

SUBJECT-ECONOMICS

PAPER: INTERNATIONAL ECONOMICS

PAPER CODE: G-3007

CLASS: M.A.III SEMESTER

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UNIT-I

TOOLS FOR ANALYSING INTERNATIONAL ECONOMICS: PART-II

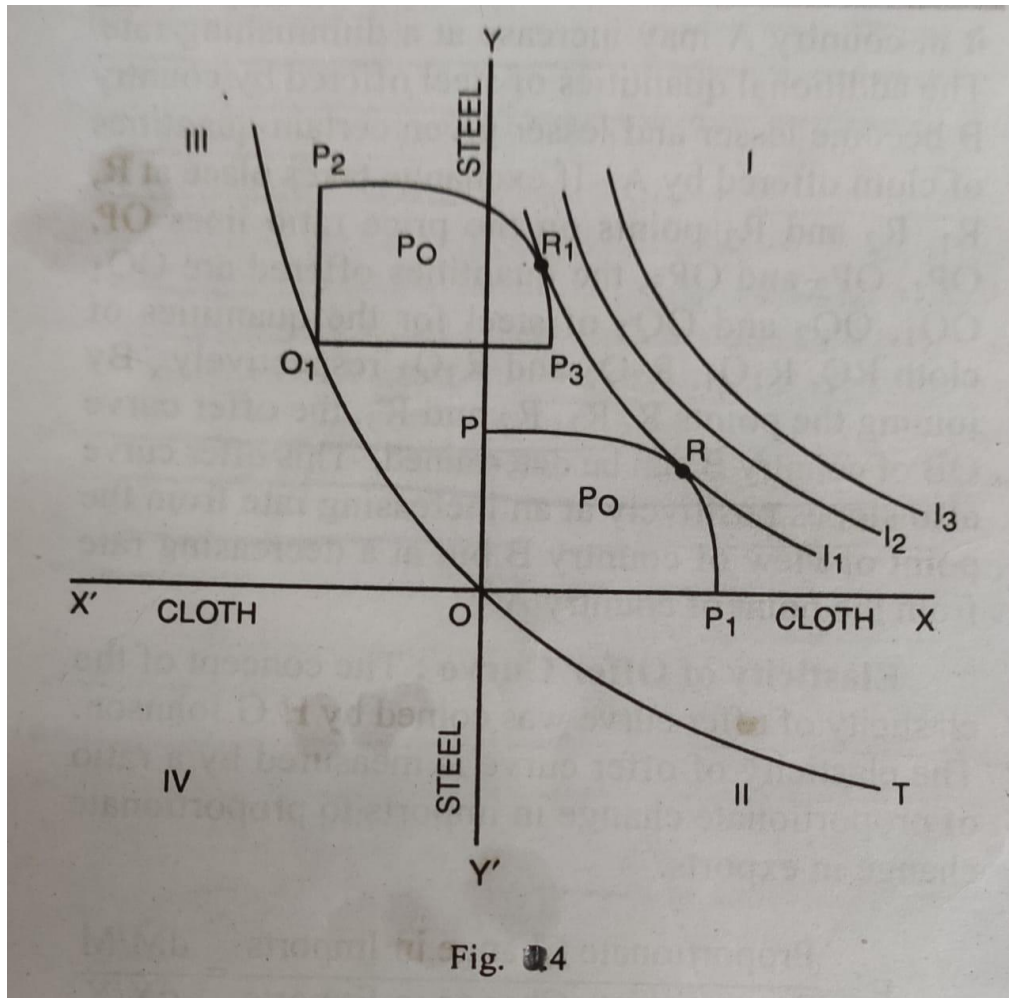
THE TRADE INDIFFERENCE CURVE:

It was given by J.E.Meade in 1952 in his work ,A Geometry of International Trade.The trade indifference curve is the locus of such positions which are equally preferred for a country and, therefore, it is indifferent about them. Given a production possibility curve,a country can reach a certain community indifference curve and have a constant level of satisfaction, if the export-import combinations are prescribed by the trade- indifference curve.

Assumptions: It is possible to construct trade Indifference curves on the basis of the following assumptions:

1. There are two countries A and B dealing in two commodities-cloth and steel.
2. Cloth is A's exportable and B's importable commodity and steel is A's importable and B's exportable.
3. There are conditions of perfect competition in the market.
4. Absence of external economies and diseconomies.
5. The individuals in each country have identical tastes and factor endowments.
6. There is price flexibility which may lead towards full employment of resources.
7. The community Indifference curves are derived from the individual Indifference curves and are negatively sloped convex curves to the origin.
8. Given the factor endowments and techniques,the production possibility curve can be determined.
9. The production is governed by increasing costs so that the production possibility curve is a negatively sloping concave curve to the origin.

The trade indifference curve can be derived with the help of production possibility curve and the community Indifference curves as shown in figure 4.



In figure 4, commodity cloth is measured along the horizontal scale XOX' . Cloth is A's exportable and B's importable. Commodity steel is measured along the vertical scale YOY' . This commodity is B's exportable and A's importable. I_1, I_2 and I_3 are the community indifference curves. PP_1 is the production possibility curve. The area POP_1 represents the production block P_0 . The production possibility curve is tangent to the highest possible community indifference curve I_1 at R . This point indicates quantities of cloth and steel consumed and produced in country A. If the production block P_0 is slid and origin shifts from O to O_1 , the production possibility curve becomes tangent to the community indifference curve I_1 at R_1 . Now point R_1 indicates the pattern of consumption and production. The points of origin O and O_1 can trace the path of the trade

indifference curve T. Figure 4. shows that the trade indifference curve slopes negatively. In the same way, the trade Indifference curves corresponding to the community Indifference curves I_2 and I_3 can also be drawn. Along the same trade indifference curve, the country is indifferent between one and another trade position. Higher the trade indifference curve, the better off is the country and vice-versa. The trade indifference map of country B can similarly be drawn. The community indifference map of that country would be placed for that purpose in quadrant III opposite to that of country A.

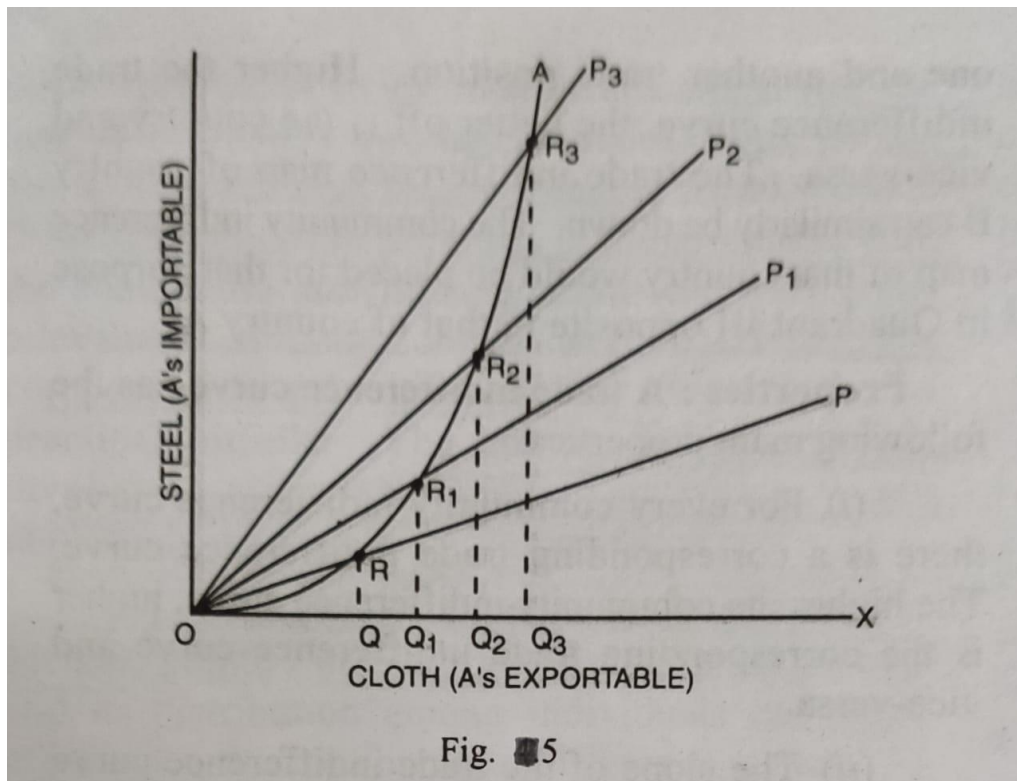
Properties: A trade indifference curve has the following main properties:

1. For every community indifference curve, there is a corresponding trade indifference curve. The higher the community indifference curve, higher is the corresponding trade indifference curve and vice-versa.
2. The slope of the trade indifference curve at any point is equal to the slope of the corresponding community indifference curve and the production possibility curve at the corresponding point. It means the slope of T at O is equal to the slope of I_1 at R and the slope of T at O_1 is equal to the slope of I_1 at R_1 . (Fig.4)
3. If the community indifference curve is negatively sloped, the corresponding trade indifference curve is also negatively sloped.
4. If the community indifference curve is convex to the origin, the corresponding trade indifference curve is also convex to the origin.

THE OFFER CURVE:

For analysing the trade equilibrium of a country, another device that is employed is the Offer Curve or the Trade Offer Curve of a country. It indicates what quantities of a particular commodity one country is willing to offer in exchange of certain quantities of another commodity. **In other words, the offer curve shows the different quantities of a particular commodity demanded by one country from the other at the different relative prices of their products, because of which it is also known as the reciprocal demand curve. This concept was originally given by Marshall and Edgeworth.**

For the derivation of the offer curve of a country it is supposed that there are two countries A and B. Cloth is the exportable commodity of A (and importable of B), while steel is the exportable commodity of B (and importable of A). If the price of cloth continues to increase relative to the price of steel, the offer curve of country A can be derived as shown in figure 5 under constant cost conditions.



In figure 5, cloth (A's exportable) is measured along horizontal scale and steel (A's importable) is measured along the vertical scale. Originally the price ratio of two commodities is indicated by the slope of the line OP. If the price of cloth rises more relative to the price of steel, the slope of the price ratio line for international exchange ratio line becomes more and more steep as shown by the lines OP_1 , OP_2 and OP_3 . As the price of cloth rises relatively more than steel, the demand for cloth in country B increases at a decreasing rate. On the other hand, country A can absorb more quantities of steel at an increasing rate. If R, R_1 , R_2 and R_3 are the points of exchange, the quantities exchanged between A and B are OQ of cloth and RQ of steel at R, OQ_1 of cloth and $R_1 Q_1$ of steel at R_1 , OQ_2 of cloth and $R_2 Q_2$ of steel at R_2 and OQ_3 of cloth and $R_3 Q_3$ of steel at R_3 .

steel at R_3 . The additional quantities of cloth offered by country A decrease in exchange of the additional quantities of steel. By joining R , R_1 , R_2 and R_3 it is possible to determine the offer curve OA of country A. It slopes positively at an increasing rate.

The derivation of the offer curve of country B is shown in figure 6.

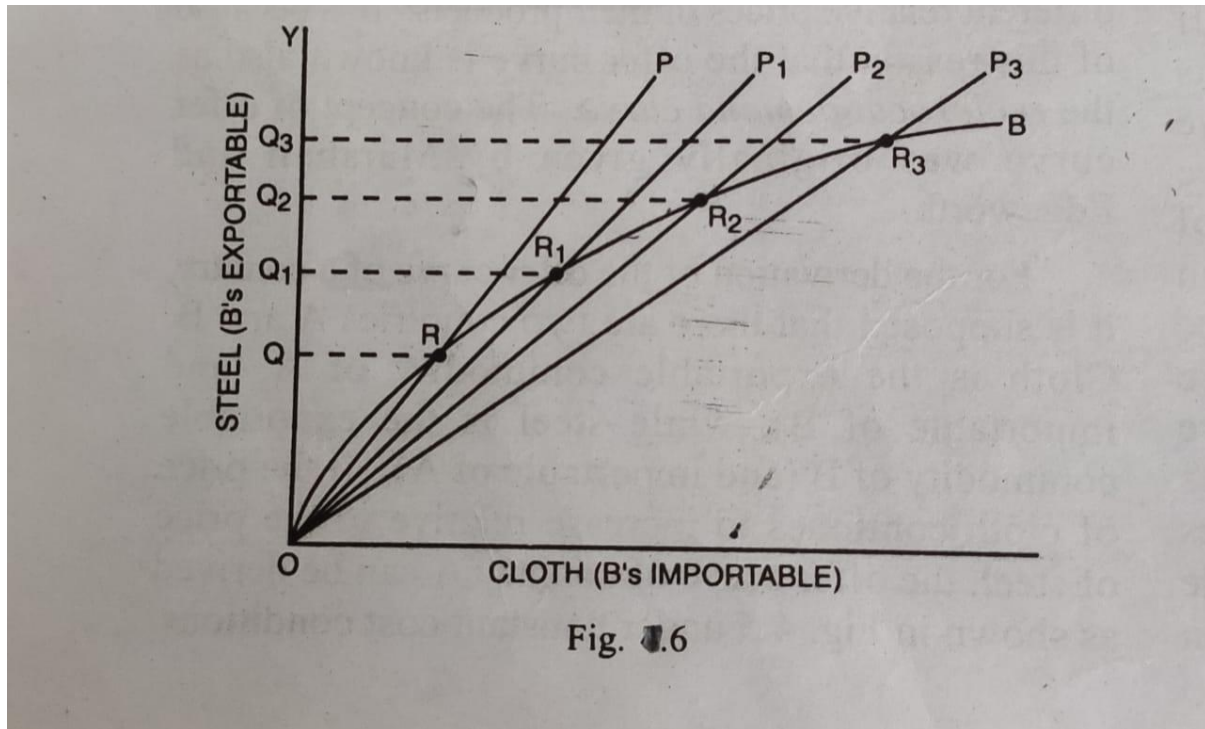


Fig. 6.6

In figure 6, cloth (B's importable) is measured along the horizontal scale and steel (B's exportable) along the vertical scale. As the price of steel rises relative to the price of cloth, the steepness of the price ratio lines decreases. OP , OP_1 , OP_2 and OP_3 are the price ratio lines, since the price of steel has been increasing at the greater rate, the demand for it in country A may increase at a diminishing rate. The additional quantities of steel offered by country B becomes lesser and lesser given certain quantities of cloth offered by A. If exchange takes place at R , R_1 , R_2 and R_3 points on the price ratio lines OP , OP_1 , OP_2 and OP_3 , the quantities offered are OQ , OQ_1 , OQ_2 and OQ_3 of steel for the quantities of cloth RQ , R_1Q_1 , R_2Q_2 and R_3Q_3 respectively. By joining the points R , R_1 , R_2 and R_3 , the offer curve OB of country B can be determined. This offer curve also slopes positively at an increasing rate from the point of view of country B but at a decreasing rate from the point of country A.

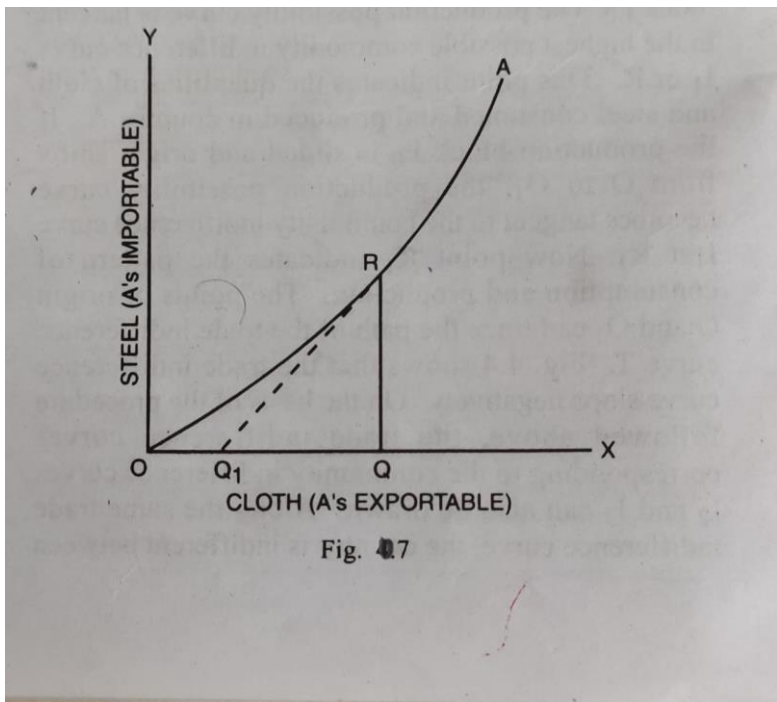
Elasticity of offer curve:

This concept was given by **H. G. Johnson**. The elasticity of offer curve is measured by the ratio of proportionate change in imports to proportionate change in exports.

$$E = \frac{\text{Proportionate Change in Imports}}{\text{Proportionate Change in Exports}} = \frac{dM/M}{dX/X}$$

$$E = \frac{\delta M}{\delta X} \cdot \frac{X}{M}$$

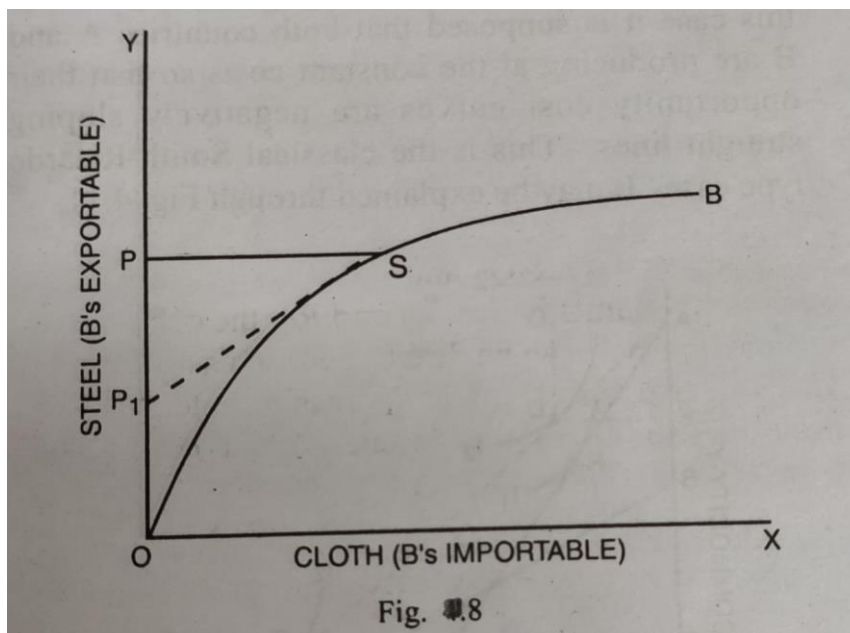
The elasticity of the offer curve of two trading countries at specific points on their respective offer curves can be measured as shown in figures 7 and 8.



In figure 7, OA is the offer curve of country A.

The elasticity of OA at R = $\frac{\delta M}{\delta X} \cdot \frac{X}{M} = \frac{RQ}{QQ_1} \times \frac{OQ}{RQ}$
 $= \frac{OQ}{QQ_1} > 1$. To the right of point R, the offer curve becomes more and more elastic. The elasticity decreases as the exchange takes place to the left of point R.

In figure 8, OB is the offer curve of country B



The elasticity of OB at S = $\frac{\delta M}{\delta X} \cdot \frac{X}{M} = \frac{PS}{PP_1} \times \frac{OP}{PS}$
 $= \frac{OP}{PP_1} > 1$. The elasticity co-efficient, along this curve, decreases to the left of point S and increases to the right of point S.

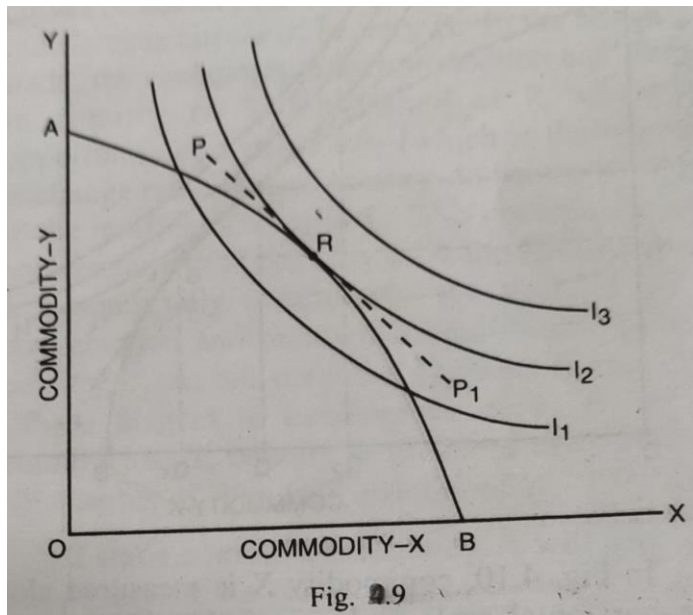
TRADE EQUILIBRIUM IN TERMS OF COMMUNITY INDIFFERENCE CURVES:

In a closed economy, the general equilibrium is determined, when the production and consumption sectors are both in equilibrium. The equilibrium in the consumption sector takes place if the marginal rate of substitution of one commodity, say X, for the other commodity, say Y, becomes equal to the price ratio of those two commodities ($MRS_{xy} = P_x/P_y$). The equilibrium in the production sector is possible when the marginal rate of transformation between these two commodities become equal to their price ratio ($MRT_{xy} = P_x/P_y$)

so the condition of the equilibrium of the whole system get satisfied when:

$$MRS_{xy} = MRT_{xy} = P_x/P_y$$

In the position of equilibrium, the slope of some community indifference curve will be exactly equal to the slope of the production possibility curve. Such a situation is shown through figure 9.



In figure 9 commodity X is measured along the horizontal scale and commodity Y is measured along the vertical scale. I_1, I_2 and I_3 show the map of community Indifference curves. AB is the production possibility curve. The line PP_1 measures the domestic price ratio of X and Y commodities. The consumption equilibrium is determined at R when $MRS_{XY} = P_X/P_Y$ or the slope of the community indifference curve I_2 is exactly equal to the slope of the price line. The production equilibrium is also determined at R where the price line PP_1 is tangent to the production possibility curve AB. At this point MRT_{XY} is equal to the price ratio of X and Y ($MRT_{XY} = P_X/P_Y$) and there is neither a rise nor a fall in the production of either of the two commodities. Thus R is the point of general equilibrium, where the price line is simultaneously tangent to both the community indifference curve and the production possibility curve and $MRS_{XY} = MRT_{XY} = P_X/P_Y$.

In an open economic system, the consumption and production equilibrium situations are not coincidental but the international trade brings about adjustments between production and demand in the case of each trading nation. In the final equilibrium, the value of exports becomes exactly equal to

the value of imports. The general equilibrium of the given country in the post-trade situation can be explained through figure 10.

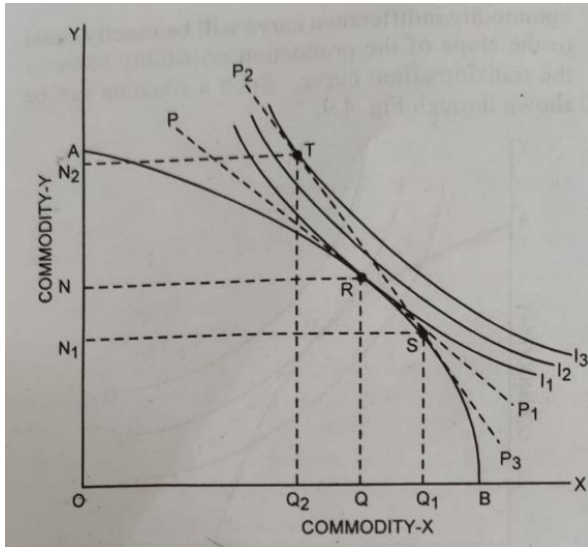


Fig.10

In figure 10, commodity X is measured along the horizontal scale and commodity Y along the vertical scale. I_1 , I_2 and I_3 are the community indifference curves. PP_1 is the domestic price ratio line. AB is the production possibility curve. Before trade, the consumption and production equilibrium is determined at R where OQ of X + ON of Y is produced and consumed by the country. If trade takes place and $P_2 P_3$ is the International exchange ratio line, the production equilibrium is determined at S by the tangency between $P_2 P_3$ and production possibility curve AB . Hence $MRT_{XY} = P_X/P_Y$. The consumption equilibrium is determined by the tangency of $P_2 P_3$ with the higher community indifference curve at T where $MRS_{XY} = P_X/P_Y$. At point S , this country produces OQ_1 quantity of X and consumes OQ_2 of it. The excess supply Q_1Q_2 is exported. At T , the demand for Y commodity is ON but domestic production of this commodity is only ON_1 so that it will import $N_1 N_2$ quantity of it. It is possible to show that in such a situation of equilibrium after trade, the value of exports is equal to the value of imports.

$$\text{Slope of } P_2P_3 = \frac{P_X}{P_Y} = \frac{Q_M}{Q_X}$$

where Q_M = Quantity imported and Q_X = Quantity exported

or $\text{Slope of } P_2P_3 = \frac{P_x}{P_y} = \frac{N_1N_2}{Q_1Q_2}$

or $P_x \cdot Q_1Q_2 = P_y \cdot N_1N_2$

Value of Exports = Value of Imports

TRADE EQUILIBRIUM IN TERMS OF TRADE INDIFFERENCE CURVES:

As we know that a trade indifference curve corresponds to each community indifference curve of a country, as a result each country has its respective map of trade indifference curves. It is the objective of each trading country to reach its highest possible trade indifference curve. The trade equilibrium will take place where there is tangency between the international price ratio line and the trade indifference curves of the two countries. It is explained through figure 11.

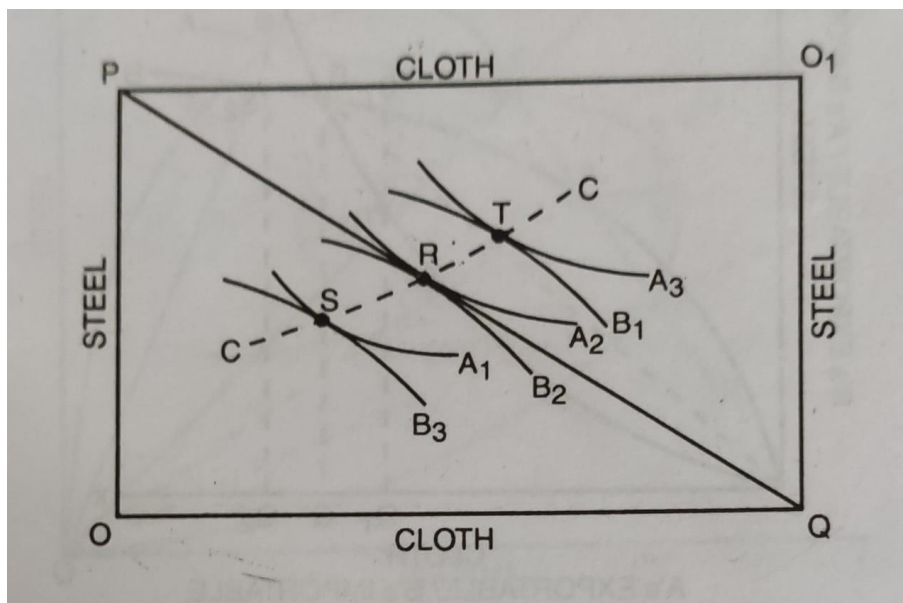


Fig.11

Figure 11 is an Edgeworth type box diagram. Figure with origin at O is concerned with country A and figure with origin as O₁ is related to country B.

Commodity cloth is exportable of A and importable of B, while steel is exportable of B and importable of A. The curves A_1, A_2 and A_3 represent trade indifference map of country A. B_1, B_2 and B_3 curves represent the trade indifference map of country B. These curves are tangent at S,R and T. Joining these points, the curve CC can be drawn which is the contract curve. All the points on the contract curve represent such combinations of two commodities at which the exchange may take place. If PQ is the international exchange ratio line or price ratio line, it cuts the contract curve at R, where the trade indifference curve A_2 of country A and B_2 of country B become tangent to each other. This point represents the optimum position from the point of view of both the countries and each one of them is better off through trade.

TRADE EQUILIBRIUM IN TERMS OF OFFER CURVES:

Given the offer curves of two trading countries the trade equilibrium is determined, where there is intersection of these offer curves as shown in figure 12.

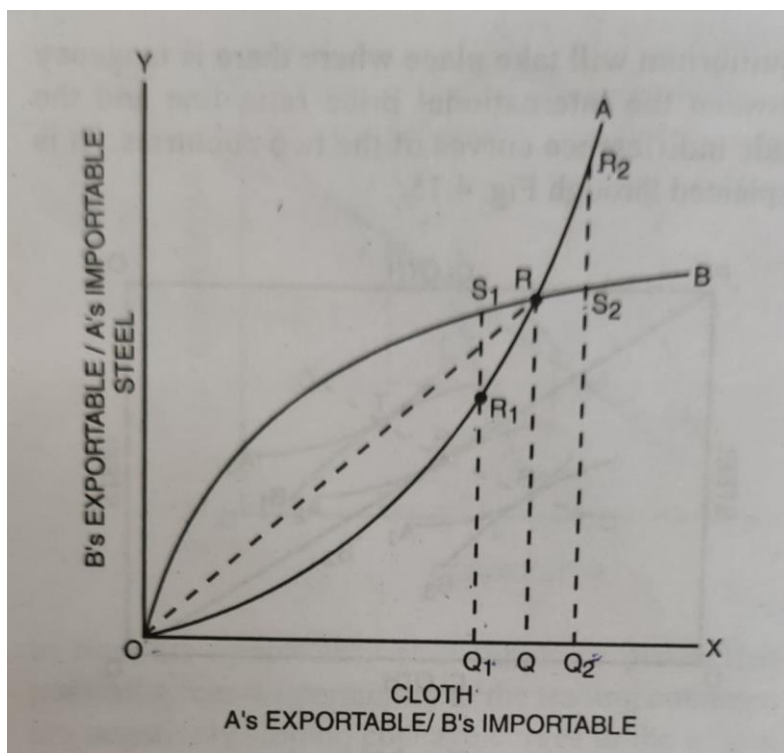


Fig.12

In this figure,OA is the offer curve of country A and OB is the offer curve of country B. Cloth is exportable commodity of country A and importable

commodity of country B. Steel is the exportable commodity of country B and importable commodity of country A. At point R_1 on the offer curve OA , the country A is willing to export OQ_1 quantity of cloth in exchange of R_1Q_1 quantity of steel. Country B, however is willing to export S_1Q_1 quantity of steel in order to import OQ_1 quantity of cloth. At point R_2 country A is prepared to export OQ_2 quantity of cloth in exchange of R_2Q_2 quantity of steel. But country B is willing to give up only S_2Q_2 of steel for OQ_2 quantity of cloth. Therefore exchange cannot take place in either of the two situations. The equilibrium takes place at point R , where the offer curves OA and OB intersect each other and OQ quantity of cloth is exchanged for RQ quantity of steel between the two trading countries. The line joining O and R is the international exchange ratio line. The slope of the line OR is measured by the ratio of quantity imported to the quantity exported (RQ/OQ).

GENERAL EQUILIBRIUM OF PRODUCTION, CONSUMPTION AND TRADE:

J.E.Meade assembled the analytical devices like the production possibility curve, the community indifference curves and offer curves in order to explain the general equilibrium of production, consumption and trade involving the two trading countries. Figure 13 is employed to explain the general equilibrium situation concerning the two trading countries A and B.

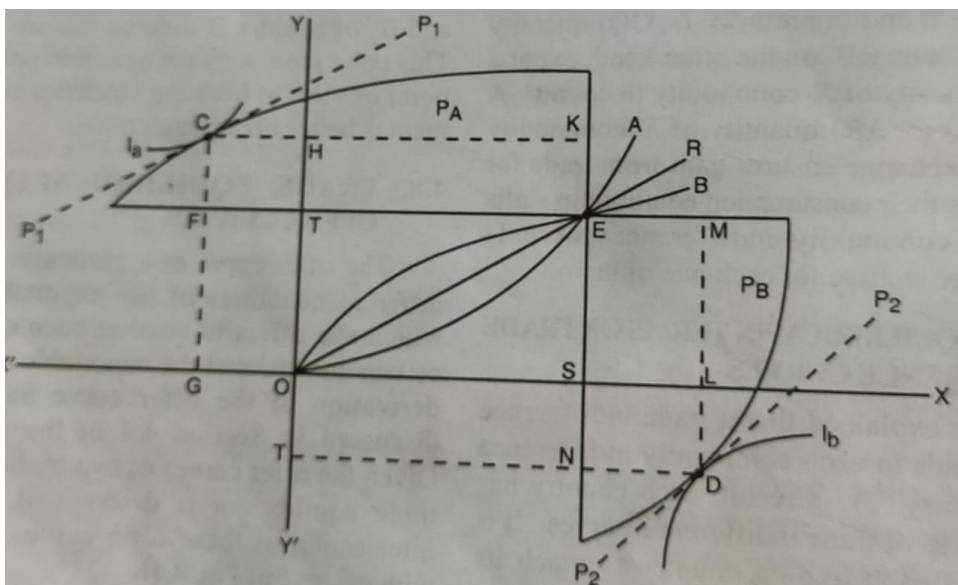


Fig.13

This figure shows that both the countries are simultaneously in the position of consumption, production and trade equilibrium. In the position of general equilibrium, there is not only a proper balance between the respective exports and imports but also an equality of the domestic price ratio of X and Y with the international price ratio of two commodities. This is evident from the fact that P_1/P_1 and P_2/P_2 the domestic price ratio lines or exchange ratio lines of countries A and B have exactly the same slope as the international exchange ratio line OR($P_1/P_1 || P_2/P_2 || OR$). As a result of the consumption, production and trade equilibrium both the countries move to their respective highest possible community Indifference curves as well as the highest production frontiers. This reflects the gains from international trade for both the countries.

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