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# UNIT 2 THEORIES OF INTERNATIONAL TRADE

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## 2.0 OBJECTIVES

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After studying this unit, you should be able to:

- describe the pattern of trade between two countries
- discuss how international trade is mutually beneficial to the trading countries.
- explain the classical theory of trade
- describe the neo-classical theories of trade
- describe the modern theory of trade.

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## 2.1 INTRODUCTION

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Foreign trade has recently, and particularly after 1991, become an important as well as debatable issue for the Indian economy. The Union budget presented in 1991 introduced a wide range of economic policy reforms related with industry and trade, ushering in an era of economic liberalism in the Indian economy. These reforms were designed to transform a closed and inward-looking economy into an open and outward-looking one by lifting controls on import and export of goods and services and by making rupee convertible. In the years that followed, our trade and industrial production have been growing at fairly high rates. There is no doubt that the liberal approach to economic policy will continue and the previous bias against international trade and investment will remain subdued in the foreseeable future. In this new economic environment the teaching of economics will develop a serious gap if the students are not made aware of the basic principles and concepts of international trade. In this unit, you will learn the concept of absolute and comparative advantage, gains from trade, terms of trade and various theories of international trade.

## 2.2 OBJECTIVES OF TRADE THEORIES

The purpose of a trade theory is to explain the pattern of trade between two countries. What is meant by pattern of trade? Suppose India exports garments, gems and jewellery and a few other products to the United States, while the latter exports computer parts, such as hard disks, and other machines to India. This pattern of export and import of goods is known as the pattern of trade. The theory of international trade explains why such a pattern emerges and lists the factors which cause such a pattern. Trade between two nations is not just in goods. Trade in services is also quite important. If the United States provides banking and insurance services to the Indian citizens, say to the Indian exporters and importers, and if these services are provided from the United States, then it is to be regarded as the U.S. export of services to India. There are two main theories on pattern of trade: the classical or the Ricardian theory and the neoclassical theory or the Heckscher-Ohlin-Samuelson theory.

The second objective of trade theory is to explain the pattern of specialisation. A pattern of specialisation tells us the kinds of products and their quantities a country would produce. In the above example, India would produce garments, gems and jewellery and other products and the United States would produce computer parts and other machines. India may or may not produce computer parts and machines which USA would produce and similarly USA may or may not produce garments and the gems and jewellery. The pattern of trade and the pattern of specialisation will depend on the model you are using to explain these patterns. If you are using the Ricardian theory then you come to the conclusion that USA would not produce garments or gems and jewellery in which India has specialised. But if you are using the neoclassical theory then you would say that USA would produce the goods it is importing from India. The domestic industries that produce the goods that the country imports are known as import competing industries (e.g. garments for USA computer parts for India) and those producing goods that the country exports are called export industries (e.g. computer parts for USA and garments for India). A country however will have industries whose products are neither exported nor imported and the goods produced by them are called non-traded goods, such as domestic transportation, electricity, etc.

The third objective of trade theory is to show that international trade is mutually beneficial to the trading countries. A country which is not engaged in trade with any country is in a state of autarky. The theory says that trade is better than autarky under any circumstances. However, how much trade a country should have and whether a country should restrict the quantities of exports and imports by customs duties, tariffs, quotas and taxes is quite another matter. These issues come in the category of trade policy which will be discussed in Unit 4.

## 2.3 RICARDIAN THEORY OF TRADE

Ricardian theory of trade focusses on the comparative advantage of the nation. Let us discuss them in detail.

### 2.3.1 Labour Theory of Value

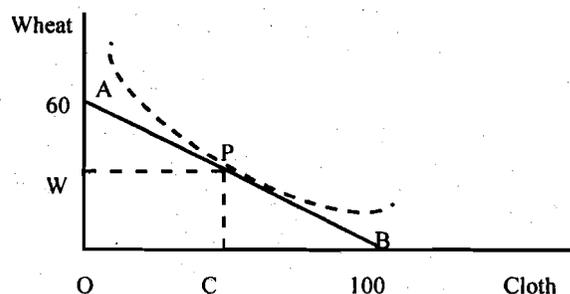
Classical economists, such as David Ricardo, believed that labour is the only source of value of goods produced in the economy. This does not mean that no other inputs are required in production, but since the other inputs such as raw materials and capital goods are also produced by labour, ultimately it is the labour which determines the relative valuation of goods. Among other inputs, not produced by labour, land is given by nature in a fixed quantity. Landowners earn rent which does not determine price, rather it is the price which determines how much rent the landowners will earn. Such an explanation of value is known as the labour theory of value. Let us understand it with the help of an example. Assume that it takes 3 hours of labour to make one yard of cloth and 5 hours of labour to 10 kilogram of wheat. The wheat and cloth markets are perfectly competitive and labour is free to move from wheat production to cloth production and vice versa. This implies that the wage rate will be same in the cloth and wheat industries. Let  $W$  be this wage rate. Then the average costs (cost per unit, one unit of cloth is one yard and one unit of wheat is 10 Kg.) in cloth and wheat production will be respectively  $3W$  and  $5W$ . These will also be the prices of cloth and wheat respectively, because under perfect competition price is equal to average cost. Thus

the relative price of cloth in terms of wheat is  $3W/5W$  or  $3/5$  which simply means that  $3/5$  th of a unit of wheat will buy one unit of cloth, or 6 kg. wheat will exchange for one yard of cloth. In the terminology of classical economists this exchange ratio is known as value which is determined only by labour and nothing else.

### 2.3.2 Autarky Equilibrium

You should understand the importance of the labour theory of value. We are dealing with two markets simultaneously and therefore it is in the general equilibrium framework. The labour theory of value gives a simple explanation of how the relative price of two goods is determined. Since we do not intend to introduce money in the model, it is the relative price or the exchange ratio which will determine the production and demand in the two industries. We would of course assume that the labour requirements per unit of wheat or cloth (5, 3) remain the same, no matter how many units of the two goods the economy produces. This assumption is known as the constant returns to scale (CRS). CRS means that the labour productivities are independent of the scale of output. What are the labour productivities in cloth and wheat production? These are  $1/3$  and  $1/5$  respectively, one hour of labour will produce  $1/3$  yard of cloth and  $1/5 \times 10 = 2$  Kg. wheat. Labour productivity is just the reciprocal of the unit labour requirement. With 300 hours of labour available and fully employed at one time in an economy, the production possibility frontier is shown as AB. Look at Figure 2.1 which shows production possibilities of wheat and cloth. Notice that if all labour are devoted to the production to cloth, then 100 units of cloth will be produced and that if all labour go into wheat production, then 60 units of wheat will be produced. Thus the slope of the production possibility frontier is  $60/100 = 3/5$  which is the exchange ratio. In autarky the economy's consumers will choose a point like P on the production frontier in such a way that their welfare is maximised. Thus in equilibrium, OW and OC are the quantities of wheat and cloth respectively, both demanded and supplied. The point P, in other words, represents a general equilibrium in the economy where demand and supply in each of the two markets are equal.

Figure 2.1: Production Possibilities of Wheat and Cloth



### 2.3.3 Absolute Advantage Versus Comparative Advantage

Now let us look at another economy where the unit labour requirements are somewhat different because of an improved technology. We assume that 1 and 4 hours of labour produce respectively one unit of cloth and one unit of wheat. Since less labour is required to produce one unit of each good in the second country (call it a foreign country), it has what is called an absolute advantage over the first country (call it the home country). So far there is no trade between the two countries. But suppose there is trade now and would it be correct to say the foreign country has no incentive to trade because it is more efficient in both goods, whereas the home country is too eager to trade because it is inefficient in the production of both goods? The answer is that the so-called absolute advantage does not determine the pattern of trade between two countries. It is the comparative advantage which is relevant.

But what is comparative advantage? In home country  $3/5$ th of a unit of wheat is exchanged for one unit of cloth and in the foreign country  $1/4$  of a unit of wheat will exchange for one unit of cloth. Since  $3/5 > 1/4$ , cloth is more expensive in terms of wheat in the home country

than in the foreign country. Thus the foreign country has comparative advantage in cloth production. But home country has comparative advantage in wheat production because here  $5/3$  units of cloth will exchange for one unit of wheat which is less than 4 units of cloth which will exchange for one unit of wheat in the foreign country. Thus, though the foreign country has an absolute advantage in both goods it has comparative advantage in only one, namely cloth. The home country has absolute disadvantage in both goods but it has a comparative advantage in wheat. But what determines comparative advantage?

In order to answer this question let us find the labour productivities in the two countries in cloth and wheat production. Look at Table 2.1 which shows the comparative labour productivities in both countries.

**Table 2.1: Labour Productivities**

	Home	Foreign
Cloth	$1/3$	1
Wheat	$1/5$	$1/4$
Ratio	$5/3$ ( $3/5$ )	4 ( $1/4$ )

As you remember, labour productivities are just the reciprocals of unit labour requirements. If we compare the ratios of the labour productivity in cloth to that in wheat production we see that the foreign country has a higher ratio ( $4 > 5/3$ ) and therefore it is relatively more productive in cloth. On the other hand, if we compare the ratios of labour productivity in wheat to that in cloth production, the home country has a higher ratio ( $3/5 > 1/4$ ) which shows that the home country is relatively more productive in wheat. Thus, the Ricardian theorem on trade pattern states that **a country has comparative advantage in the good in which its relative labour productivity is higher than its trading partner and tends to export this good and tends to import the good in which its trading partner has comparative advantage.**

As regards the pattern of specialisation the Ricardian theory states that a country completely specialises in the good in which it has comparative advantage. In the above example the home country will produce only wheat and the foreign country only cloth because the relative labour productivity is assumed to remain constant. Obviously, with no change in labour productivity, the country will put all its labour in the production of the good in which its labour is relatively more productive. If this theory is taken to be true, then no country will have an import competing sector because the imported goods will not be produced at all in the country.

### 2.3.4 Free Trade and Gains from Trade

The countries will not trade with each other unless trade makes them better off. What we can show here is that free trade is always better than no trade. In course of this discussion we will further explain why in the Ricardian system the specialisation is complete. Our starting point is the exchange ratios or values in the two countries in the pre-trade situation. For the home country the exchange ratio ( $3/5$  unit of wheat exchanged for one unit of cloth) is the slope of the production possibility frontier in Figure 2.1. One may draw a similar diagram for the foreign country and the slope of its production possibility frontier will show the exchange ratio as  $1/4$  unit of wheat for one unit of cloth. But there is another aspect of Figure 2.1 which has not been fully explained and this is the indifference curve drawn as a dotted curve, tangent to the production possibility frontier. At the equilibrium point P, the marginal rate of transformation (MRT) which is slope of the production possibility frontier gives the rate at which wheat can be converted into cloth by shifting labour from wheat to cloth. This is again the same as the exchange ratio. The slope of the indifference curve measures the marginal rate of substitution (MRS) or the rate at which the consumers will substitute wheat for cloth. At P,  $MRT=MRS=3/5$ . For the foreign country  $MRT=MRS=1/4$ .

Let us assume that the two countries have no trade with each other. Now suppose that the home country shifts labour from cloth to wheat to produce an extra  $3/5$  unit of wheat at the cost of one unit of cloth. But this loss of one unit of cloth can be more than compensated through trade with the foreign country where only  $1/4$  unit of wheat is required to buy one unit of cloth. In this exchange the home country gains from trade. Since trade is gainful, the home country will keep on reducing the production of cloth and increasing the production of wheat till it produces only wheat and complete specialisation occurs. But will the foreign country also gain? We will soon find out.

Theory of comparative advantage provides the basis for trade. When two countries are autarkies, there are four markets : markets for wheat and cloth in the home country and the markets for wheat and cloth in the foreign country. If trade is free, there are no tariffs or quotas or any other kind of restriction on the movement of goods between the two countries, then the four markets get integrated into two markets : one world market for wheat and one world market for cloth. The exchange ratio between cloth and wheat will be determined in the world markets. What will be the exchange ratio when the world markets are in equilibrium? We can argue that it will lie between the exchange ratios in the two countries in the pre-trade situation, i.e., between  $1/4$  and  $3/5$  which are simply the prices of cloth in terms of wheat in the foreign and home countries respectively. Since the foreign country is exporting cloth the pressure of home country's import demand for cloth will raise the price of cloth  $1/4$  to say  $2/5$ . In the home country the opposite will happen. Since it is an importer of cloth, the foreign supply will keep adding to domestic supply and reduce the price of cloth from  $3/5$  to say  $2/5$ . In other words, we are assuming that the equilibrium exchange ratio will be  $2/5$  in the world markets. Remember that in free trade the two countries will pay the same price for any good and the law of one price has to hold.

Now we can make a comparison between free trade and no trade, assuming that in free trade both countries can exchange  $2/5$  unit of wheat for one unit of cloth. Remember that this exchange ratio was  $3/5$  in the home country and  $1/4$  in the foreign country before trade. It is now easy to see that home country will gain by reducing the production of cloth and importing it and the foreign country will gain by reducing the production of wheat and importing it. If the home country reduces cloth production by one unit, it can increase wheat output by  $3/5$  unit. But out of this  $3/5$  unit of extra wheat the home country can export  $2/5$  unit to the world market and import one unit of cloth in exchange. The consumer who lost one unit of cloth will get it back through import with country and the country will end up with a surplus of  $1/5$  unit of wheat. If the foreign country reduces the production of wheat by one unit, it can increase the production of cloth by 4 units. In the world market  $5/2$  units of cloth will exchange for one unit of wheat. Thus the foreign country recovers the loss of one unit of wheat through import and has a surplus of  $3/2$  units of cloth. Thus, free trade benefits both countries who tend to specialise completely in the goods in which they have comparative advantage.

### 2.3.5 Terms of Trade

The definition of commodity terms of trade is the price of one good in terms of the other. In autarkies the home country's terms of trade was  $3/5$  unit of wheat for one unit of cloth, whereas the foreign countries terms of trade was  $1/4$  unit of wheat for one unit of cloth. As we have just argued, the equilibrium terms of trade in the world markets will be somewhere between  $1/4$  and  $3/5$  and we have assumed that it is  $2/5$ . In the context of trade, the terms of trade is the price of the exported good in terms of the imported good. Since the home country is an exporter of wheat, its terms of trade is  $2/5$  unit of wheat for one unit of cloth. But for the foreign country which is a cloth exporter the terms of trade is just the reciprocal of the home country's terms of trade, i.e.,  $5/2$  units of cloth for one unit of wheat.

International trade will not only change the autarky terms of trade of the two countries and bring them together at a common level, it will also change the relative wage rate. The ratio between the home country's wage rate and the foreign country's wage rate is known as the factorial terms of trade. The meaning of factorial terms of trade is number of hours of one country's labour that will exchange for one hour of the other country's labour. But one has to be careful in interpreting this concept. There is no exchange of labour between the two

countries, there is only an exchange of goods. But goods embody labour hours spent in the production. Thus , trade determines factor terms of trade indirectly.

We have just seen in the above that the commodity terms of trade will lie between 3/5 and 1/4. Can we find such limits for the factorial terms of trade? The answer is yes and the limits for the factorial terms of trade are 1/3 and 4/5. To prove this let us assume that  $W_h$  and  $W_f$  are respectively the wage rates in the home and foreign countries measures either in terms of wheat or in terms of cloth. In the foreign country which has comparative advantage in cloth the average cost of cloth must be less than the home country's average cost of cloth. This is precisely why the home firms do not produce cloth. Since this average cost is  $W_f$  in the foreign country and  $3W_h$  in the home country,  $W_f < 3W_h$  or  $W_h/W_f > 1/3$  (remember that 1 and 3 are respectively the number of hours of labour required to produce one unit of cloth in the foreign and home countries ). Since 4 and 5 hours of labour are required to produce one unit of wheat in the foreign and home countries respectively and since the home average cost in wheat must be less than the foreign average cost, we must have  $5W_h < 4W_f$ , or  $W_h/W_f < 4/5$ . This shows that the factorial terms of trade will lie between 1/3 and 4/5. These numbers can be located in the table above giving labour productivities where 1/3 is simply the ratio of labour productivities in the two countries in cloth production and 4/5 is the ratio of labour productivities in the two countries in wheat production.

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**Check Your Progress A**

1. What is comparative advantage?

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2. Distinguish between absolute advantage and comparative advantage.

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3. What is terms of trade?

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4. State whether following statements are True or False.

- i) Constant returns to scale means that the labour productivity are independent of the scale of output.
- ii) The absolute advantage determines the pattern of trade between two countries.
- iii) Free trade is always better than no trade.
- iv) Theory of comparative advantage provide the basis for trade.
- v) Trade does not determine factor terms of trade indirectly.

## 2.4 THE NEOCLASSICAL THEORY OF TRADE

The neoclassical theory focusses on the factor abundance, which determines the pattern of trade. Let us discuss the theory in detail.

### 2.4.1 Relative Factor Abundance

The pattern of trade in the Ricardian theory depends entirely on the technological differences between two trading countries, as reflected in their respective labour productivity ratios. It does not depend on how much labour each country has. The neoclassical theory, on the other hand, focuses on the latter aspect, namely factor endowments. In contrast to the Ricardian theory the neoclassical theory assumes that there are at least two factors, say labour and capital which are used in the production of goods. But the two countries have the same technology or the same production functions. They differ only in respect of relative factor endowments : one country being relatively labour abundant and the other relatively capital abundant. If  $K$  is the total supply of capital and  $L$  the total labour supply, then  $[K/L]_h > [K/L]_f$  implies that the home country is relatively capital abundant and the foreign country relatively labour abundant. This is called the physical definition of relative factor abundance. There is an alternative definition. If the foreign country is relatively labour abundant, then labour must be relatively cheaper there. In other words, if  $w$  is the wage rate and  $r$  the rental of capital, then  $[w/r]_h > [w/r]_f$  would imply that the home country is relatively capital abundant, or relatively scarce in labour endowment and would therefore have a relatively higher wage rate. One should note that the second definition does not necessarily follow from the first. The reason is very simple. A country may be relatively scarce in labour, but this does not necessarily mean that the relative wage rate will be high because it is quite possible that there is very little demand for the goods that require the use of labour intensively. Similarly, in a country where labour is plentiful, wage rate may be still very high because of extremely high demand for the goods in which labour is used intensively. The lesson that we learn is that it is not possible to determine the price of a factor only by looking at its supply. One has to look at the demand side also.

### 2.4.2 Factor Intensity

Since at least two factors are needed to produce goods, it is necessary to look at the relative intensity of factor use. Let  $X$  and  $Y$  be the quantities of the two goods and  $L$  and  $K$  be the labour and capital used in their production. Let  $K_x$  and  $L_x$  be the capital and labour used in the production of  $X$  and let  $K_y$  and  $L_y$  be the capital and labour used in the production of  $Y$ . If  $K_x/L_x > K_y/L_y$ , then  $X$  is capital intensive and  $Y$  is labour intensive. In general, the capital labour ratios will be different for different goods. For example we would expect the production of gems and jewellery to be labour intensive and computer hardware to be capital intensive.

### 2.4.3 The Assumptions of the Neoclassical Model

The neoclassical theory makes the following assumptions:

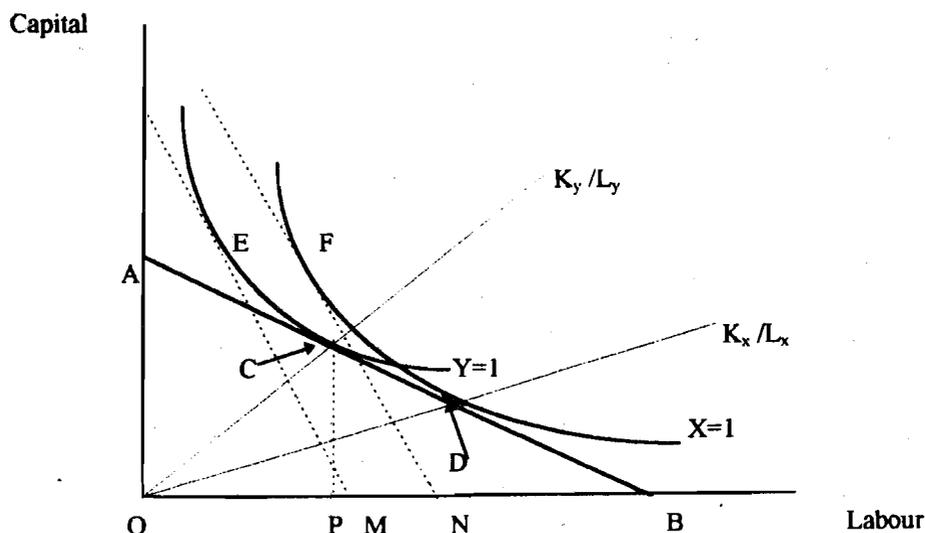
- i) Perfect competition
- ii) Constant returns to scale which means that if labour and capital inputs are doubled, output is also doubled. As a result of this assumption that average cost of production becomes independent of the level of output that is produced. For instance, the average cost of  $X$  is  $(wL_x + rK_x) / X$  which can be written as  $w(L_x/X) + r(K_x/X)$ . The firms will change labour output ratio or the capital output ratio if and only if the wage rate changes relative to the rental price of capital in order to minimise cost. But if output changes, labour and capital inputs will change in the same proportion as output, keeping  $L_x/X$  and  $K_x/X$  constant. Thus, the average cost will not change when output is changed, but it will change in response to changes in the factor prices. What we have just said for good  $X$  is equally true for good  $Y$ . The relationship between average cost and factor prices will be discussed later.
- iii) In two goods model, it is assumed that one good is labour intensive and the other capital intensive and this status does not change.
- iv) Only goods move from one country to another, not factors.

- v) The countries have the same technologies to produce X and Y for their factor endowments differ : one country is labour abundant and the other is capital abundant.
- vi) The factors of production are fully employed : there is no unemployment of labour or excess capacity.

### 2.4.4 Product Price Ratio and Factor Price Ratio

Under the assumption of constant returns to scale there is relationship between the product price ratio, i.e.,  $P_x/P_y$  and the factor price ratio, i.e.,  $w/r$ . This is discussed in Figure 2.2. As you know, in a competitive market price is equal to average cost in the long run because profit is competed away. Therefore, the product price ratio is equal to the average cost ratio, i.e., the ratio between the average cost of X and the average cost of Y. In the figure two unit isoquants are drawn and these are marked as X=1 and Y=1. These isoquants represent one unit of output for each of the two products. Every good will be produced at the minimum cost by the profit maximising producers. AB is the isocost line whose slope is the factor price ratio,  $w/r$ . The cost minimising condition is that the marginal rate of technical substitution, measured by the slope of the isoquant, is equal to the factor price ratio, measured by the isocost line. Thus, the input combinations at C and D are the cost minimising input combinations for producing one unit each of Y and X respectively. The cost of producing one unit of output is given either by OB in terms of labour or by OA in terms of capital. Since AB is tangent to both the isoquants, the cost of producing one unit, or the average cost is the same for X and Y. Thus, with the factor price ratio given by the slope of AB, the average cost ratio or the product price ratio is one, i.e.,  $P_x/P_y = 1$  and at this factor price ratio the capital labour ratios of the two industries are represented by the slopes of the lines joining O with C and D. It is quite obvious that Y is capital intensive and X is labour intensive. Another important point to note is that the average cost measured by OA or OB for producing X or Y will remain the same no matter how many units of the two goods are produced. This is because the average cost, under constant returns to scale, is independent of output and responds only to changes in the factor price ratio.

Figure 2.2: Product Price Ratio and Factor Price Ratio



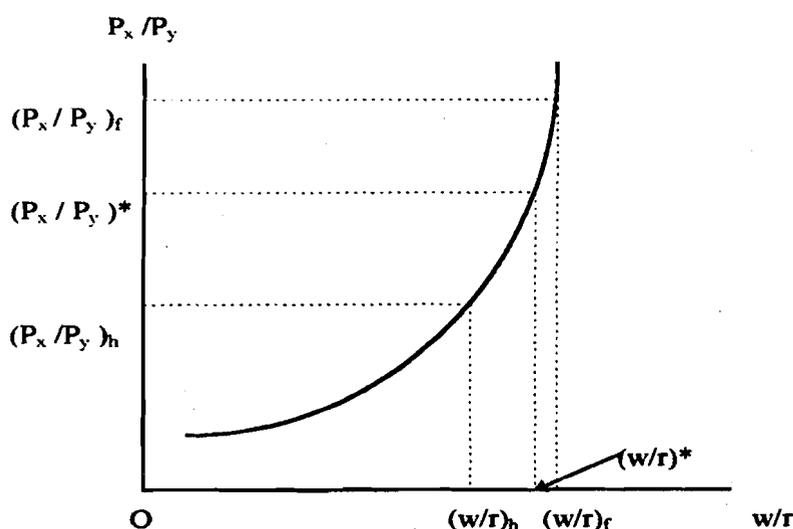
Let us now see how the average costs in the two industries producing X and Y change when the wage rental ratio ( $w/r$ ) rises. Common sense would suggest that since labour is intensively used in X and since it is the wage rate ( $w$ ) that rises relatively to the rental price of capital ( $r$ ), the average cost of X should rise relatively to the average cost of Y. In the Figure 2.2, the initial situation is one of equal average costs or product prices of the two industries and this happens because the isocost line is a common tangent to both isoquants. But if  $w/r$  rises, the cost minimisation points will not be on a common tangent, rather the two industries will minimise cost on different isocost lines. These two isocost lines are drawn as dotted lines and Y-industry will minimise cost at E, while X-industry will minimise cost at F. Therefore, the average cost ratio which is the same as the product price ratio ( $P_x/P_y$ ) is now  $OM/ON$

which is greater than one. This proves the proposition that as  $w/r$  rises,  $P_x/P_y$  will rise if  $X$  is labour intensive. The general relationship between the factor price ratio and the product price ratio is that if the price of one factor rises relatively to that of the other factor, then the price of the good intensive in that factor will rise relatively to that of the other good. This relationship is crucial to prove the neoclassical trade theorem which we take up next.

### 2.4.5 The Heckscher-Ohlin-Samuelson (HOS) Theorem

The HOS theorem states that a country which is relatively abundant in labour will have comparative advantage in the labour intensive good and the relatively capital abundant country will have comparative advantage in the capital intensive good. Thus it is the factor abundance rather than technology which determines the pattern of trade. To prove the theorem we use the relationship between  $w/r$  and  $P_x/P_y$  which we have just established. Assuming the  $X$  is labour intensive Figure 2.3 shows this relationship. The figure shows that the foreign country is capital abundant and the home country labour abundant by the factor price definition of relative factor abundance, since  $(w/r)_f > (w/r)_h$ . As a result of this, a comparison of autarky prices tells us:  $(P_x/P_y)_h < (P_x/P_y)_f$ , or the home country's relative price of  $X$  is less than the foreign country's relative price of  $X$  in autarky. Therefore, the home country (labour abundant) will export  $X$  (labour intensive) and the foreign country (capital abundant) will export  $Y$  (capital intensive).

Figure 2.3: Pattern of Trade



As trade takes place the two countries' autarky prices will converge to the equilibrium world price, just as in the Ricardian model, provided that there are no impediments to trade. The Figure shows this equilibrium world price as  $(P_x/P_y)^*$  which is the commodity terms of trade at which trade will take place in equilibrium and  $(w/r)^*$  as the factorial terms of trade in equilibrium. In the neoclassical model free trade not only equalises the relative commodity price in the two country but also equalises the relative wage rate.

### 2.4.6 Factor Price Equalisation Theorem

Free trade in the neoclassical model will not only equalise  $w/r$  in the two countries but will also equalise the real factor prices. This is known as the factor price equalisation theorem. A proof of the theorem is given by using Figure 2.2. In this diagram one can measure the real wage rate and the real rental price of capital. Let us suppose that the slope of  $AB$  is  $(w/r)^*$  which is the same in the two countries. But the slope of  $AB = (PC/PB)$  also measures the marginal rate of technical substitution, or the slope of the isoquant marked as  $Y=1$ . Remember that the marginal rate of technical substitution is the ratio of the marginal productivities of factors, i.e.,  $MPL/MPK$ , the ratio between the marginal productivity of labour and the marginal productivity of capital. Combine with this another implication of constant returns to

scale, namely that if factors are paid their marginal productivities, total output is exhausted. These give us two equations:

- 1)  $MPL/MPK = PC/PB$  which implies that  $(PB)(MPL) = (PC)(MPK)$
- 2)  $(OP)(MPL) + (PC)(MPK) = 1$

Substituting the first equation in the second equation we get :  $MPL = 1/OB$ . Similarly it can be proved that  $MPK = 1/OA$ . The real reward of a factor is nothing but its marginal productivity. Since  $1/OB$  and  $1/OA$  are respectively the real wage and the real rental price of capital in Y, these must also be the real factor prices in X because under perfect competition real factor prices cannot be different in the two industries. The X and Y isoquants drawn in Figure 2.2 are the isoquants of both the home and the foreign countries as their technologies are identical. Thus, with the slope of AB representing the equilibrium factorial terms of trade, trade will equate the real factor prices in the two countries.

### 2.4.7 Samuelson-Stolper Theorem

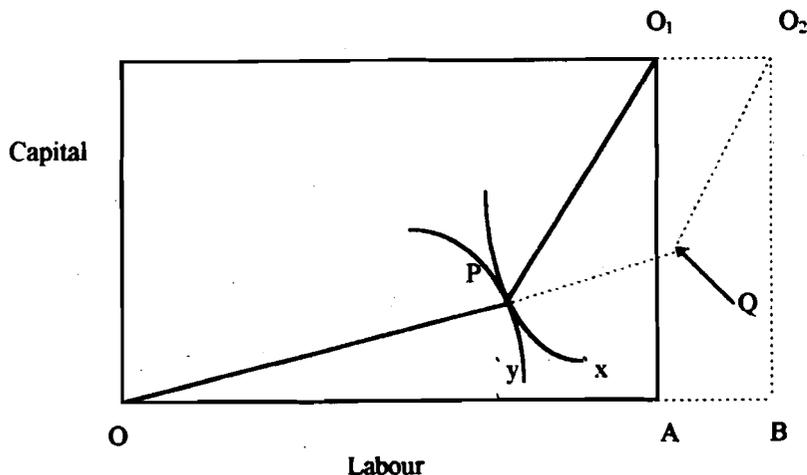
If the price of a good rises relatively to the price of the other good, what happens to the real factor prices? In order to answer this question we go back to Figure 2.2. Remember that if the isocost line is AB,  $P_x/P_y$  is equal to one, the real wage rate is  $1/OB$  and the real rental price of capital is  $1/OA$ . If the isocost lines are the dotted lines (EM or FN), then  $P_x/P_y$  is greater than one, i.e., the price of X rises relatively to the price of Y. Now the real wage rate is  $1/ON$  measured in X and  $1/OM$  measured in Y. In either case the real wage rate increases, because both ON and OM are less than OB. You may check that the real rental price of capital declines by looking at the vertical intercepts of EM and FN. Also recall that X is labour intensive in this case. This gives us the Samuelson-Stolper theorem which states that **as the price of a good rises relatively to the price of the other good, the real reward of the factor intensively used in the good whose price has risen (labour in this case) will rise and the real reward of the factor unintensively used (capital in this case) will fall.**

### 2.4.8 Rybczynski Theorem

So far we have discussed the neoclassical theory only in terms of the factor price definition of factor abundance. Let us now use the other definition, namely the physical definition of relative factor abundance. We start by again referring to Figure 2.2 where we recognise the fact that the factor intensities,  $K_x/L_x$  and  $K_y/L_y$ , depend entirely on the factor price ratio and will change only if the factor price ratio changes. Also, the factor price ratio will change only if the product price ratio changes and the Samuelson-Stolper theorem teaches us just this. It then follows that if the product price ratio is constant, the factor intensities in the two industries will stay constant. Now we ask ourselves the following question: Given the product price ratio what will happen to the output in the two industries if the endowment (supply) of a factor of production changes? Since the product price ratio is assumed to stay constant, an increase in the supply of labour or capital will not change the factor intensities in the two industries. Then our answer will come from the following box diagram (Figure 2.4). The box shows that the economy is endowed with OA amount of labour and  $AO_1$  amount of capital. The outputs produced in the two sectors are given by two isoquants marked as 'x' and 'y' which are tangent to each other at P. Under constant returns to scale we may also measure output along rays through the origin. In other words, the output of X can be measured as OP and that of Y as  $O_1P$ . Note that at P the economy uses up all resources. In fact, at any point in the box full employment of labour and capital takes place, but at P the use of resources is optimal as the marginal rates of technical substitution, measured by the slopes of the isoquants for X and Y are equal. Recall that this was also true in Figure 2.2 because the isoquants of the two products were tangent to the same isocost line or parallel isocost lines. In other words, P is the point where the goods are being produced at the minimum cost. Also note that as in Figure 2.2 X is the labour intensive good and Y is the capital intensive good. We can easily see this by comparing the slopes of OP and  $O_1P$  which tells us that X industry uses less capital per unit of labour than Y industry. Now let the supply of labour increase by AB without any change in the supply of capital. Since this, as argued, will not change the factor intensities, the new production point must be Q with PQ being an extension of OP and  $O_1P$  and  $O_2Q$  parallel lines. The new production point clearly

shows that the output of X rises from OP to OQ and that of Y falls from  $O_1P$  to  $O_2Q$ . Generalising this result we state the Rybczynski theorem : **If the supply of a factor rises and the terms of trade remain constant, then the output of the good intensively using that factor will rise and the output of the good intensively using the other factor whose supply has not changed will fall.**

Figure 2.4: Relative Factor Abundance



With the help of Rybczynski theorem we can now see the validity of the HOS theorem in terms of physical definition of factor abundance. Let us suppose that the home country and the foreign country are identical in every respect, i.e., they have the same technology and factor supplies. Then the production of goods in the two economies can be represented by point P in Figure 2.4 for both countries as their isoquants are identical. Let us assume that the consumers in the two countries have identical tastes and therefore identical demand functions. As a result the relative price of X in terms of Y will be identical in the two countries. Now suppose the home country's labour endowment increases by AB. The production point for the home country will be Q and that for the foreign country will be P. In other words, the home country becomes a labour abundant country and the foreign country a capital abundant country. But now the two countries cannot have the same relative price of X in terms of Y in their respective autarky equilibria. This is because the home country will produce more X and less Y than the foreign country. With identical tastes of consumers in the two countries, the relative price of X in terms of Y in the home country will be less than that in the foreign country. Thus X will be relatively cheaper in the home country which produces too much of it and Y relatively dearer as too little of it is produced. Therefore the HOS theorem is valid as the home country which is labour abundant has comparative advantage in X which is labour intensive and the capital abundant foreign country has comparative advantage in Y which is capital intensive.

## 2.5 MODERN THEORIES OF TRADE

The contemporary theories of trade deviate from the assumptions of perfect competition and constant returns to scale made both in the classical and the neoclassical models. In the modern theories the market structure is either monopolistic or oligopolistic. In the former case a large number of producers produce goods that are not identical but differentiated in quality or design. In the latter case only a few producers serve the market with either identical products or differentiated products. The products which are just differentiated horizontally are similar in quality but different in design, like a red pen and a blue pen, white wine and red wine or wooden furniture and steel furniture. Vertical product differentiation involves quality differences as in small cars and large cars. If the products are horizontally differentiated they are produced by more or less the same technology. Vertical product differentiation would invariably mean that the technology varies with quality or type of the product.

The modern theories assume economy of scale in production. An example of economy of scale is shown in the following Table 2.2.

**Table 2.2: Economy of Scale**

Labour	Units of Output
3	1
5	2
6	3
7	4
8	5
9	6
10	7

One may easily check that the technology described above is a departure from the constant returns to scale we have been using so far. For example the output is doubled from 1 to 2 as labour is less than doubled from 3 to 5. Suppose that there are two similar goods, A and B being produced by the above technology. The economy has 10 units of labour. The consumers will consume the two goods in 1:1 proportion. Therefore the labour force will have to be equally divided in the production of the two goods and 2 units each of A and B will be produced and consumed in the economy. Now suppose there is another economy with the same technology to produce A and B having 10 units of labour. Then it is quite easy to see that one economy produces only A and the other produces only B and then trade with each other then the consumers in each country will be able to consume 3.5 units each of A and B and be better off than autarky. This is an example of trade taking place between two countries having the same technology and factor endowments simply due to economy of scale. But there is difference in the nature of trade. In the earlier models the products were different and produced by different technologies and the trade was between two industries, such as one country exporting cloth and importing wheat. This kind of trade is called inter-industry trade. But in the contemporary models trade is intra-industry, i.e., in the same industry located in two different countries. It is like one country exporting white wine and importing red wine - both goods requiring the same technology as in the above example. It turns out that a very substantial part of world trade is intra-industry in nature which shows the importance of modern theories in the contemporary world.

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**Check Your Progress B**

1. Enumerate two assumptions of the Neoclassical theory.

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2. Distinguish between product price ratio and factor price ratio.

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3. What is factor price equalisation theorem?

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4. What is Rybczynski theorem?

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5. State whether following statements are True or False.

- i) The pattern of trade in Ricardian theory depends entirely on the technological differences between two trading countries.
- ii) Under the assumption of constant returns to scale, there is no relationship between the product price ratio and the factor price ratio.
- iii) Average cost, under constant returns to scale is independent of output and responds only to changes in the factor price ratio.
- iv) According to Heckscher—Ohlin—Samuelson theorem, a country which is relatively abundant in labour will have comparative advantage in the labour intensive goods.
- v) The contemporary theories of trade do not deviate from the assumptions of perfect competition and constant returns to scale.

## 2.6 LET US SUM UP

Trade theories explain the pattern of trade between two countries, the pattern of specialisation and the mutual benefit of the trade. There are various trade theories to explain above phenomenon. Ricardian theory states that a country has comparative advantage in the good in which its relative labour productivity is higher than its trading partner and tends to export this good. The country tends to import the good in which its trading partner has comparative advantage. Heckscher—Ohlin—Samuelson theorem emphasises that a country which is relatively abundant in labour will have comparative advantage in the labour intensive good and the relatively capital abundant country will have comparative advantage in the capital intensive good. This theory advocates that it is the factor abundance rather than the technology which determines the pattern of trade. The modern theories of trade assumes monopolistic or oligopolistic market structure and economy of scale in production.

## 2.7 KEY WORDS

**Absolute Advantage:** The advantage enjoyed by a country because it can produce a product at a lower cost than other countries.

**Comparative Advantage:** The theory that there may still be global efficiency gains from trade if a country specialises in those products that it can produce more efficiently than other products.

**Economy of Scale:** The lowering of cost per unit as output increases because of allocation of fixed costs over more units produced.

**Terms of Trade:** The quantity of imports that can be bought by a given quantity of a country's exports.

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## 2.8 ANSWERS TO CHECK YOUR PROGRESS

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A 4 i) True; ii) False; iii) True; iv) True; v) False.

B 5 i) True; ii) False; iii) True; iv) True; v) False.

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## 2.9 TERMINAL QUESTIONS

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1. Critically examine Ricardian Theory of Trade.
2. Describe The Heckscher—Ohlin—Samuelson Theorem.
3. “In the neoclassical model free trade not only equalises the relative commodity price in the two countries but also equalises the relative wage rate”. Discuss.
4. Explain the Rybczynski Theory of trade with suitable diagram.
5. Explain the modern theory of trade.
6. Distinguish between
  - i) Absolute advantage & comparative advantage
  - ii) Classical theory and Neo-classical theory.
7. Write notes on:
  - i) Terms of Trade
  - ii) Free trade and gains from trade
  - iii) Factor price equalisation theorem.