each add unit.

ie $(21, 14)$ (and not $21, 14.5$)

This will continue till all unskilled labour also is used up for prodn & leave 0 unit of y at $(35, 0)$

$$\begin{array}{rcl} \text{ie } 40L^3 & \Rightarrow & 20X \\ + 60L^4 & \Rightarrow & 15X \\ \hline 100L & \Rightarrow & 35X \end{array}$$

Considering all this points, we get a graph where the downward sloping line would be comfortably flatter first with a slope of $-\frac{1}{2}$ till the point where corresponding x coordinate is 20 and later slopes downward steeper with a slope of -1 to touch the x axis at $(35, 0)$.

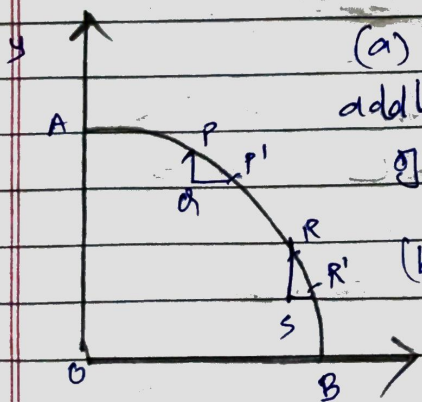


$\triangle OABC$ is the bundle and

ABC is the PPC curve (with a kink at B)

A conclusion from example is that skilled resources are suitable for x and hence it is taken initially.

Thus in general when more and more heterogeneous resources are there PPC would be a concave to origin curve.



(a) PPC is -vely sloped, because everywhere addl unit of x produced requires a sacrifice of y (along the curve)

(b) The amt of commodity y that has to be sacrificed / given up for prodn of an addl unit of commodity x increases as x increases (ie $RS > PQ$)

28-12-2021

Marginal benefit :- the benefit derived by add unit.

Marginal cost :- the cost incurred for the production of an add unit of a commodity.

Opportunity cost :- cost of the next best comm/app foregone / given up

Sunk cost :- The probable cost is irrespective of what we do (ie the timing ll be unfavorable, u will realize it doesn't add to your benefit only after buying & spending the cost, the bought item can't be saved by any means)

Note :- Rational people behave upon marginal cost, not on sunk cost.

Now let us take another example :-

There are two countries A and B having 1000 units and 100 units of labour respectively. Each country produces two items, food (F) and clothing (C). Country A requires 2 units of labour and 4 units of labour to produce a unit of food and clothing respectively. Country B requires 4 units and 2 units of labour to produce a unit of food and cloth respectively.

To sum up

	A	B
	1000 L	100 L
Food (F)	2L	4L
Clothing (C)	4L	2L

We need to find frontiers of production.

We know that either both countries can produce these goods domestically with no trade at all (i.e. autarchy) or they can specialize in one, produce them more, trade a portion of it to buy the other product (import) from the other country producing the same if it is gaining.

The idea of Gain of trade was actually developed by Adam Smith.

Gain of trade

A country is said to have an absolute advantage (AA) in the production of a commodity if the labour (resource / Factor of prod) requirement is lower in the country compared to the other.

This idea was kept in mind when Smith proposed: -

AA Theory of Trade

A country should specialize in the production of the commodity which it has an AA and trade this commodity for other commodity.

Now based on this it can be said that: -

Country A ~~specialize in~~ has an AA in production of food.
Country B has an AA in the production of clothing.

Assuming International relative price $\frac{PF}{PC} = 1$

i.e. 1 unit of food can be exchanged for 1 unit of cloth & vice versa.

Let us consider Country A.

(*) In case of 'specialize and trade', the country won't produce clothing instead it'd be exchanged w/ food.

eg: $2L \xrightarrow{P} 1F \xrightarrow{E} 1C$

using 2 units of labour, 1 unit of food can be produced which can in turn be exchanged for 1 unit of clothing.

(2) In case of autarky.

$$4L \xrightarrow{P} 1C$$

Here 4 unit of labour used to acquire 1 unit of clothing.

It is clear that country A is better off in (1) case than (2).

because it requires less labour to acquire cloth.

Or put in other words the same unit of labor spend to produce cloth in A can

Let us take the example of country B ^{be used to acquire double the unit of cloth produce}

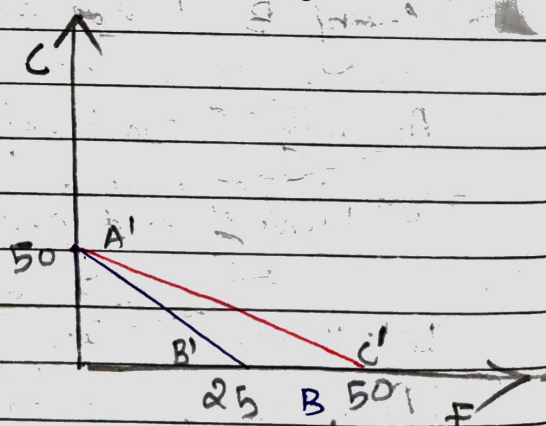
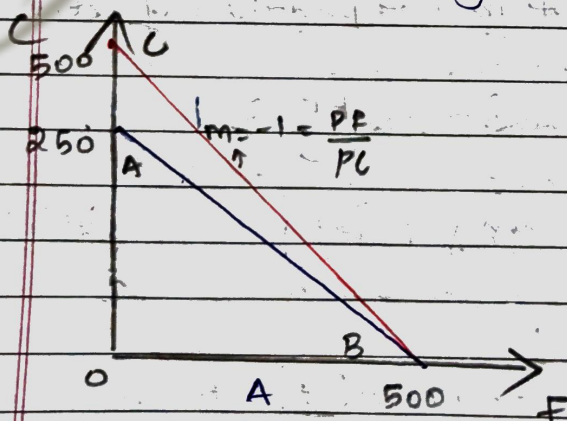
(1) Specialize and trade (food not produced but imported)

$$2L \xrightarrow{P} 1C \xrightarrow{E} 1F$$

(2) Autarky.

$$4L \xrightarrow{P} 1F$$

Here for B is better off with case (1) because the very same 4L can give you 2 units of food in case (1) whereas only a single unit in case (2).



From the fig we can understand that.

AB is the PPF of country A and A'B' is the PPF of country B. AB and A'B' are also the CPF of both countries under autarky.

With specialization and trade, BC is the CPF of country A, and A'C' is the CPF of country B. The slope of CPF in this case is -1 is the price relative $\frac{P_F}{P_C}$.

Note:

AA theory is independent of the difference in the endowment of resources (here labour) if any.

Q Does gain from trade depend on $\frac{P_F}{P_C}$? Yes
 If the $\frac{P_F}{P_C}$ is in such a way that, the CPF formed out of S&T coincides with/ is under the PPF/CPF in case of autarky, then there'll be no gain and thus no trade.

QED $13 - 12 = 2021$

Now let us look into another situation, what if a single country has AA in both goods' production.

eg:

	Country A	Country B	Country B has
Food	2L (unit)	1L	AA in both
Cloth	4L	1.5L	commodities.

Can they trade?

Here comes David Ricardo with a new concept -

Theory of Comparative advantage (CA)

A country is said to have comparative advantage in the production of a commodity (F) if the opportunity cost of producing the commodity is lower in country (A) compared to other country (B).

Labour Table

	A	B
1F	2 L	1 L
1C	4 L	1.5 L

Opportunity Cost Table

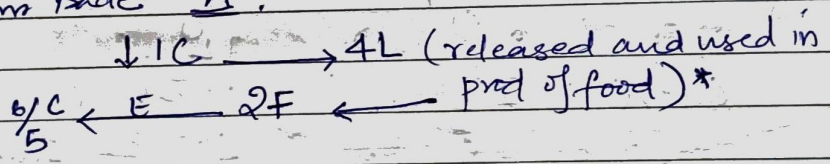
	A	B
1F	$\frac{1}{2}C$	$\frac{2}{3}C$
1C	2F	$\frac{3}{2}F$

Country A has CA in production of food and
Country B " CA " " " of cloth.

According to Ricardo,

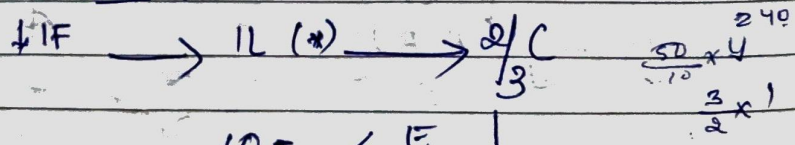
A Country should specialize in the production of the commodity in which it has a CA and trade with the other country.

Gain from trade A.



by reducing production of cloth by 1 unit, Country A following Ricardo's theory of CA got that is 10F. E $\rightarrow$ 6C
 6 units of cloth thus acquiring 2F. E $\rightarrow$ 2x6C
 a gain of $\frac{1}{5}$ units.

B



$\frac{1}{9}$ gain for food.

$$\frac{10}{9}F$$

$$\frac{2}{3} \times \frac{10}{3}$$

Different cases of $\frac{PF}{PC}$

I If $\frac{PF}{PC}$ is between $\frac{1}{2}$ and $\frac{2}{3}$ i.e. $0.6 < \frac{PF}{PC} < \frac{2}{3}$

The above case suggests both countries will gain.

II If $\frac{PF}{PC} = \frac{1}{2}$ $PF = \frac{1}{2} PC$

A $\downarrow IC \longrightarrow 4L (*) \longrightarrow 2F \xrightarrow{E} \underline{1C}$

A's gain = 0.

B

$\downarrow IF \longrightarrow 1L (*) \longrightarrow \frac{2}{3}C \xrightarrow{E} \underline{\frac{1}{3}F}$

Gain = $\frac{1}{3}$.

Thus in this case gain of one country will be zero (here A) and that of other country (here B) will be true ($\frac{1}{3}$).

III If $\frac{PF}{PC} = \frac{2}{3}$ $PF = \frac{2}{3} PC$

A

$\downarrow IC \longrightarrow 4L (*) \longrightarrow 2F \xrightarrow{E} \underline{\frac{4C}{3}}$

Gain = $\frac{1}{3}$.

B

$\downarrow IF \longrightarrow 1L (*) \longrightarrow \frac{2}{3}C \xrightarrow{E} \underline{1F}$

Gain = 0.

Gain of one country (here B) is zero and that of other country is positive.

IV If $\frac{PF}{PC}$ less than $\frac{1}{2}$ (ie $\frac{1}{4}$)

A

$$\downarrow 1C \rightarrow 4L (*) \rightarrow 2F \xrightarrow{E} 0.5C$$

Gain = $-0.5C$

B

$$\downarrow 1F \rightarrow 1L (*) \rightarrow \frac{2}{3}C \xrightarrow{E} \frac{8}{3}F$$

Gain = $\frac{8}{3}F$

In this case one country will lose that is gains would be negative (here A with -0.5)

V If $\frac{PF}{PC}$ greater than $\frac{2}{3}$ (2)

A

$$\downarrow 1C \rightarrow 4L (*) \rightarrow 2F \xrightarrow{E} 4C$$

Gain = $4C$

B

$$\downarrow 1F \rightarrow 1L (*) \rightarrow \frac{2}{3}C \xrightarrow{E} \frac{1}{3}C$$

Gain = $-\frac{2}{3}F$

here one country (B) loses ($-\frac{2}{3}$)

PF/PC	Result
$\frac{1}{2} < \frac{PF}{PC} < \frac{2}{3}$	Gain for both country $G_A > 0$ $G_B > 0$
$\frac{PF}{PC} = \frac{1}{2}$	$G_A = 0$; $G_B > 0$
$\frac{PF}{PC} = \frac{2}{3}$	$G_A > 0$; $G_B = 0$
$\frac{PF}{PC} < \frac{1}{2}$	$G_A < 0$; $G_B > 0$
$\frac{PF}{PC} > \frac{2}{3}$	$G_A > 0$; $G_B < 0$

Also within core 1 Suppose $\frac{PF}{PC} = 0.55$ then $PF = 0.55 PC$

A

$\downarrow TC \rightarrow 4L(A) \rightarrow \downarrow F \rightarrow 1.1C$

$PC = \frac{1}{2} PF$

Gain $> 0.1C$

B

$\downarrow IF \rightarrow 1L(*) \rightarrow \frac{2}{3}C \xrightarrow{K} \frac{11}{30}F$

Gain $> \frac{11}{30}F = 0.36F$

	$PF/PC = 0.6$	$PF/PC = 0.55$
Gain A	0.2	> 0.1
Gain B	0.11	< 0.36

As $\frac{PF}{PC}$ approaches opportunity cost of country A, the gain acquired by country A reduces.

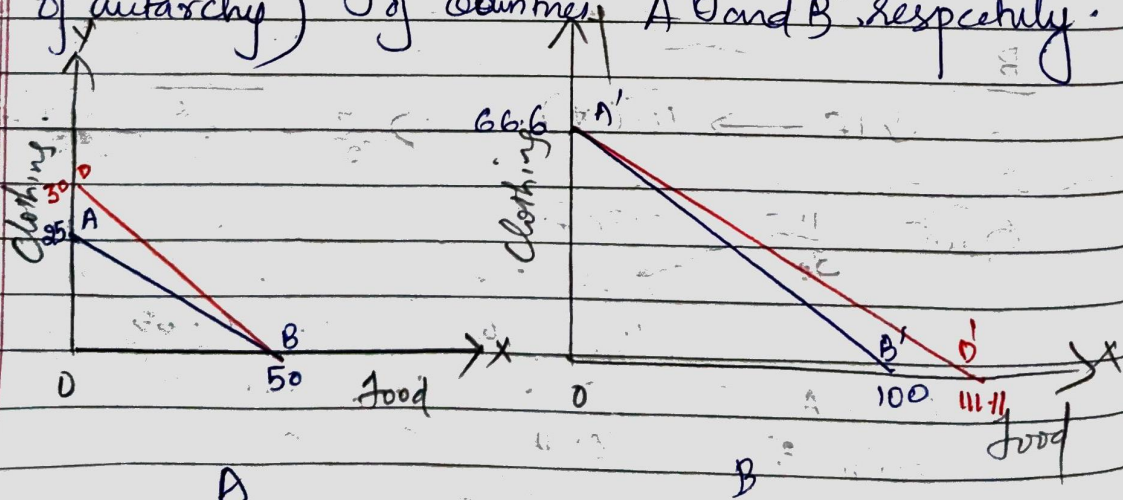
- > Both CA and AA are supply side theory of international trade and is thus an incomplete theory. It talks about what are the possibilities of production only.
- > The bar for international trade is differential technology (and not difference in the endowment of resources).

14-02-2021

- > Closer the PF is to a country's opportunity cost the lower PC would be the gain from trade for that.
- > $OC_A \leq \frac{PF}{PC} \leq OC_B \rightarrow$ trade + gains from trade.

Suppose labour endowment is 100 units.

Then ~~following~~ ^{AB and A'B'} would be the PPFs of (also PPF in case of autarchy) of countries A and B respectively.



In order to obtain CPF of both countries in the case of gain of trade at $\frac{PF}{PC} = 0.6$ Equations must be formed

Country A

The economy can produce 50 units of food ~~ie 50~~.

let f be units of food retained; then $(50 - f)$ units of food will be exchanged at the rate of 0.6 for clothing.

$$ie \quad C = (50 - f) \frac{PF}{PC} \quad \text{ie } B.C. > 0.6.$$

Given $\frac{PF}{PC} > 0.6$

$$C > 0.6 (50 - f)$$

$$\Rightarrow \underline{C > 30 - 0.6f}$$

if economy sells all the units of food then $C = 30$.
if economy domestically produces all clothes then $C = 50$.

Country B

The economy can produce 200 units of cloth

let c be the unit of cloth retained,

$$\text{Then } F = \frac{PC}{PF} \left(\frac{200}{3} - c \right) \quad \text{why? } \frac{PF}{PC}$$

$$F > \frac{10}{6} \left(\frac{200}{3} - c \right)$$

$$\frac{PF}{PC} > 0.6$$

$$\frac{PC}{PF} = 10/6$$

$$F > \frac{1000}{9} - \frac{10}{6} C$$

$$\frac{10}{6} C = \frac{1000}{9} - F$$

1000
2000
1000

$$C = \frac{6000}{9} - 6f$$

$$C = \frac{200}{3} - 0.6f$$

if the economy produces all cloth for
domestically $(0, \frac{200}{3})$

if the economy sells all cloth then
the pt is $(111.11, 0)$

$$\frac{200}{3} - 0.6 \left(\frac{200}{3} \right)$$

Thus reqd line will be the

CPF in this case

(see BD and A'D')

$$\frac{200}{3} \times 0.4$$

$$\frac{200}{3} \times \frac{2}{5}$$

$$0.6f = \frac{200}{3}$$

$$f = \frac{200}{3} \times \frac{10}{6}$$

$$= 111.11$$

Q4:

Demand

Demand is desire backed by ability

The quantity demanded of any good is the amount of the good that the buyers are willing and able to buy

D_n of (P_n)

ceteris paribus

↓
Qty demanded

↗ Price

↓
dependent variable

↓
Independent variable