[Academic Script]
[Heckscher-Ohlin Theory & General Equilibrium Framework of International Trade]

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Lecture No. & Title:	1: Heckscher-Ohlin Theory & General Equilibrium Framework of International Trade

Heckscher-Ohlin Theorem and General Equilibrium framework of International Trade

Introduction:

After finishing the concept of classical theory of international trade, we move to modern version of international trade. Swedish economist Eli Heckscher has given the new approach of international trade after world war-I. Another Swedish economist Bertil Ohlin has developed this approach further and given the modern theory of international trade in his book '**Interregional and International Trade'**. This theory is known Heckscher-Ohlin theory of international trade.

They both believe in comparative cost theory. What is the reason of comparative cost and specialization? Why does comparative cost arise? This theory gives the answers to these questions. This theory uses **General Equilibrium Approach**. According to Ohlin "**International trade is a special case of interregional trade."**According to this theory there are three reasons for difference in production cost of any particular commodity:

1. **Demand for commodity**
2. **Production system of commodity**
3. **Relative ratio of factors of production in a nation**

This theory assumes that demand for commodity and production system are constant. Therefore, the main reason for difference in production cost is relative ratio of factors of production. This theory does not substitute Ricardo's theory of international trade. In fact, it supports the Ricardian version of international trade. According to this theory, difference in production cost and ultimately it leads to difference in factor endowments leads to difference in commodity prices. This theory says that the main reason of international trade is difference in factor endowments. Therefore, this theory is also known as factor endowment theory. Differences in commodity prices are due to cost

differences which are the results of differences in factor endowments in the two countries.

Assumptions:

(1) There are only two countries, two goods and two factors of production. This model is known as **2x2x2 model.**

(2) There is **perfect competition in goods market** which means that price is determined by the industry and producers and consumers cannot affect the market price.

(3) There is **perfect competition in factor market** which means that neither labor nor capital has the power to affect prices or factor rewards.

(4) There is **full employment** in both nations.

(5) There is **constant return to scale (CRS).** It exhibits that doubling the inputs (labor and capital), output will increase by twofold. We can say that production function is homogenous of degree one. If we double the amount of labor and keep capital constant, output will increase less than the increase in the amount of labor. It shows the diminishing returns to labor. Similarly, there are is diminishing returns to capital also.

(6) We can know the abundance of goods. One cannot change the abundance of the goods.

(7) There is **free trade** between two nations. There are no restrictions like tariffs, quota etc.

(8) The **factors of production** are completely **mobile within the nation**. But they cannot move from one nation to another. Therefore, **international mobility does not exist.** We can say that one labor can move from Mumbai to Ahmedabad but he or she cannot move from Mumbai to New York.

(9) **The production function of two goods is different but they are same in both nations.** It means that production function of good X is same in both nations and production function of good Y is same in both nations. But production functions of X and Y are different in both nations.

(10) Factors affecting demand like taste, preferences and income are assumed to be constant.

(11) The stock of the factors of production in both nations is constant. They are homogeneous.

According to this theory,

Difference in supply of factors of production

↓

Difference in factor endowments

↓

Difference in price of the goods

↓

Imports and exports of the goods

It says that the main reason for the international trade is the difference in factor endowments because of difference in supply of factors of production.

Theory:

A nation exports goods, which use relatively a greater proportion of its relatively abundant and thus cheap factor of production and imports goods which use relatively a greater proportion of its relatively scarce and thus expensive factor of production.

It means that a nation will export the commodity whose production requires the intensive use of nation's relatively abundant factor and import the commodity whose production requires intensive use of nation's relatively scarce factor. In other words, capital-rich nation exports capital-intensive commodity and imports labor-intensive commodity. Similarly, labor-rich nation exports labor-intensive commodity and imports capital intensive commodity.

Example:

We assume:

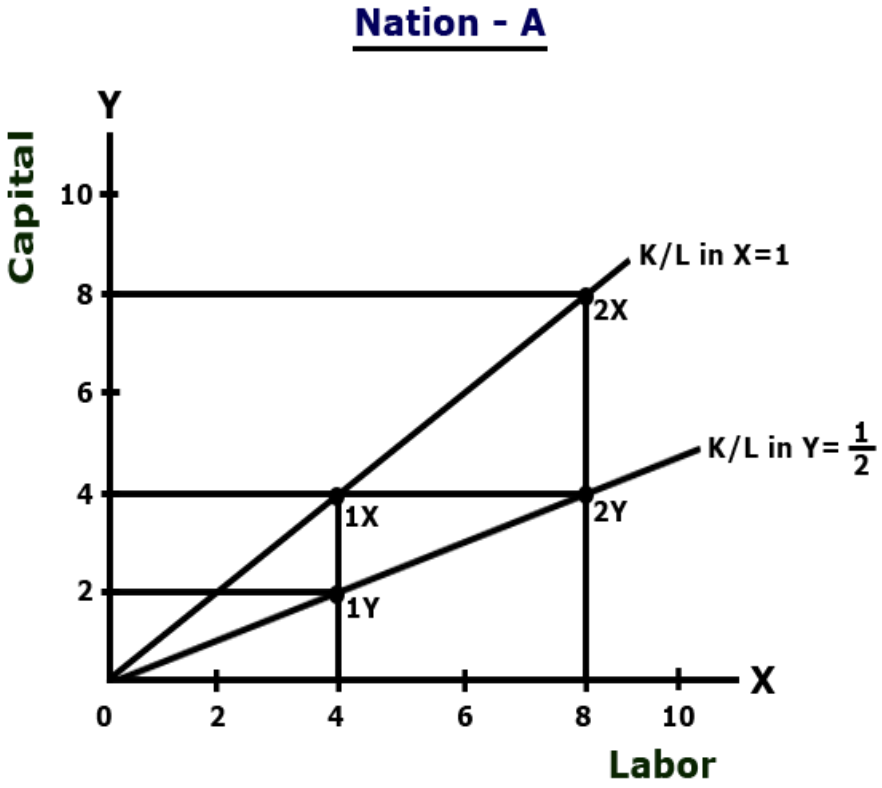
Two nations: A and B and Two commodities: X and Y

- **Nation A is capital abundant** and **nation B is labor abundant** nation. This means that nation A has relatively more supply of capital than labor and nation B has relatively more supply of labor than capital.
- The production of X requires more capital and less labor. It means that **commodity X is capital intensive**. Similarly, production of Y requires more labor and less capital hence **commodity Y is labor intensive.**
- That is good X is capital intensive if capital-labor ratio (K/L) used in the production of good X is greater than K/L ratio used in the production of good Y.

E.g. If 4 units of capital and 4 units of labor are required to produce 1 unit of X in nation A. Therefore, K/L ratio = 4/4 = 1. If production of good Y requires 2 units of capital and 4 units of labor then K/L ratio = 2/4 = 1/2 in nation A. Here, K/L ratio of X is greater than the K/L of Y hence commodity X is capital intensive and commodity Y is labor intensive.

The above example shows that absolute amount of capital and labor used in the production of goods is not important to decide the intensity of the goods but the amount of capital relative to labor i.e. K-L ratio is important. Consider in the figure-1.

Figure-1: K-L ratio in nation A



Amount of labor is measured on X-axis and amount of capital is measured on Y-axis.

(1) Figure-1 shows that nation A can produce 1X with 4 units of capital and 4 units of labor. We can say that nation A can produce 2X with 8 units of capital and 8 units of labor (Assumption of CRS).Thus, K-L ratio = 8/8 = 4/4 = 1. This is given by the slope of 1 for the ray from the origin for commodity X.

(2) Nation A requires 2 units of capital and 4 units of labor to produce 1Y. Therefore, 4 units of capital and 8 units of labor are required to produce 2Y (assumption of CRS). Thus, K-L ratio in Y=

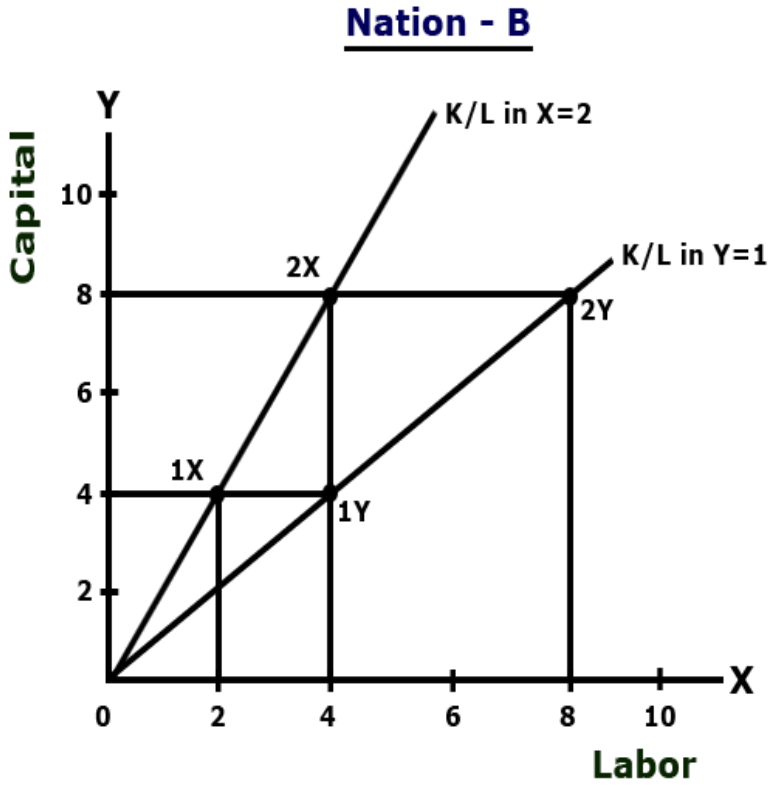
2/4 = 4/8 = 1/2. This is given by the slope of 1/2 for the ray from the origin for commodity Y.

(3) It is important to note that the ray from the origin for commodity X is steeper than the ray for commodity Y. it means that the slope the ray for commodity X is higher than the slope of the ray for commodity Y.

(4) Therefore, we can say that commodity X is capital-intensive and commodity Y is labor-intensive in nation A.

Now assume that, If 4 units of capital and 2 units of labor are required to produce 1 unit of X in nation B. Therefore, K-L ratio = 4/2 = 2. If production of commodity Y requires 4 units of capital and 4 units of labor then K-L ratio = 4/4 = 1 in nation B. Here, K/L ratio of X is greater than the K-L of Y hence commodity X is capital-intensive and commodity Y is labor intensive. Consider in the figure 2.

Figure 2: K/L in nation B



(1) It is important to note that the ray from the origin for commodity X is steeper than the ray for commodity Y. it means that the slope the ray for commodity X is higher than the slope of the ray for commodity Y.

(2) Therefore, we can say that commodity X is capital-intensive and commodity Y is labor-intensive in nation B.

Commodity X and commodity Y are capital and labor intensive respectively in both nations.

Factor Abundance and Production Possibility Frontier:

We can define factor abundance in two ways:

1. In terms of physical units.
2. In terms of relative factor price.

According to the definition of physical units, nation A is capital abundant if the ratio of total amount of capital to the total amount of labor (TK/TL) available in nation A is greater than that of nation B.

Therefore,

$$TK_A / TL_A > TK_B / TL_B$$

It means that the relative amount of capital in nation A greater than that of nation B. Similarly, the relative amount of labor is greater than in nation B than that of nation A.

According to the definition of relative factor price, nation A is capital abundant if the ratio of the interest rate (price of capital) to wage rate (price of labor) is lower than that of nation B.

Therefore,

$$(P_K/P_L)_A < (P_K/P_L)_B = (r/w)_A < (r/w)_B$$

The reason for this is, nation A has relatively more capital than labor and hence capital is relatively cheaper than labor in nation A. Similarly, nation B has relatively more labor than capital and hence labor is relatively cheaper than capital in nation B. Therefore, we can say that **nation A is capital abundant nation** and **nation B is labor abundant nation.**

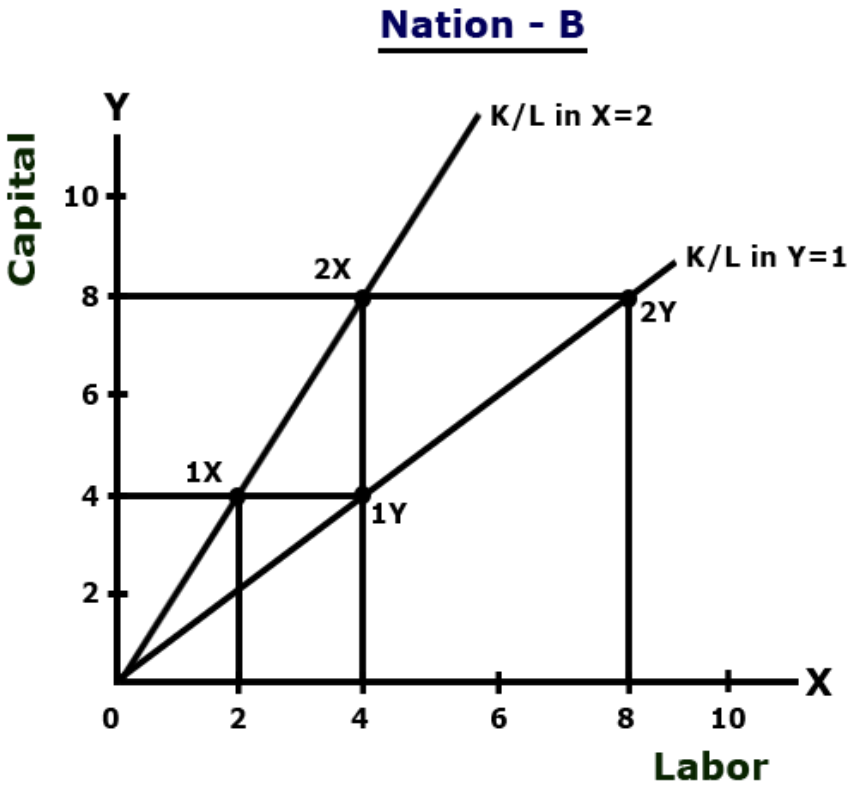
Production Possibility Frontier:

A production possibility frontier (PPF) is locus which shows the combinations of two or more goods that can be produced by using given factors of production.

In our example, nation A is capital abundant nation and commodity X is capital-intensive commodity, nation B is labor abundant and commodity Y is labor-intensive commodity. Therefore, nation A can produce more of commodity X and nation B can

produce more of commodity Y. This gives the PPF of nation A and nation B, consider in the figure-3:

Figure-3: PPF of nation A and nation B



Commodity X is measured on X-axis and commodity Y is measured on Y-axis.

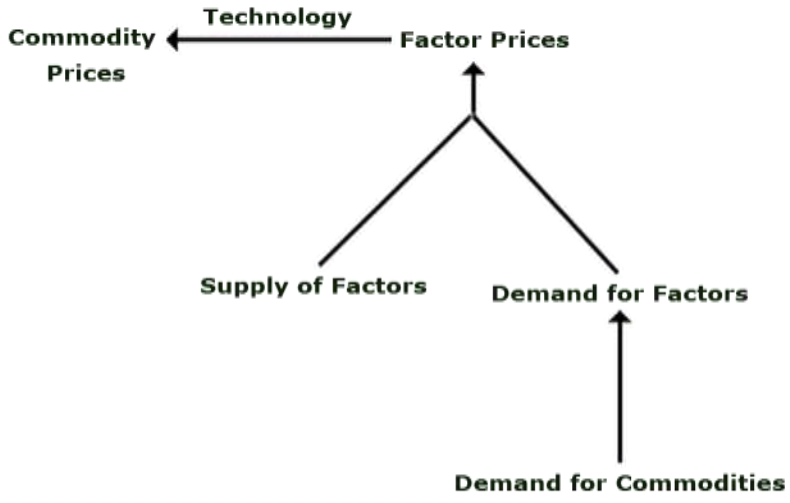
1. Nation A can produce more of commodity X and less of commodity Y because nation A is capital abundant nation and commodity X is capital-intensive. Nation A can produce maximum OS amount of X and maximum OR amount of Y. Therefore, OS>OR.
2. Nation B can produce more of commodity Y and less of commodity X because nation B is labor abundant nation and commodity Y is labor-intensive. Nation B can produce maximum OP amount of Y and maximum OQ amount of X. Therefore, OP>OQ.

3. The PPF of nation A is flatter and wider than the PPF of nation B. It indicates that nation A can produce relatively more of commodity X and nation B can produce relative more of commodity Y.

General Equilibrium Framework of the Heckscher-Ohlin Theorem:

The general equilibrium framework of the H-O theorem can be summarized with the use of Figure-4.

Figure-4: General Equilibrium Framework of H-O Theory



(1) The factor price is determined by the supply and demand for factors. We need factors of production to produce commodity. It means that the demand for factors of production is a result of demand for commodities.

(2) The price of factor of production and technology determines the price of the final commodity.

(3) The price of factors of production is different and hence price of the commodities is different.

(4) The difference in relative commodity prices among nations then determines comparative advantage and the pattern of trade.

Consider Figure-5.

Figure-5 (a) shows the production frontiers of nation A and nation B. According to our example,

(1) Nation A is capital abundant and commodity X is capital-intensive. Hence nation A can produce more of commodity X. Nation B is labor abundant and commodity Y is labor-intensive. Hence nation B can produce more of commodity Y.

(2) We assume that two nations have equal tastes. Therefore, both nations face same indifference map. IC_1 is common for both nations is tangent to nation A's PPF at point A and nation B's PPF at point B.

(3) Both nations can reach IC_1 in isolation. It means that points A and B exhibit their equilibrium points of production and consumption in the absence of trade.

(4) The relative commodity price is P_A in nation A and P_B in nation B. Since $P_A < P_B$, nation A has comparative advantage in commodity X and nation B has a comparative advantage in commodity Y.

Figure-5: H-O Model

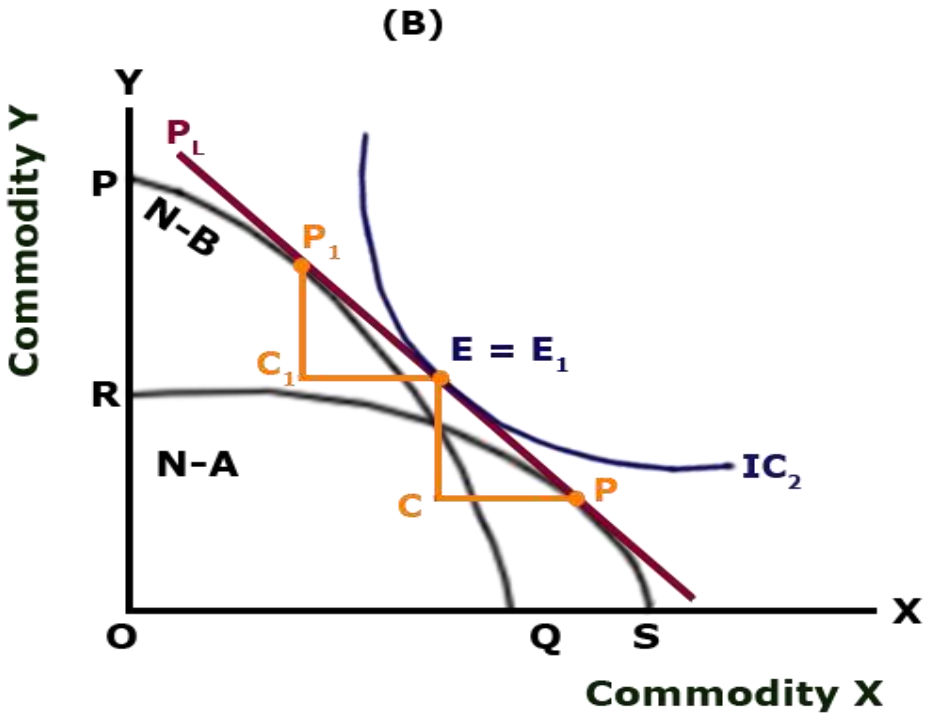


Figure-5(b) shows that,

(1) Nation A specializes in commodity X and nation B specializes in commodity Y. Specialization in production will continue until nation A has reached point P and nation B has reached point P_1.

(2) At points P and R, PPFs of two nations are tangent to common relative price line P_L.

(3) Nation A will export commodity X and in exchange for commodity Y and consume at point E on IC_2. Trade triangle is PCE.

(4) Nation B will export commodity Y and in exchange for commodity X and consume at point E_1 on IC_2 (E_1 = E). Trade Triangle is $P_1C_1E_1$.

(5) Nation A's exports of commodity X equal to nation B's imports of commodity X. (i.e. PC = E_1C_1). Similarly, nation B's exports of commodity Y equal nation A's imports of commodity Y (i.e. P_1C_1=CE).

(6) Both nations gain from trade because they consume on higher indifference curve.

Summary:

Heckscher and Ohlin have given the modern version of the international trade theory with the help of general equilibrium approach. According to this theorem, a nation will export the commodity whose production requires the intensive use of nation's relatively abundant factor and import the commodity whose production requires intensive use of nation's relatively scarce factor. In other words, capital-rich nation exports capital-intensive commodity and imports labor-intensive commodity. Similarly, labor-rich nation exports labor-intensive commodity and imports capital intensive commodity.