

Fig 3

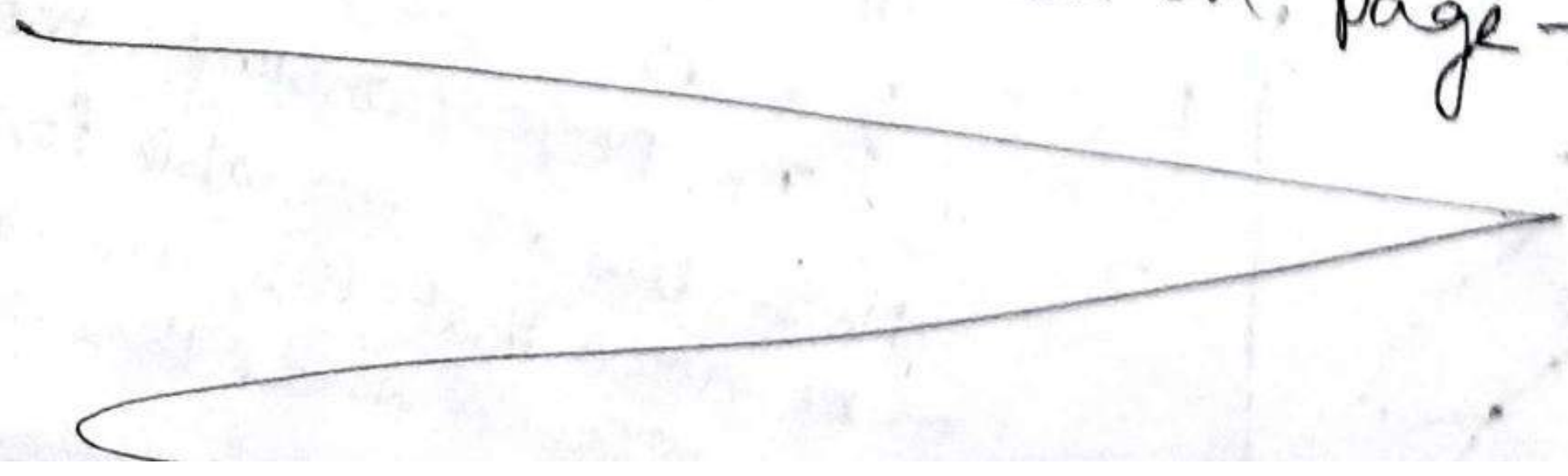
- ↳ Budget line in production sector is known as Cost line.
- ↳ Cost for 'Capital' and Cost for 'labor' is in a same way like price for good Y and good X, the analogy remains same as used in consumption sector.

↳ At the point where cost line is tangent to the Isoquant curve, Producer is at equilibrium in production sector and the Condition for the equilibrium is —

$$\begin{aligned}
 MRTS_{KL} &= \text{Price Ratio of these inputs} \\
 &= \frac{\text{Wage}}{\text{Interest Rate}} \text{ or } = \frac{W}{r}
 \end{aligned}$$

↳ what we have found that $MRS_{xy} = \frac{P_x}{P_y}$ is analogous to $MRTS_{KL} = \frac{W}{r}$ and what we do in general equilibrium of 2x2 Economy model; we review both the Consumer and production equilibriums. We show that the two sectors are analogous (they are similar in construction and presentation). In these equilibriums we are dealing with a single producer in production sector. We do this as a prelude to understanding how the 2x2x2 --- economy model and its equilibrium point comes directly from the same tools and understandings of the equilibrium points reached for a single consumer or single producer.

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↳ 2 producers, 2 consumers, 2 inputs, 2 outputs --- Equilibrium Model.

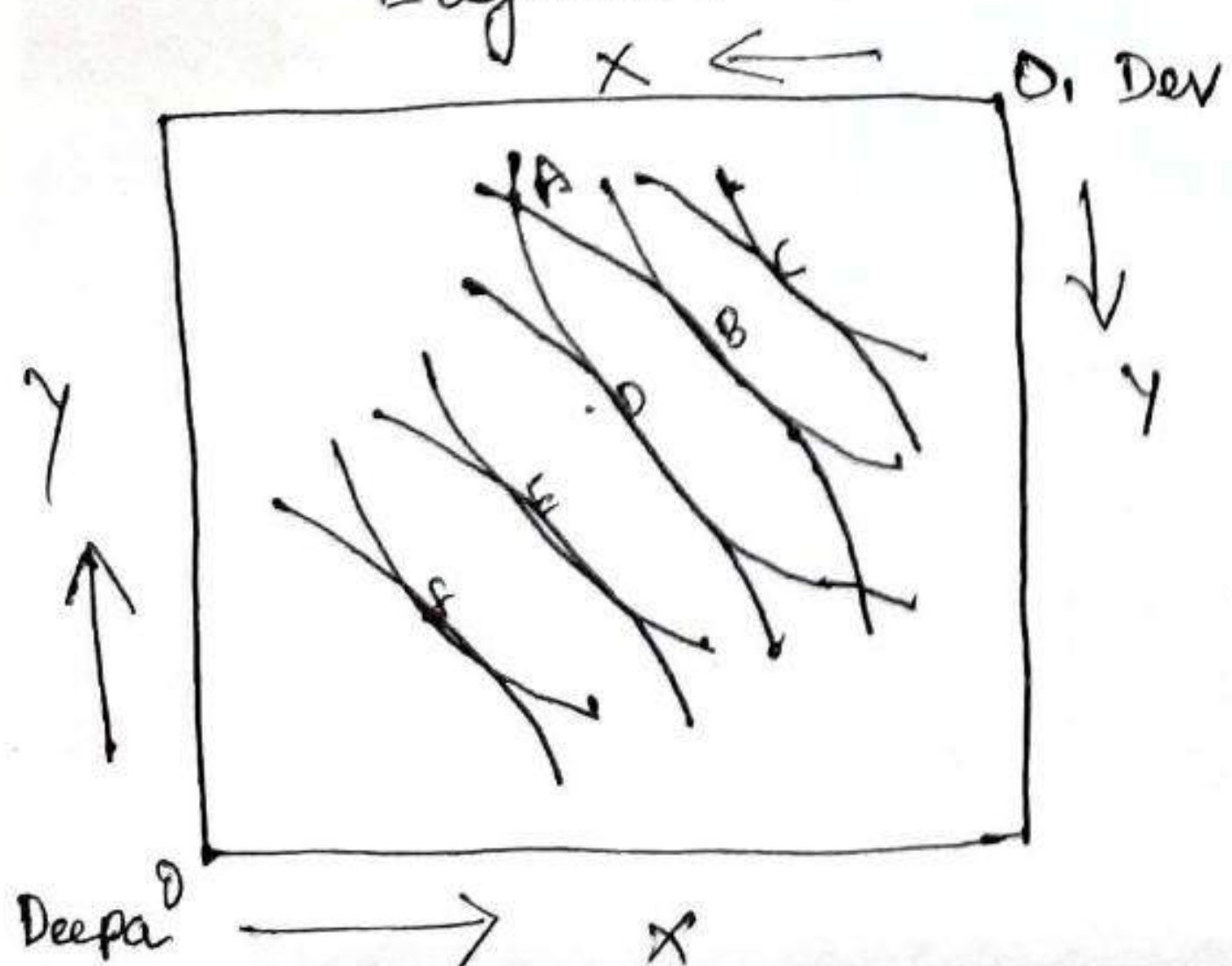
Let us derive the one side that's consumption side, which is also the exchange side for the Two Consumer.

↳ Here, Two Things are to be remembered i.e. Pareto Efficiency when none of the Consumers can be made best off by Trade, Situation in the economy can still be improved; If one of them remains at the level of utility then also there is the room for Trade to improve efficiency but when there is the chance to change the Allocation of resources, where one of the consumer becomes best off then it is not possible to improve market anymore; and any such move will be Pareto inefficient.

↳ So, The essence of this model is the virtue of Trade, Trade is the virtue, Trade enhances efficiency. That's how we can derive our conditions.

↳ Our conditions come from the fact that ~~the~~ economy has reached to a level from where it's difficult to improve the condition of general equilibrium.

↳ Earlier Indifference Curve of one consumer was considered but now Two consumers will be considered, These consumers are competing with one another for the same quantity of goods. That is why here there will be the use of Edgeworth Box Model. Edgeworth Box model represents that the Goods are finite.



↳ There are Two consumers Deepa and Dev, who have limited resources like Y and X.

↳ If Deepa Consumes more of Y and X then less is available for Dev. It is to be noted that they are consuming same resources and there are finite.

Fig. 4

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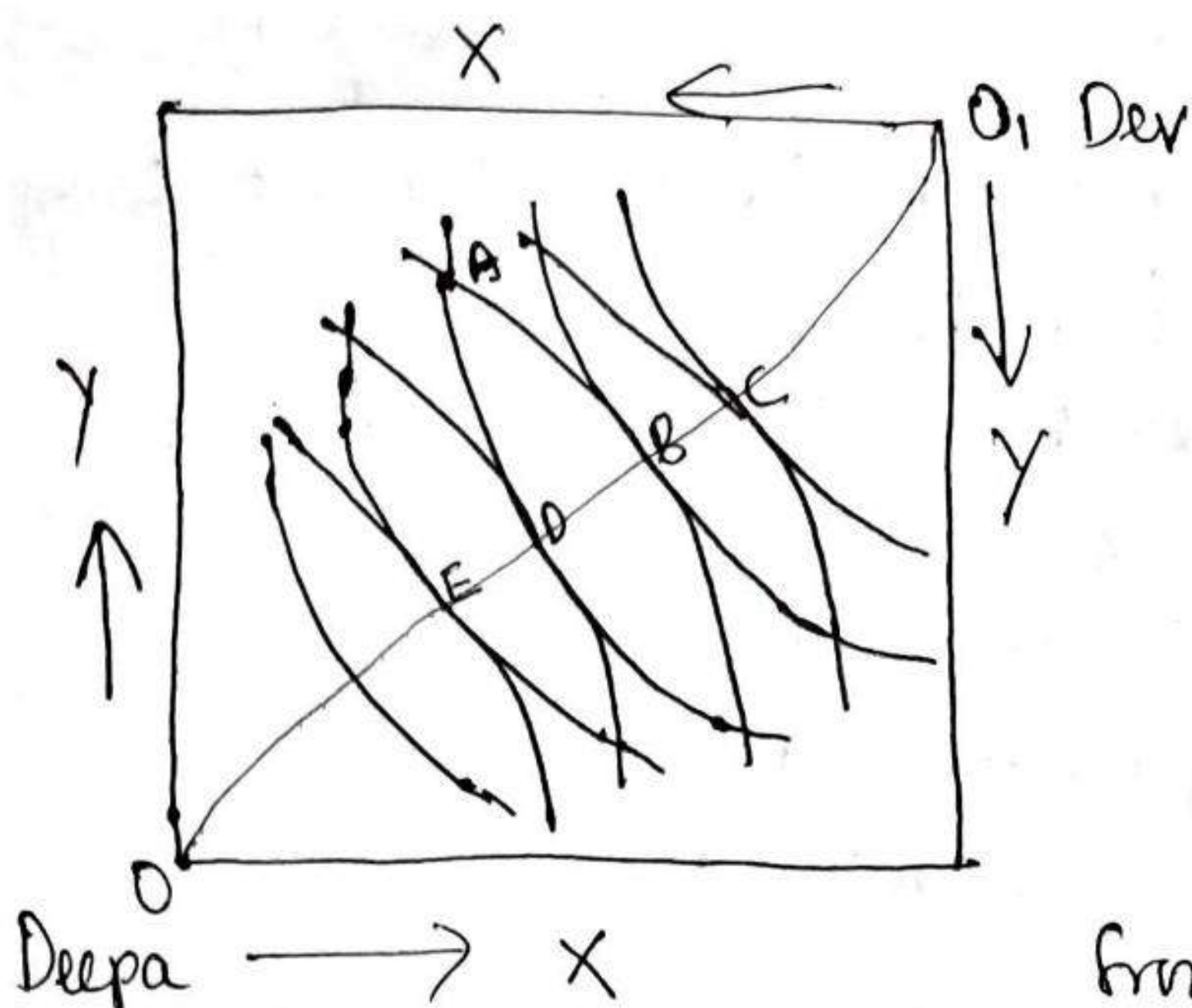


Fig. 5

Initially there is the Indifference Curves 'IC' for Deepa, which are drawn outwards from origin point 'O'.
 When we move outwards from 'O' the share of Deepa in the economy increases & when we move outwards

from 'O₁' then the share of Dev in the economy increases. AS, both are competing

they can't grow at the same time. They have to grow at the expense of one and the other. This model explains the virtue of trade, why trade is good and why trade would achieve better level of efficiency in the economy.

Now, imagine that initial allocation of resources was 'A'. at 'A' point Deepa would be consuming more of 'Y' and Dev will be consuming less of 'Y'; This is how 'Y' resource is shared between two consumers at initial resource allocation point 'A' and if we consider resource 'X', we find that more is consumed by Dev & less by Deepa.

If both of these consumers decide to enhance level of utility and if we trade it with bargain & trade it with the units of goods. then this decision will improve utility and in turn there will be Pareto Efficiency Enhancing.

Suppose, They start from point 'A' and trade up to the point 'B' or they start from point 'A' and trade up to the point 'D'. we find that movement of trade from point 'A' to 'B' indicates that Deepa reaches at higher IC which will improve her utility and if we consider trade movement from point 'A' to point 'D' we find that utility of Dev improves as, he moves to higher IC.

↳ So, it doesn't matter whether the price line is closer to Deepa or Dev both represent the relative prices.

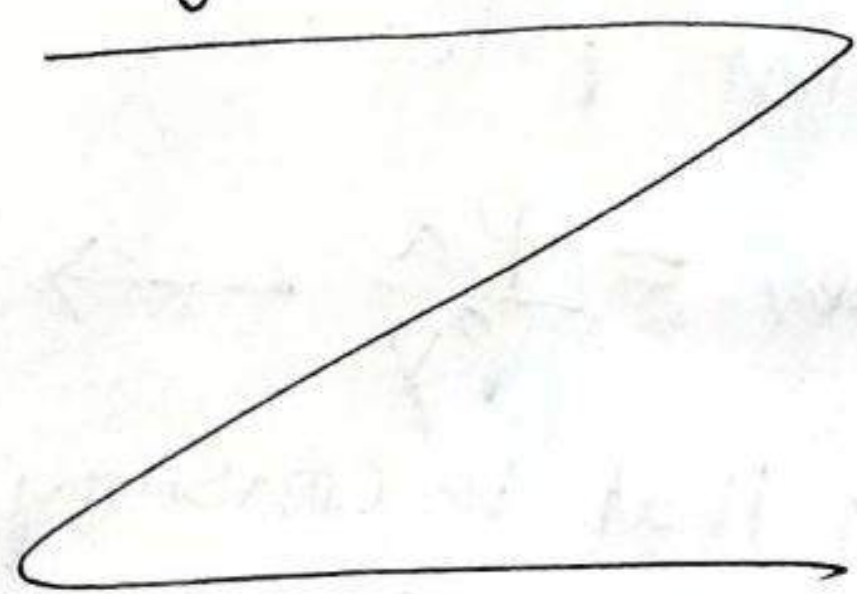
All that means distribution of resources or Initial allocation of resources, where prices are the same. With the prices of

Two goods we can start with Point 'A' again on 'PL' Price line and we can trade along with price line to the Point 'C', This price line represents Competitive prices, so

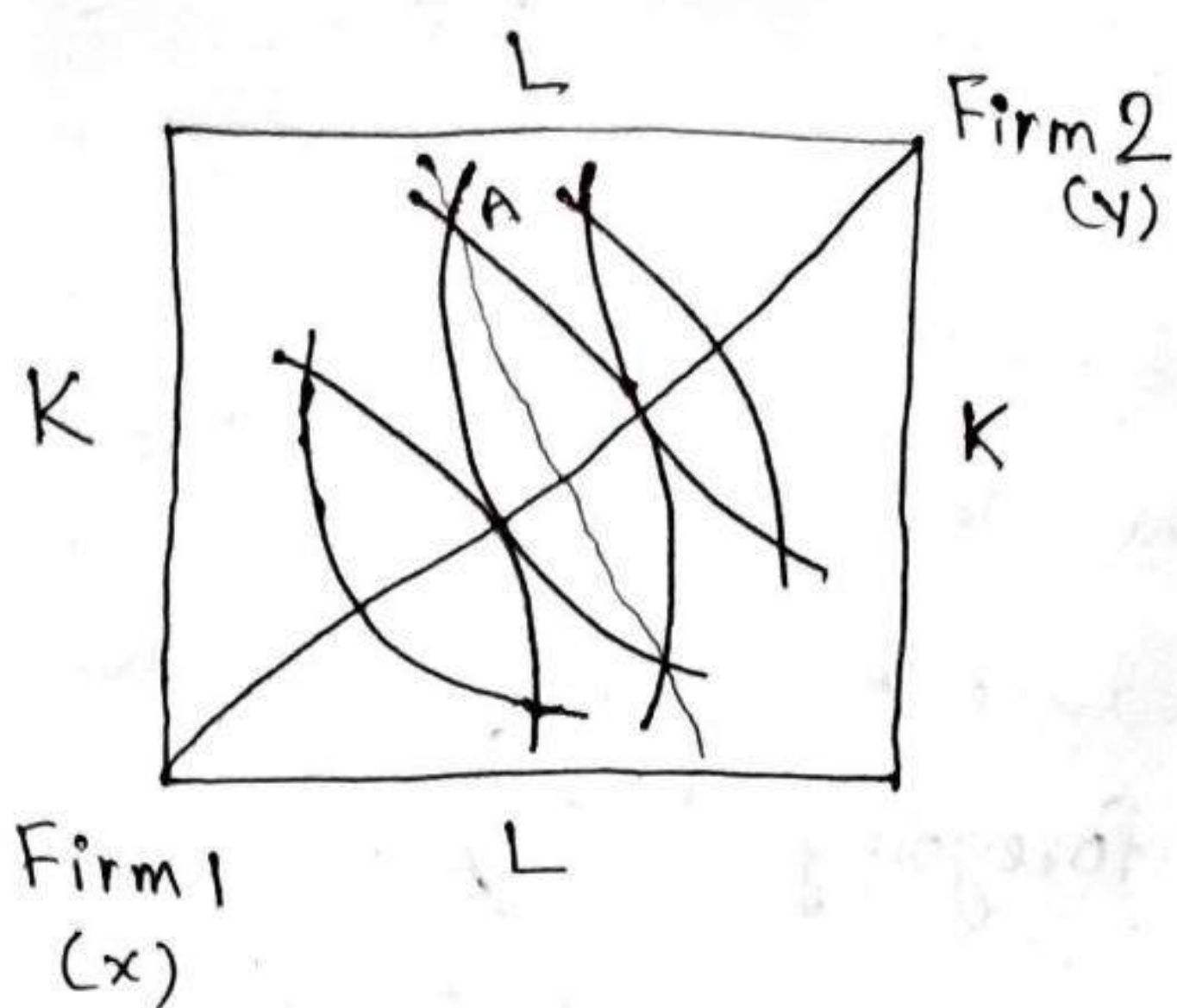
we do not have transaction cost, the market is much more efficient. Moving from 'A' to 'C' ~~Deepa~~ ^{Deepa} has moved to higher level of utility. (C is definitely has higher level of utility)

$C > D = A$ and if movement from 'A' to 'C' Dev moves to higher level of utility $C > B = A$, Both consumers have improved and they are now at the higher level of utility.

So, no one gained against other as both, are ~~a~~ better in bargaining.



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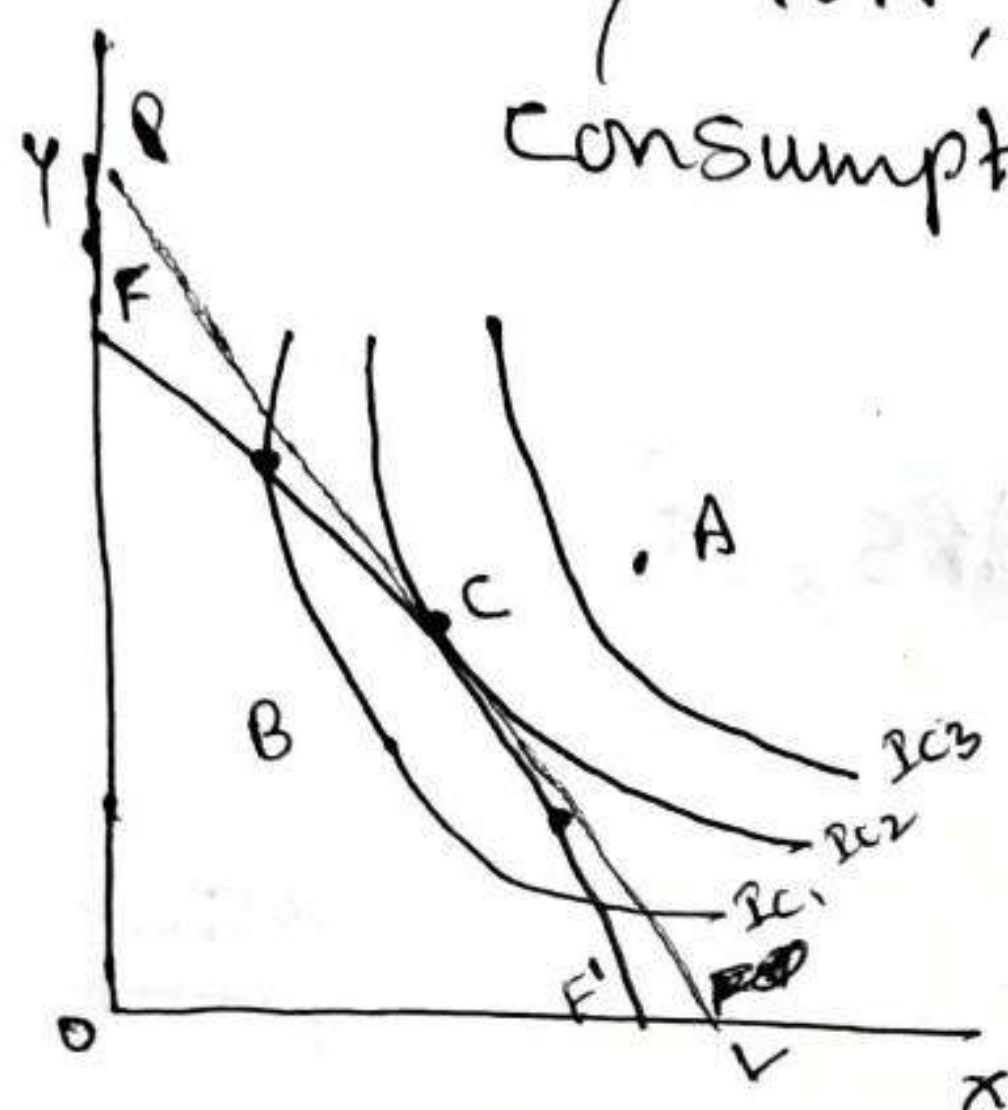


By means of figure 2 we have ended up in deriving the relationship Condition for production sector \rightarrow
 $MRTS_{KL} (Firm_1) = MRTS_{KL} (Firm_2) = \frac{w}{r}$ (wage / interest rate)
 — IInd Condition

$MRS_{xy}^{Deepa} = MRS_{xy}^{Dev.} = \frac{P_x}{P_y}$ — Ist Condition

Fig. 8

NOW, we have to link up the Production Sector with the Consumption Sector.



Here, we have to make use of Production Possibility Frontier (PPF) FF' along with Y & X axis. If economy is producing below FF' frontier it is having under production & if it is producing along with FF' frontier it has make use of all the resources efficiently.

Fig. 9

Here, we can quote that FF' frontier represent same conditions of Contract Curve of Edgeworth-Box.

NOW, how we can link up consumption sector \rightarrow we can SuperImpose $MRS_{xy}^{Deepa} = MRS_{xy}^{Dev.} = \frac{P_x}{P_y}$ — ① with production sector and for that we would have Indifference Curves (Community IC).

Point 'c' is Tangent to both (PPF) FF' and IC₂

Most efficient point for consumer would be Consuming along the Budget line, which represents what they want to consume but what they also consume. This point 'c' is Tangent to both (PPF) FF' & IC₂. NOW, at that point 'c' slope of IC₂ can be determined.

↳ Please Refer Fig. 9 of page no. 8

↳ Slope of IC = $\frac{P_x}{P_y}$ also represents slope of Budget line.

↳ Budget line PL also represents the slope of PPF = MRT
(we also know that when we produce more of y then we have to bear opportunity cost for foregoing of X)

↳ So, MRT also represents the ratio of Cost producing between X & Y.

$$\therefore MRT = \frac{MC_x}{MC_y}$$

And MRT = $\frac{P_x}{P_y}$ of consumer sector = MRS_{xy} for all consumers

$$\therefore MRS_{xy} = \frac{P_x}{P_y} = MRT = \frac{MC_x}{MC_y} \text{ --- III}^{rd} \text{ condition}$$

↳ It can also be Explained by means Algebra

In perfect competition market \rightarrow Price 'P' = Marginal cost 'MC'
 $P = MC$

↳ in this case there are Two sectors

Price 'P' of 'X' = MC_x

Price 'P' of 'Y' = MC_y

↳ Ratio is also equal i.e. — $\frac{P_x}{P_y} = \frac{MC_x}{MC_y}$

↳ as we know from consumption sector we know that

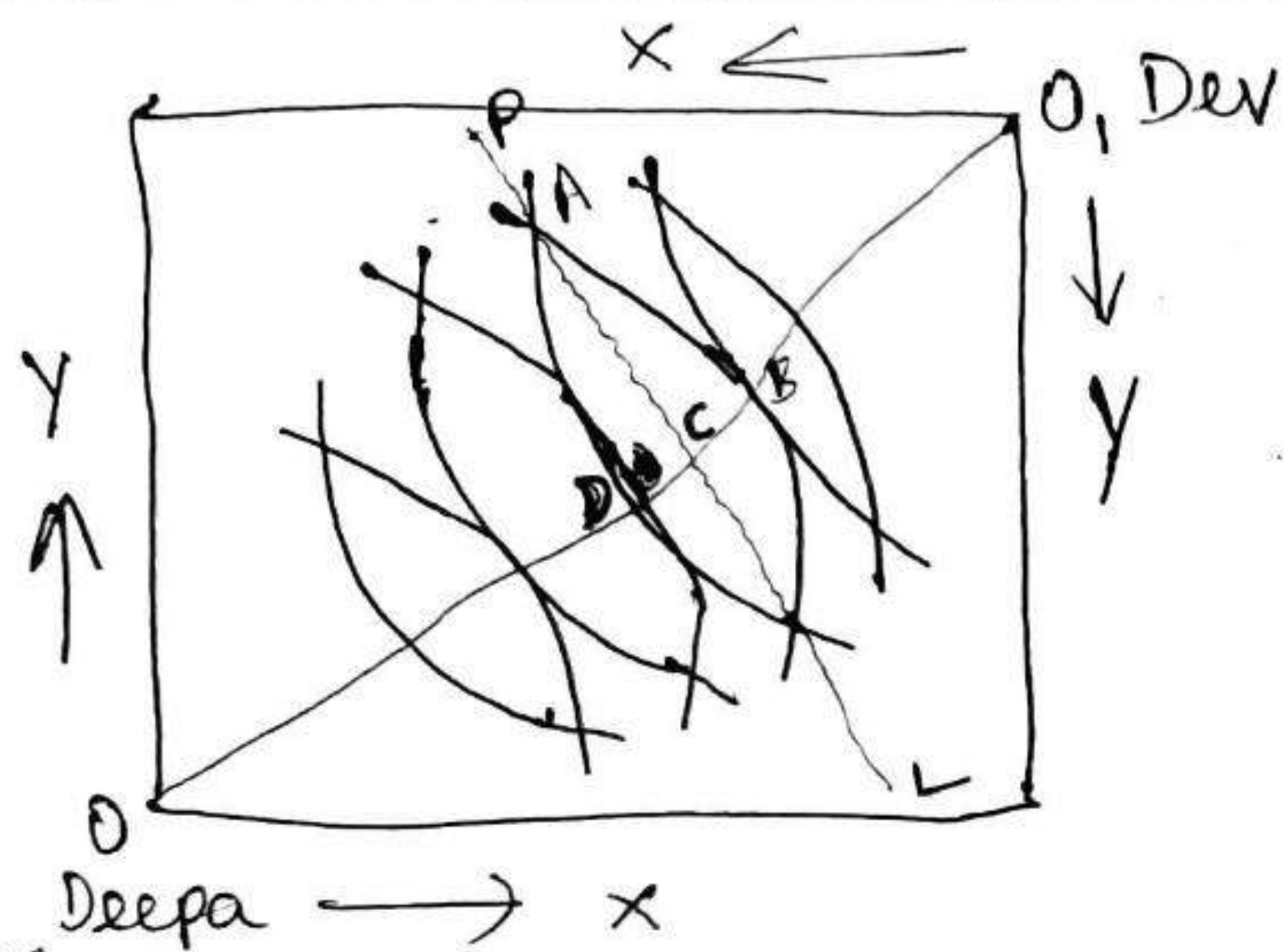
$$\frac{P_x}{P_y} = MRS_{xy}$$

$$\therefore MRS_{xy} = \frac{P_x}{P_y} = \frac{MC_x}{MC_y} = MRT \text{ --- III}^{rd} \text{ condition}$$

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↳ This indicates that because of virtue of trade, utility of only one consumer improves. Therefore Trade is important for this economy. A point like F, E, D, B and C where Consumers IC are tangent to each other are the Efficient points and if we draw or join these points we get "Contract curve" and any point along this Contract curve is known as Pareto Efficient point in this model.

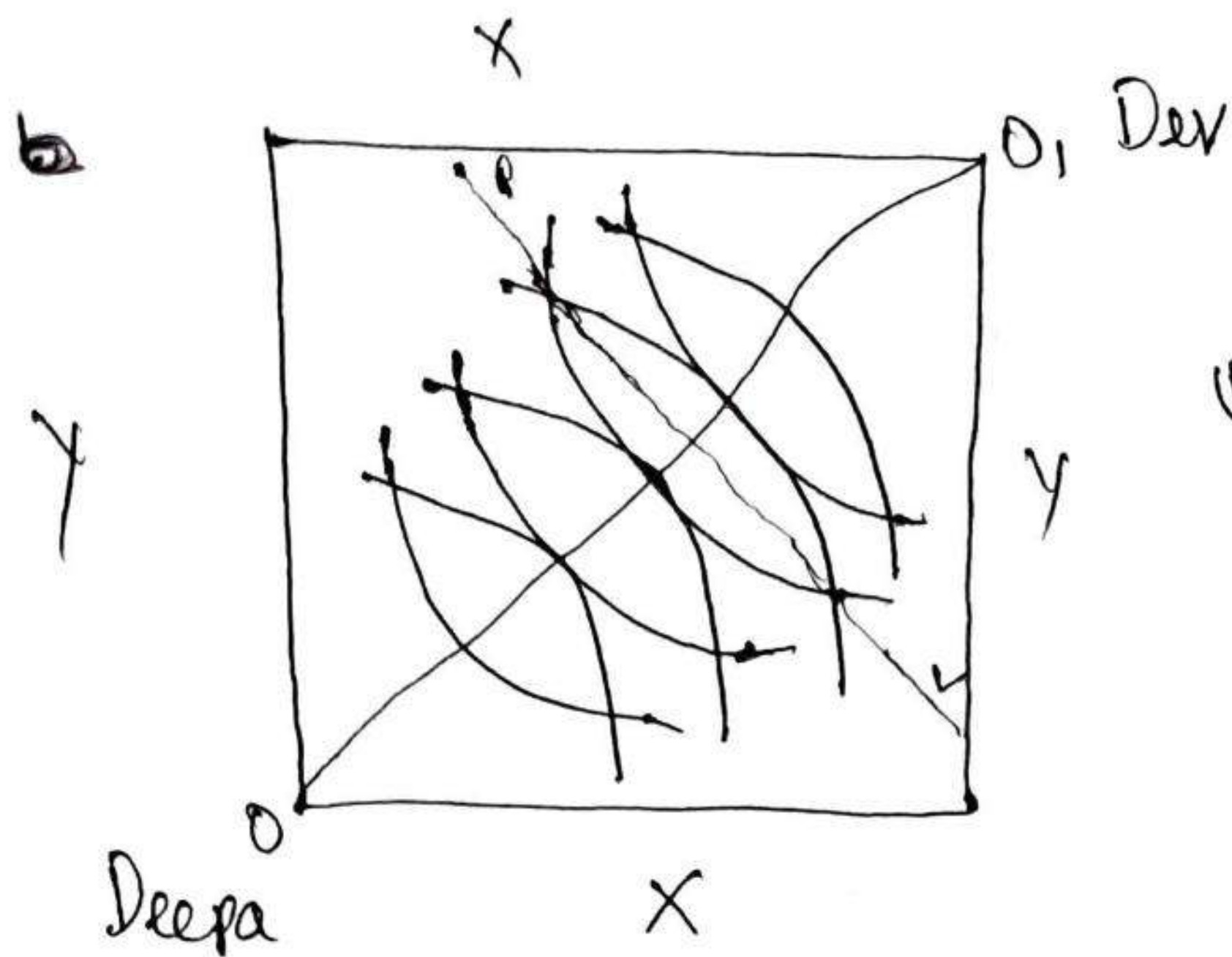
↳ MRS_{xy} for Deepa = MRS_{xy} for Dev, this is the initial step ~~of~~ we develop equilibrium condition for Exchange sector.



↳ By means of our Previous Edgeworth Box, we have analysed that in the market there are two Consumers who are Bargaining with each other and that is how Trade has achieved Pareto Efficiency in that Market along with the Contract curve.

Fig 6
 ↳ Now the Question is what happens if Market has already established prices which are market efficient. Budget Line represents the price ratio of the goods. here we can also represent Prices in the market by using something like 'PL' Budget Line but in this case we call the price line which is exactly the same thing. As, we have Two consumers, 'PL' Budget line is applied to both, As it clear to us that when Dev moves away from Origin 'O1' outwards the share of Dev to X and Y good increases. In the same way when Deepa moves from Origin point 'O' outwards, then the share of Deepa to X and Y good increases.
 ↳ Here, more important is the slope of price line, that's what determines the relative prices of the goods.

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↳ $MRS_{xy} \text{ Deepa} = MRS_{xy} \text{ Dev}$

↳ Let us move back to the equilibrium state of single consumer where,
 $MRS_{xy} = \text{Slope of Budget Line}$
 or
 $= \frac{P_x}{P_y}$

Fig. 7

↳ In our previous Edgeworth Box we said that slope of Budget Line is synonymous to the slope of price line so, the price line is the Budget line in this model.

↳ In our previous Edgeworth Box Description we have also said that along with this Contract Curve all the points were Pareto efficient, and on those points

$MRS_{xy} \text{ for Deepa} = MRS_{xy} \text{ for Dev} = MRS_{xy} \text{ for others.}$

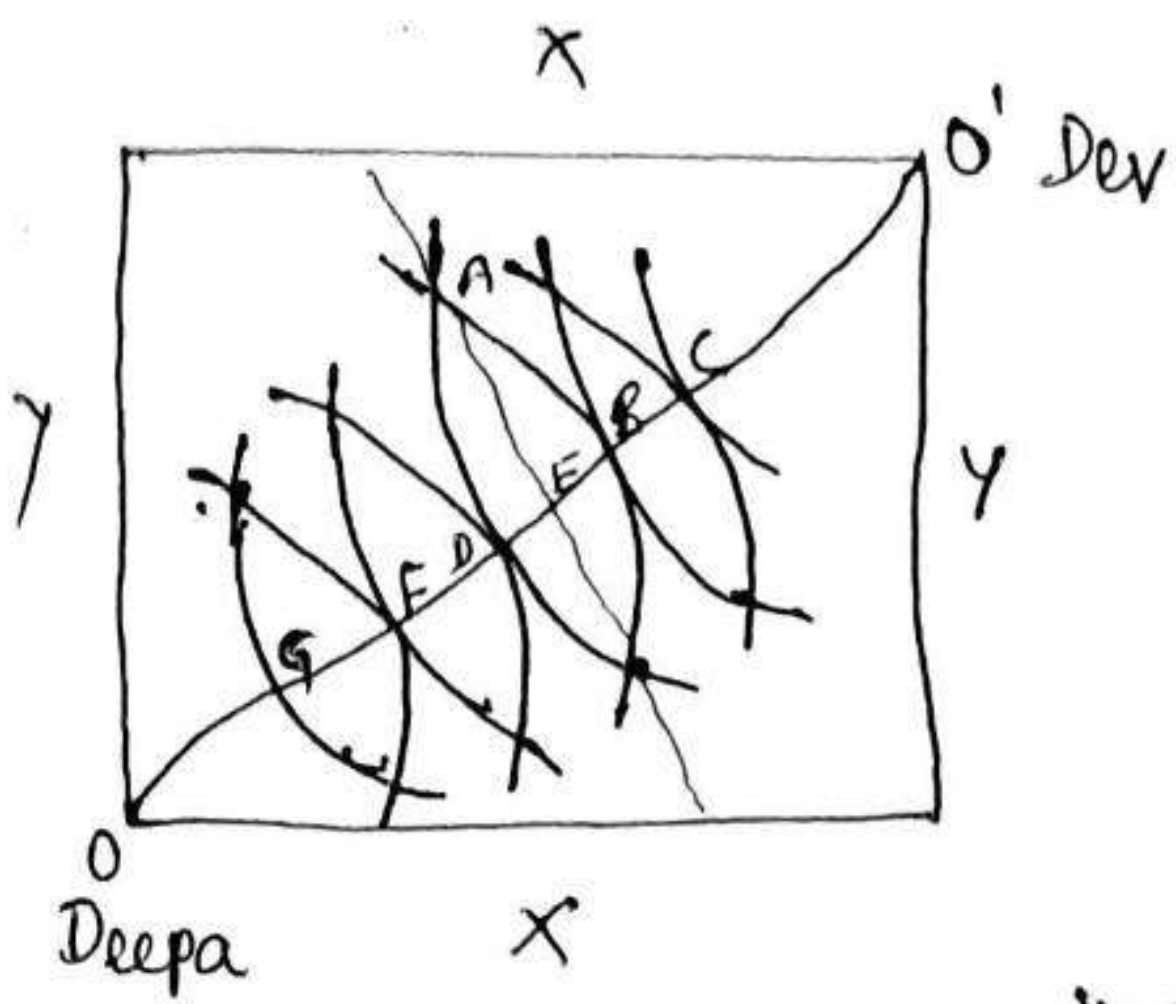
↳ So, only thing we need to our model is the Trade with Bargaining is Just Price Line — $\frac{P_x}{P_y}$

$MRS_{xy} \text{ Deepa} = MRS_{xy} \text{ Dev} = \frac{P_x}{P_y} \rightarrow \text{I}^{\text{st}} \text{ Condition}$

↳ This Ist condition tells that in consumption sector the consumption of Two goods by Two Consumers is at the most efficient level given their price.

↳ Now, we will take all this information & apply it to Production sector.

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↳ In this section whole Economy is considered where perfect competition is present and there is the use of MAP. In this model we does not insist that trade will result in fare distribution of resources, when we

move from point 'A' to B, D, F and it was facilitated by Trade. whether we were using another point 'E' which is more efficient or fare. But nowhere did we say that initial level of distribution was affected after trade has taken place. Trade does not do that. We know that according to philosophers, sociologists, human scientists that probably there may be another point 'G' or 'C' which are less desirable or unjust or unfair. 'G' or 'C' are still pareto efficient point but lawyers, philosophers, sociologists, human scientists might tell that these points are undesirable. For that they give various reasons — like — Unfair Distribution of resources may lead to high level of Unemployment, Crime, high property prices, Diseases, loss of public Revenue, These are negative externalities which come as a result of unfair distribution of resources.

↳ So, Government intervention can also be described like this model.

END

General Equilibrium and Economic Efficiency

Economic Efficiency :-

when no individual in society can be made better off without making someone else worse off.

when the marginal benefit to consumers of a product is equal to the marginal cost of producers.

⇒ General Equilibrium model which is divided into consumption sector and production sector.

Here we take Two sectors combinably

Conditions for equilibrium $MRS_{xy} = \frac{P_x}{P_y}$ for one consumer

$$MRS_{xy} = \frac{P_x}{P_y} \quad \text{--- (1)}$$

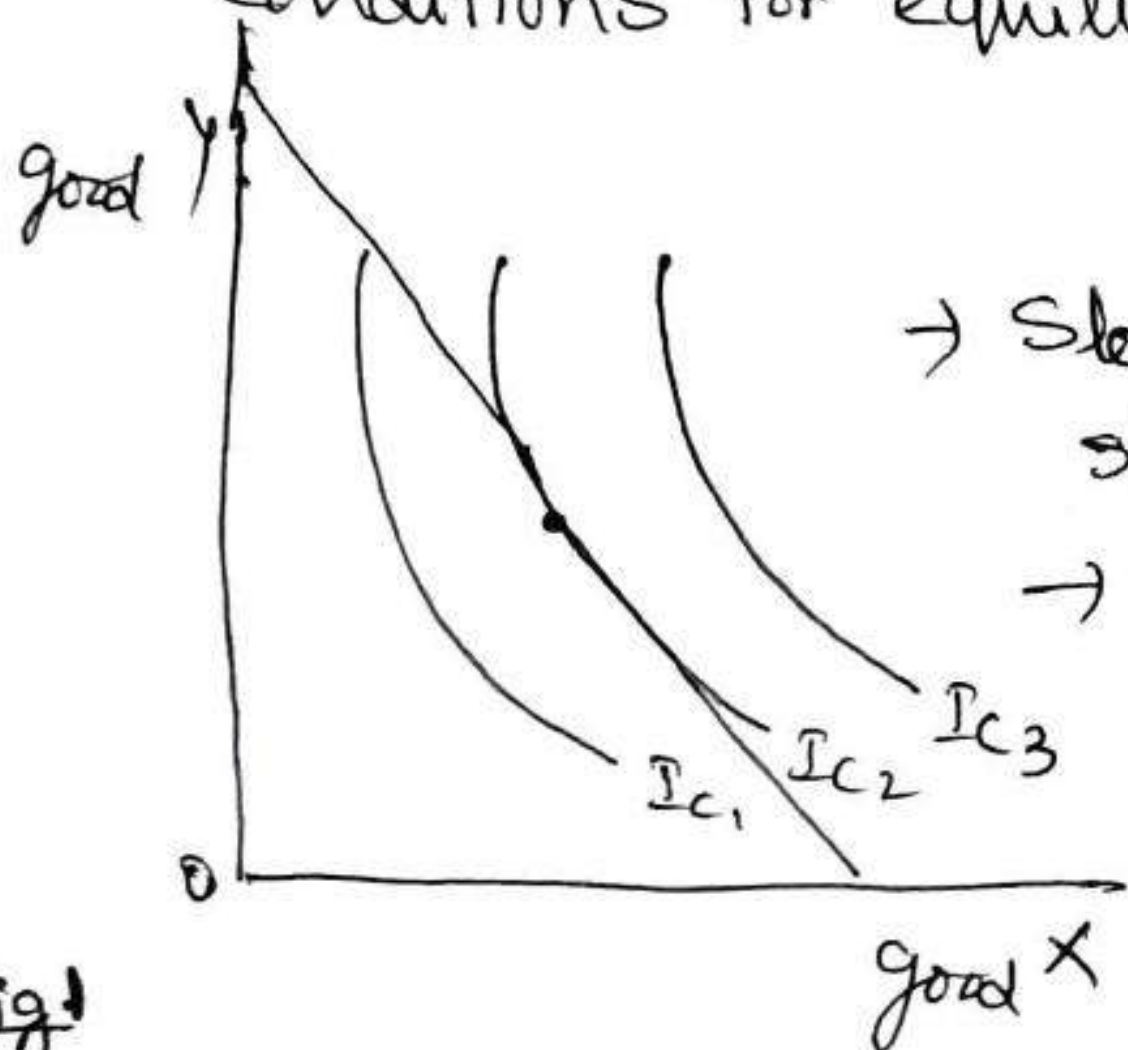


Fig 1

→ Slope of IC represented by MRS should be equal to slope of Budget line.

→ more outward Budget line is more Expenditure consumer can make.

→ The point at which Budget line is tangent to the IC, at this point slope of IC is equal to the slope of Budget line. that will be condition-

- (1) in consumption sector with one consumer.

⇒ In production sector here is the use of Iso Quants and the input used for the production of goods like Capital "K" and Labor "L". In production sector we don't say that producer is maximising the profit but we say that producer is minimising the cost.

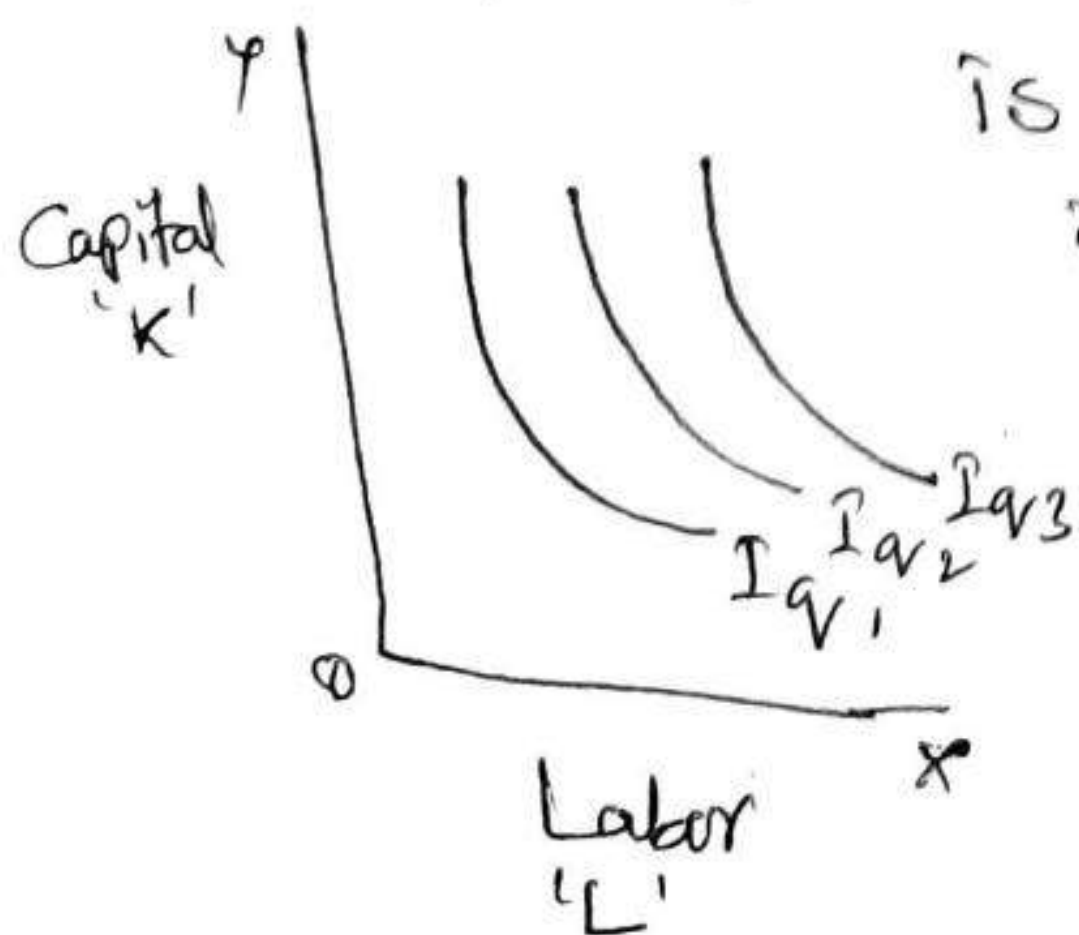


Fig 2

So, producer tries to acquire higher level of output with the minimum cost.

⇒ Budget line in production sector can be called as Cost line. that will represent Total Cost.