**International Economics**

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**Lecture No. # 37**

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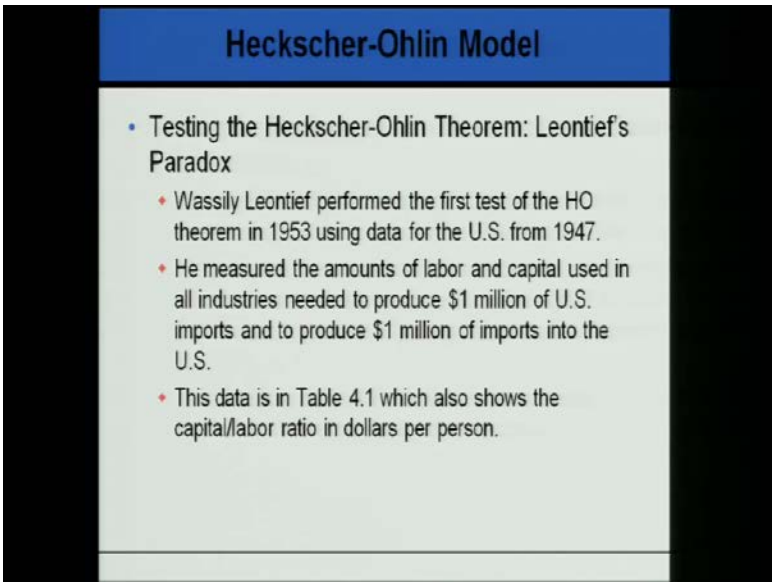


Good afternoon, today we are going to discuss the testing of the Heckscher-Ohlin theorem and as you recall the Heckscher-Ohlin theorem says that a country which is rich in capital will export capital intensive product. A country which is rich in labor will export labor intensive product. A more refined way of stating the Heckscher-Ohlin theorem is, country exports the good which uses intensively the abundant factor and imports the good which uses intensively its scarce factor.

The empirical testing, the first of its sort was done by Professor Leontief in the year 1953 and he used the 1947 data for the exports and imports and the capital and labor requirements to produce 1 million U S dollar worth of exports and imports. And when I say capital and labor which were used they were both direct and indirect requirements to produce 1 million rupee worth of exports and imports.

So, Leontief performed the first test for the Heckscher-Ohlin model using the U S data from 1947 and he measured the amount of labor and capital used in all industries needed

to produce dollar 1 million of U S imports and to produce 1 million of imports into the U S.

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Now, you can see the data which was used. So, to produce 1 million U S dollar worth of exports, the capital requirements were dollar 2.55 and its capital is in dollar millions.

While the capital which was required for to produce 1 million worth of imports was dollar 3.1, it is again in dollar millions. The labor person years were for exports were 182 and for imports it was 170. Now, on capital and labor they were both direct and indirect requirements.

So, direct requirements are the requirements which are done by the primary factors, the indirect requirements are the capital and labor used to produce intermediate goods which are used in making exports and imports. As far as exports are concerned it was easy to get the data. For imports it was difficult to get the capital labor requirements for imports coming from the rest of the world.

So, assuming that the technology was same Leontief could work out the direct and indirect requirements of capital and labor to produce 1 million worth of import competing goods. So, as in the Heckscher-Ohlin model you assume that the technology is same. So, he could work on the capital labor requirements to produce 1 million worth of import competing goods, but we surprised when we worked out the capital labor ratio

in exports, it worked out to be lesser than the capital labor ratio used in imports. Now, this was little surprising because one would expect that U S being capital rich will export capital intensive product and import labor intensive product, but here the capital labor intensity in exports was less than the capital labor intensity in imports.

So, the paradox was that a country which was rich in capital had a lower capital labor intensity in exports than imports. So, then he questioned that a country which is rich in capital does it mean that it will export labor intensive product and import capital intensive product from outside.

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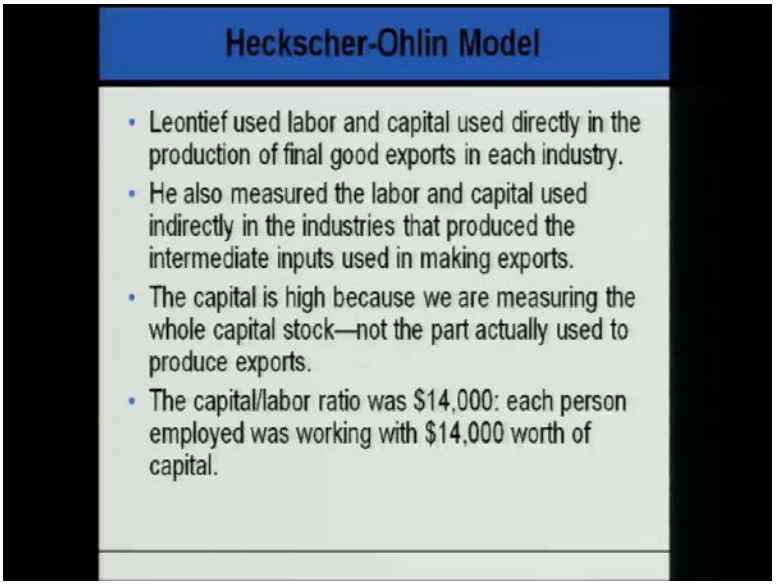


So, this was a paradox this what was called the Leontief's paradox and various reasons were given for explaining what were the reasons for this paradox. Now, Leontief used both labor and capital used directly and indirectly in the production of final goods of exports in each industry.

So, the capital labor ratio was dollar 14,000. Each person employed was working with dollar 14,000 worth of capital

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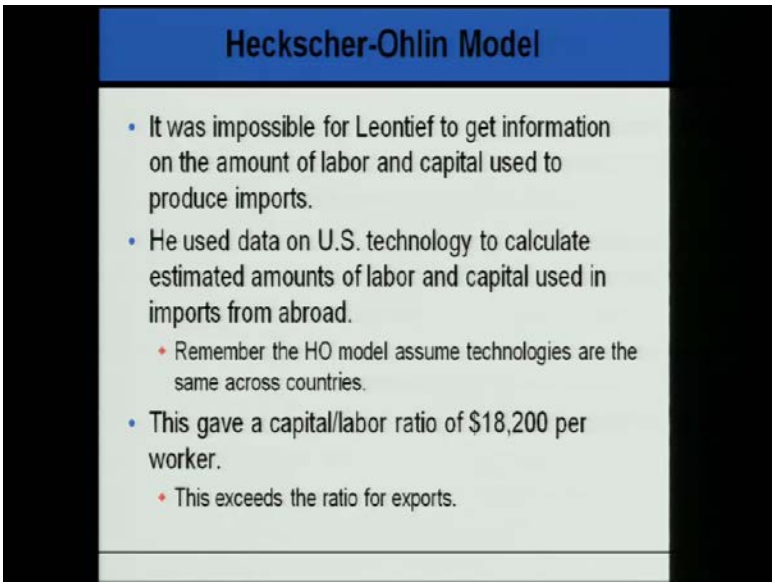


It was impossible for Leontief to get information on the amount of labor and capital used to produce imports. So, he used data on U S technology to calculate estimated amounts of labor and capital used in imports from abroad.

So, please recall that the HO model assumes technologies are same across countries. This gave capital labor ratio of dollar 18,200 per worker, this exceeds the ratio for exports. Now, please recall in the Heckscher-Ohlin model there is a relationship between the capital labor intensity of each product and abundance.

So, a country which is rich in capital exports capital intensive product. So, here Leontief questioned himself and also to the community at large that U S being rich in capital is having a lower capital labor ratio in exports and a higher capital labor ratio in imports. So, would that mean that a country which is rich, which is abundant in capital will export labor intensive product and import capital intensive product. So, this was some sort of a paradox.

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So, from the HO model Leontief expected that the U S would export capital intensive good and import labor intensive goods Leontief however, found the opposite the capital labor ratio for U S imports was higher than for exports. This contradiction came to be called the Leontief's paradox.

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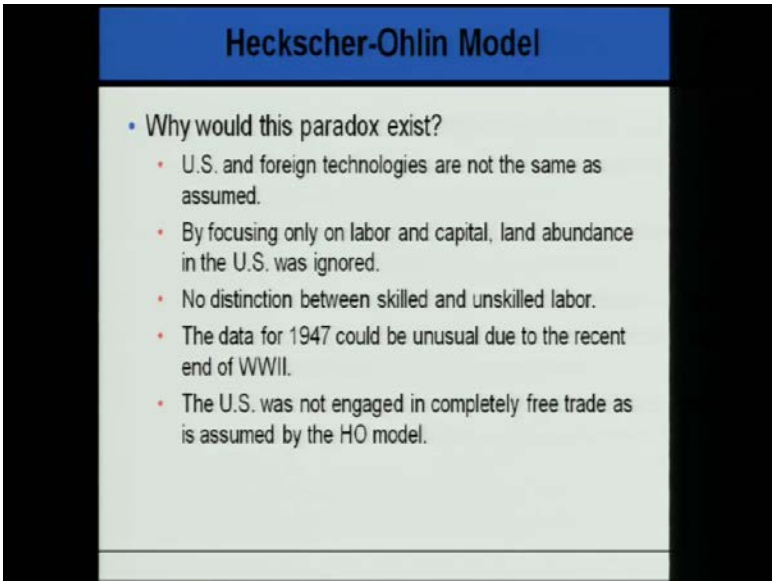


So, various reasons were given for why would this paradox exist. Now, this came from Leontief itself and he thought that U S and foreign technologies are not the same as assumed and this may have led to the Leontief's paradox. The second reason is that they

considered only labor and capital and land abundance in the U S was entirely ignored. This may be another reason that the for the Leontief's paradox to exist.

Then more importantly there was no distinction made between skilled and unskilled labor. It was always possible that the U S which is rich in skilled labor would export skilled intensive product. So, this was not taken into account and the data for 1947 could be an unusual data due to end of the world war 2, it ended in 1945. So, 1947 could be an unusual year and then another reason which was given for the paradox was that U S was not engaged in complete free trade as was assumed by the HO model.

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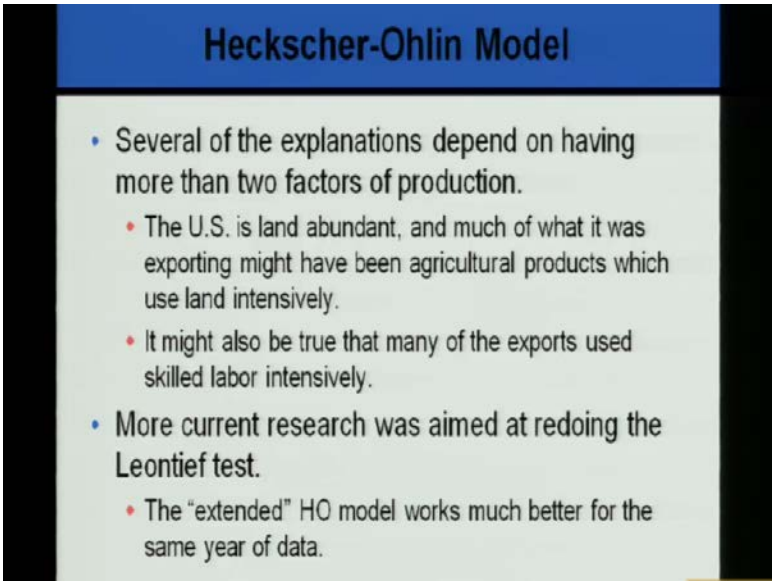


Now, several of the explanations dependent depend on having more than two factors of production. So, here to explain the Leontief's paradox we need to deviate a little bit from the Heckscher-Ohlin model. Heckscher-Ohlin two into two into two model needs to be extended to account for the empirical facts of international trade and that deviations are that you need to extend this Heckscher-Ohlin model by assuming more than two factors of production, by assuming more than two countries, by assuming more than two goods.

So, one deviation is that you need to take into account more factors of production and. So, the more current research was aimed at redoing the Leontief test and the extended HO model works much better for the same year of data. Now, the extended HO model the contribution came from Professor Vanek in1968. So, therefore, the extended model is called the Heckscher-Ohlin Vanek, HOV model and it assumes more than two factors,

more than two goods, but the number of factors are equal to the number of goods and more than more than two countries.

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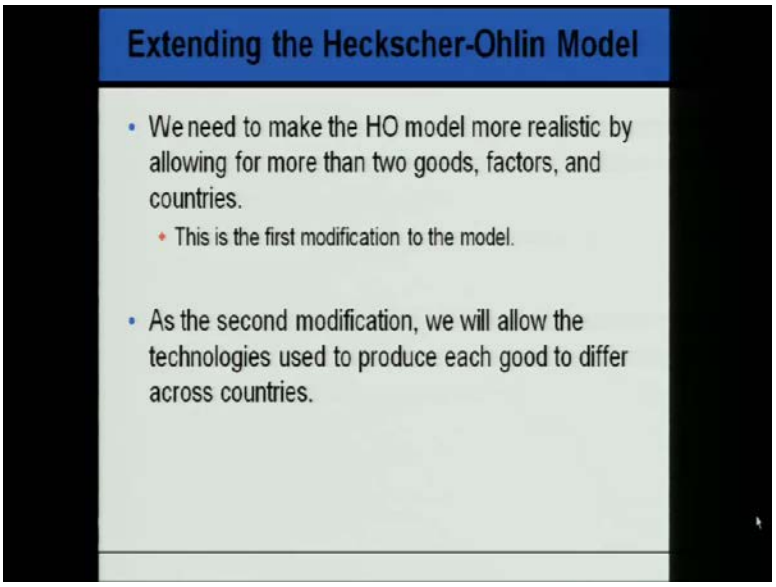


So, we need to make the HO model more realistic to take into account the empirical facts of international trade. So, this is the first modification to the model and the second modification is that we will allow technologies to differ across countries. So, these two modifications in the Heckscher-Ohlin model are needed to taken to account the empirical facts of international trade.

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Now, there are when you talk of many goods factors and countries the predictions of the HO model depend on knowing what factor a country has in abundance and which good uses that factor intensively. When there are more than two goods, it is more complicated to evaluate factor intensity and factor abundance. Now, please recall the Heckscher-Ohlin theorem which says a country which is rich in labour will export labour intensive product.

So, you have to establish a relationship between factor intensity and factor abundance. It was easy in the two into two into two model because factor abundance was defined as if the capital labor ratio in one country is greater than the capital labor ratio in another country, you would say that this country, country a according to the physical definition is rich in capital.

Capital intensities were defined as that if the capital labor ratio used in the production of good x exceeds the capital labor ratio used in producing y you would say that x is capital intensive. So, it was easy to define what is factor intensities and what is factor abundance, but when you talk of the first modification in the Heckscher-Ohlin model which talks of extending the two into two into two model that is having more than two factors of production, having more than two goods and number of countries it is difficult to define what is factor intensity or factor content of the net exports and the abundance.

So, this contribution came from professor Vanek and the extended model was modified and it was called the Heckscher-Ohlin-vanek model. So, see how Vanek contributed in defining and measuring the factor content of trade. Now, how do we measure the factor intensity of exports and imports when there are thousands of products traded between countries? How can we use this to test the HO model? That is, those are the questions. How do we measure the factor abundance? How do we measure the factor content of trade?

Now, please recall the table that I showed Leontief could work out the capital and labor requirements to produce 1 million of worth of exports and imports. So, if you can work out the labor and capital requirements to produce say a unit of exports and imports then you can always measure the total capital and labor required to produce the entire exports and imports.

So, when unit labor requirements, unit capital requirements are known and if it is known that these are the total exports and the total imports in that particular year you can always workout the total capital and labor requirements.

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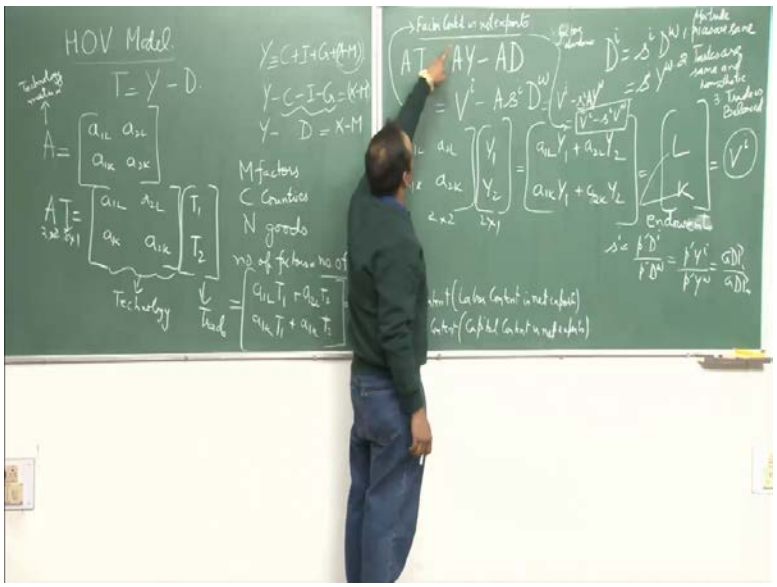


So, the equations behind the HOV model are the following, this is called the Heckscher-Ohlin-vanek model. So, it is a relationship between three things. It is a relationship between technology, it is a relationship between trade and it is a relationship between endowments.

So, trade, technology and endowments are related through the HOV model. Now, I will go to the board and define the model to you and then we will get the final equation of the HOV model. So, here trade is something which is output minus the demand. Now, please recall the identity which is y is equal to the GDP of the country is equal to consumption expenditure plus investment expenditure plus government expenditure plus net exports.

So, if you have to talk about net exports then this is y minus c minus i minus g which is equal to x minus m. Now, I would call this as y and this as the demand in the economy which is equal to x minus m. Now, what the HOV model does is that it defines an A matrix. This is the technology matrix. Now, this technology matrix is talking about the primary factors which are used for producing one unit of good one and good two.

Now, you can see that a one L is the amount of labor required to produce one unit of good one. Capital a one k is the amount of capital required to produce one unit of good one. a two L is the amount of labor required to produce one unit of good 2. a 2 k is the amount of capital required to produce one unit of good two. So, A T would work out to be A 1 L, A 2 L, A 1 k, A 2 k, T 1, T 2 this is the technology matrix. This is the technology, this is the trade matrix. Trade of 2 goods T 1 and T 2 this is the technology matrix.

Now, here we are assuming we have M factors, we have C countries and you can have N goods and what we further assume is that the number of factors is equal to the number of goods. So, equal number of goods, equal number of factors, but it is beyond 2 into 2 into 2. So, you get A T is equal to this, if you work on this it will be A 1 L T 1 plus A 1 A 2 L T 2, this would be A 1 k T 1 plus A 1 k T 2. Now, if you see the first row it would give you the total labor required to produce and trade two goods. a one k T 1 plus a one k T 2 is the total capital required to produce and trade these two goods.

So, this is just for depicting that what is this resulting matrix A T. So, a here is two rows two column, t is two rows one column. So, the resulting matrix is two rows one column, but what you get on the left side is the total labor required for the trade of the net exports or trade of the two goods. This is denoted by f L i, this is denoted by f k i, this is called the factor content. Here it is the labor content in net exports, this is the factor content more specifically it will be the capital content in net exports.

So, then this is the left side A T would become the left side. So, this model can be written as A T is equal to A Y minus A D. D is the demand, y is the output. So, if you work further on this A Y would give you the factor endowment in this country which I call as V i. Now, again if you assume that there are only two factors of production and two goods, if you multiply it with y 1 and y 2 what you would get would be A 1 L y 1 plus A 2 L y 2, you would get A 1 k y 1 plus A 1 A 2 k y 2.

Now, you can see that the resulting matrix will give you the total labor required to produce the output. The second row would give you the total capital required to produce the total output. So, this would give you the labor endowment and this would give you the capital endowment. So, this is this whole thing is defined as V i. So, this is the V i

vector, this is the endowments, these are the endowments. So, A Y would give you V i minus. Now this is the demand in country I, this is s i d w now d i is s i d w.

Now, we have assumed certain things after trade prices are same, second tastes are same and homothetic and third we assume that trade is balanced. Now, what it would do would that if you assume this then this would can be written as s i y w. Why because please recall that if you assume these set of assumptions then s i is p dash d i divided by p dash d w. Prices are same and if you have further assume that tastes are same and homothetic that is homothetic means that the consumption proportion c by y 1 is equal to c 2 by y 2 is equal to c 3 by y 3. So, even if incomes are changing c by y ratio between the countries remain the same and income elasticity of demand is equal to one if you assume that tastes are homothetic.

So, s i is p dash d i by p dash d w, prices are same. Now, if you further assume that trade is balanced. If trade is balance then exports are equal to the imports. So, whatever is your output will be equal to the demand if x minus m is same initially. So, y will be equal to d. So, this would become p dash y i by p dash y w. So, this will be GDP i by GDP w. So, if you work further on this, this would become V i minus s i A Y w and this would give V i minus s i A Y w would give you V w.

Now, this is the final equation of the HOV model. V i is the endowment in country i, V w is the total endowments in the world. So, if this is labor available in country i, V w will be the total labor endowments in the entire world in the world. If V i is capital then V w will be the total capital which will be sum of capital of all countries in the world. Now, when you do empirical work if you have to find out V w then you need to get the data for all the capital stock available in all countries.

So, depending on the availability of data you may get data for 144 countries, you may get data for 33 countries, you may get data for 75 countries whatever it may be this is the sum of the endowments, this is the endowment in that particular country. So, now, see what Heckscher-Ohlin-vanek does is that it relates this factor content in net exports to something which is this which is the called the factor abundance.

So, you have the left side which is the factor content in net exports and then you have the right side which is that is the equation for the factor abundance. So, for each country you can now define the labor content in net exports and if this works out to be positive then

you also assume that this country is labor rich. Now, how it will be labor rich? If L i minus s i L w is greater than 0 or L i is greater than s i by L w or L i by L w is greater than s i. s i is GDP i by GDP w.

So, the labor which is available in this country and the total labor which is available in the entire world, if this share is greater than its GDP share in the total world then you say that it is abundant in labor. And this is related to the labor content in net exports. So, if the factor content is positive then according to this equation it should be abundant, the country should be abundant in labor. If the capital content in net exports is positive then this country should be rich in capital and how will you define richness? Richness will be defined by the capital endowment in this country divided by capital endowment in the entire world, if it is greater than the GDP share then you will say that it is abundant in capital.

So, now it is to be seen empirically take it into account the various factors whether the factor content of each factor in net exports whether it is turning out to be positive or negative, if it is positive then that country should be abundant in that factor. Now, if you do this exercise the contributors are trifler, who worked on the HOV model. He worked out the factor content of the net exports and try to relate it by to the factor abundance using the sign test and the rank test. I will come to the sign test and rank test, he found that most of the countries were not satisfying the Heckscher-Ohlin-vanek model.

So, in other words he was finding signs which were opposite, factor content sometimes worked out to be positive, but the abundance worked out to be negative. For example, in case of U S he found to a surprise that the factor content for labor was positive, but the country was not rich in labor factor abundance, he did not find out factor abundance in labor. Similarly, China surprised. He found that Chinese are rich in r and d scientists and r and d scientists were defined as the r and d intensity multiplied by the total population.

So, something more needs to be done with this equation. Specially, with how you define factor abundance. Now, that is something which is different in defining factor abundance is that you need to multiply this endowment with its productivity. So, endowment multiplied by its productivity will give you the effective endowments in that country. So, how will you get the effective endowments of the world? Effective endowments of the world will be the sum of the effective endowments of all countries.

So, that is what that is how the changes, the modification comes. Modification comes because now you assume that the technologies are different and to take into account the different technologies, he redefined how do you define factor abundance in the HOV model, he multiplied each endowment into its productivity. So, the contribution also came from Feenstra's work. They redefined what is factor endowments. As I said they multiplied each endowment with its productivity and then relooked at the same equation. So, then this became effective factor endowment in country i, this became effective factor endowment in the entire world.

So, if the effective factor endowment in country i divided by effective factor endowment in the entire world is greater than the GDP share, then you will say that this country is abundant in say labor or capital or skilled labor or unskilled labor whatever it is. So, as I said to take into account the empirical facts of international trade that is most of the trade which takes places is between more than two countries, there are more than two factors of production, there are more than two goods which are involved because you can always think that a country can export thousands of products. It has various factors of production, it can have land, it can have skilled labor, it can have unskilled labor, it can have semi skilled labor, it can have r and d scientists, it can have capital, you can have many factors. Now, to take into account this empirical fact you need to introduce the HOV model and in the HOV model you take into account more than two factors, more than two goods, but you assume that the number of factors are equal to the number of goods and second modification that you do is that you account for the differences in technology.

Now, here the Heckscher-Ohlin model deviates from the earlier Heckscher-Ohlin model given by professor Heckscher and his student Ohlin by assuming that technologies are different and how do they account for this different in difference in technologies? They work out the effective factor endowment and the effective factor endowment in the entire world. And if this share of effective endowment divided by effective endowment of the entire world is greater than the GDP share then you say that this country is rich in that particular labor in that particular endowment.

So, then how do we measure the factor content of trade? Factor content of trade is a into t which will give you the total labor and capital required to produce the entire exports and entire imports. And if you work out it will be this a matrix the primary factor matrix also

called the technology matrix, this would this would give you the total labor requirement to produce and export the labor content in net exports you can always work out the capital content in net exports.

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So, then using Leontief's test we can look at the similar data. We can multiply as numbers shown in table 4.2 by the actual value of U S exports and U S imports. So, this work was done by professor Leamer in the 1980s, he used the same Leontief's data of 1947 and then he could workout the total labor required to produce the entire exports. So, he was working out the factor content. So, he worked on the HOV model given by the by Vanek. So, the HOV model was worked on by professor Leamer in 1980 and he worked out the factor content in net exports and then he tried to relate it with the factor abundance.

So, they worked out the factor content of exports and the factor content of imports which works out the amount of labor and capital used to produce in exports and imports by taking the difference between the factor content of exports and factor content of imports they could work out the factor content of net exports

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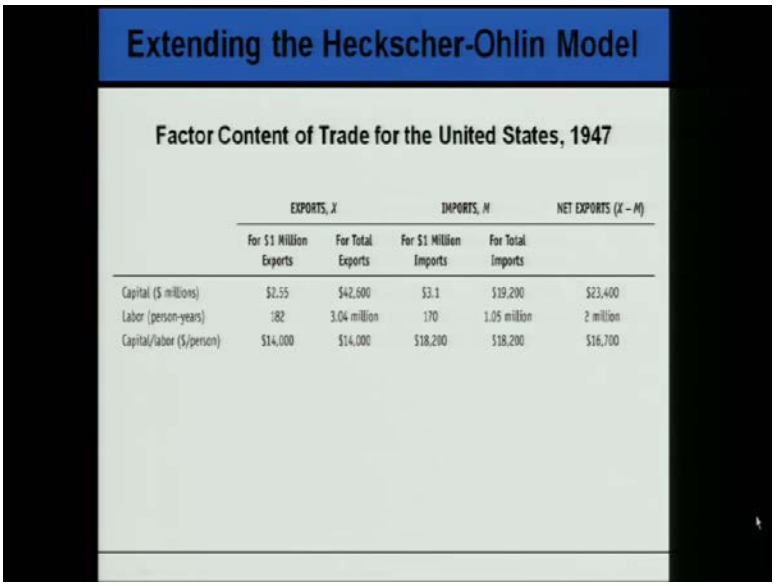


Now, this is the table. You can see that if you work out this was the figure that was worked out by Leontief, the amount of capital and labor required to produce 1 million worth of exports both direct and indirect requirements and you can get the capital labor ratio.

Now, for total exports how much will be the capital which will be used? For this you need to know the total exports of U S in the year 1947 because these are capital labor requirement, unit capital requirements, unit labor requirements. So, if you have to get the entire capital and labor you need to know what is the total exports or the total imports. Total exports were nearly 16700, the imports were around more than 6000 U S dollars in that particular year in 1947. If you work that out you will get the total export figure, you will get the total imports figure, you will get the total capital required to produce the entire exports, you will get the total capital required to produce the entire imports, you will get the total labor required to produce the entire exports, you will get the total labor required to produce the entire imports.

So, then the net exports that is the capital required to produce net exports is dollar 23,400, the labor required to produce the entire net exports is 2 million. What is to be seen is that this factor content is a positive figure. So, this A T i A T is a positive figure. Now, this has to be matched by the abundance of capital and labor in the U S. So, you can use one this HOV formula where you find out v i by v w and compare it with s i or

you do what trifler did. He found the effective endowment that is multiplied each endowment with its productivity and worked out the effective endowment of the entire world, then got the share effective labor divided by effective labor in the world if it is greater than the GDP share then you say that this country is rich in labor.

So, form this table what comes out is the factor content of capital in net exports is positive, the labor content in the net exports is positive. Now, that is the left side the right side is this that we need to see whether U S has labor abundance or capital abundance. Now, since both these factor contents are positive we see that the U S was running a trade surplus. Now, when the factor contents are positive naturally you would tend to export capital intensive and labor intensive product.

Now, let me tell you the time period, this is a time period when the countries had just come out of the world war 2, the U S was supporting the European countries specially the countries which were affected by the war and mainly the Germany. So, it was exporting both capital intensive and labor intensive products.

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So, it was running a trade surplus. The fact that the factor content of net exports for both capital and labor are positive will be very important because then we will try to relate with whether U S has a abundance in capital and in labor.

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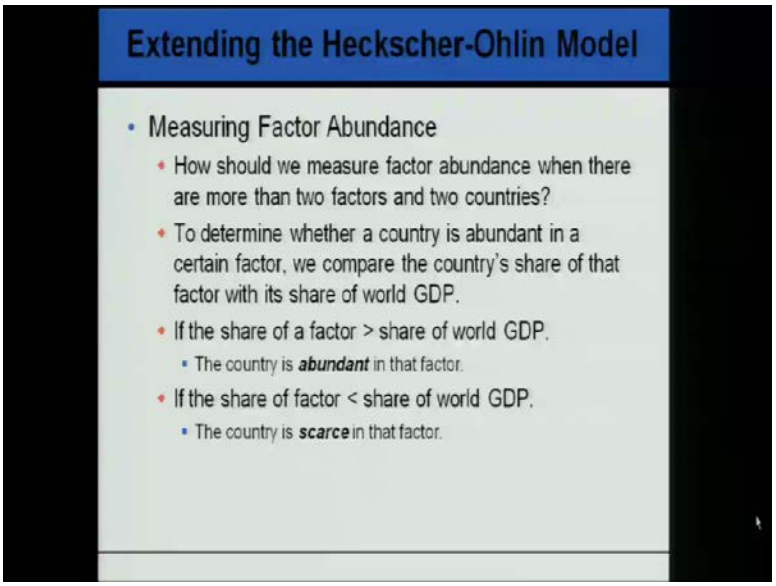


So, this is a repetition of how do we measure factor abundance if the share of that factor is greater than the share of the world GDP the country is abundant in that factor, if the share of factor is less than the share of world GDP then the countries scarce in that factor. So, there is again this the same if you look at this equation, if this has to be greater than 0 GDP share in GDP world if GDP share in GDP world if v i by v w is greater than s i than you say that a country is abundant in that factor, is a share of factor is less than the share of world GDP the country is scarce in that factor.

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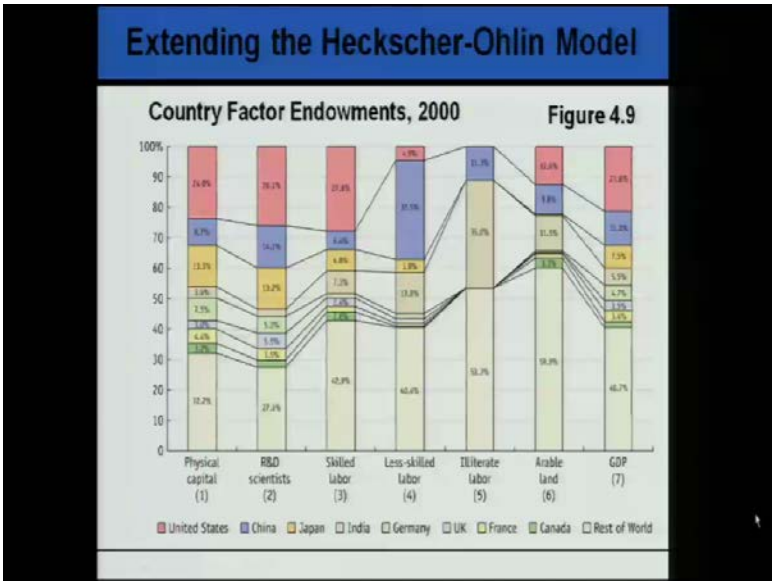

Now, this is an interesting table. Now, if you look at the countries factor endowments you have these different factors physical capital, r and d scientists, skilled labor, less skilled labor, illiterate labor and arable land. Arable land is a hectares of arable land, illiterate labor is the product of 1 minus adult literacy rate into adult population, that is how you define illiterate labor, less skilled labor is anyone who has completed primary and secondary education, skilled labor is someone who has done tertiary education, r and d scientists are defined as r and d intensity into the total population and physical capital is from the pen world tables its capital to labor ratio multiplied by the total labor force in the year 2000.

Now, from this table you can you and the this last column is about the GDP. Now, you can see that U S which is in this colour is dark pink, 24 percent is the physical capital share in the total physical capital of the entire world. So, this is like v i by v w, this is like v i by v w which is 24 percent and this is greater than its GDP share in the year 2000, this is all in the year 2000 which is 21.6.

So, then you can say that U S is capital rich when you have more than two factors, more than two countries and more than two goods, this is how you define factor abundance for China the ratio is say 8.7, but its GDP share is 11.2 percent. So, China is scarce in physical capital. Japan 13.3 percent is the factor share, its GDP share is 7.5 percent. So, Japan can be said to be capital rich. Look at India 3.6 percent, that is the endowment share in the world endowment and its contribution to GDP is 5.5 percent. So, India is scarce in physical capital. Come to r and d scientists the U S share is 26.1 percent, its GDP share is 21.6 percent. So, U S is rich in r and d scientists. India, if you look the share is very minimal, it is less than its GDP share. So, it is scarce in r and d scientist.

If you look at skilled labor, less skilled labor and illiterate labor for India you would find that India is rich in skilled labor, less skilled labor, illiterate labor, but it is scarce in physical capital and r and d scientists. China from this seems to be that it is rich in r and d scientists. Now, look at arable land. Very surprising that U S share 12.6 percent is less than its GDP share. India again 11.5 percent, it is greater than the GDP share. So, India is rich in land.

So, this is the table which shows which country is rich in capital, which is rich in r and d scientists, which is rich in skilled labor, which is rich in less skilled labor, but this may

not give the correct figures always because from here it seems that China is rich in r and d scientists, from here it seems that U S is not rich in arable land, from here it seems that as far as the skilled labor is concerned you can see that Japan skilled labor is less than its GDP share.

So, something needs to be done about this because it uses this particular equation. Now, that something is that these each endowments have to be multiplied by the productivity to get the effective endowments and then it has to be compared with the GDP share. So, effective factor endowment share has to be compared with the GDP share.

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So, that is how technology is taken into account. So, what comes out of the last table is that for example, 24 percent of the worlds physical capital is located in U S, 8.7 percent is located in China, 13.3 percent in Japan, but U S had 21.6 percent of the world GDP, China had 11.2, Japan had7.5.

So, we can conclude that U S was abundant in physical capital, the opposite holds for China and India, their shares of world capital are less than their shares of GDP.

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Now, we can use the similar comparison to determine whether each countries abundant or not in r and d scientists, in two types of labor distinguished by skill in arable land or any other factor of production. For example, U S is abundant in r and d scientist, U S is also abundant in skilled labor, but it is scarce in less skilled labor and illiterate labor. India scarce in r and d scientists because 2.5 percent of the world total its share is lower than its GDP share which is 5.5 percent.

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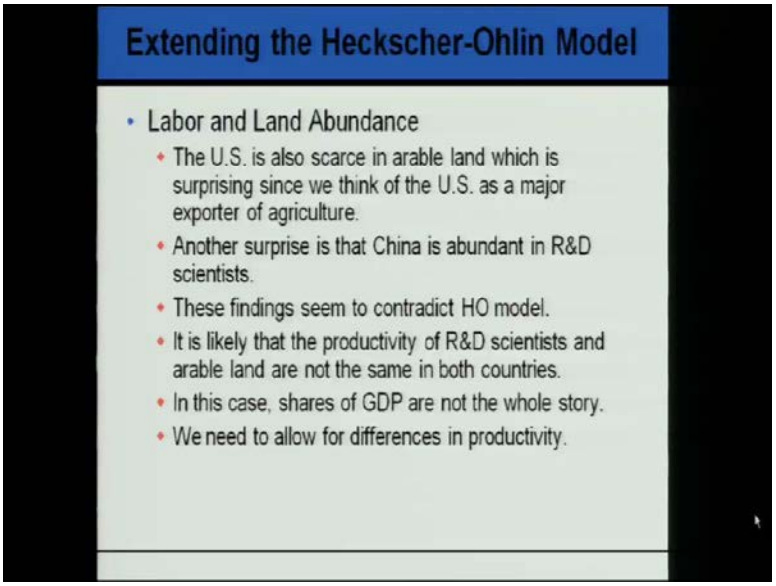

Now, U S is also scarce in arable land which is surprising since we think of U S as a major exporter of agriculture. Another surprise is that China is abundant in r and d scientists. These finding seems to contradict the Heckscher-Ohlin model. So, it is likely that productivity of r and d scientist and arable land are not the same in both countries. In this case shares of GDP are not the whole story we need to allow for differences in productivity .

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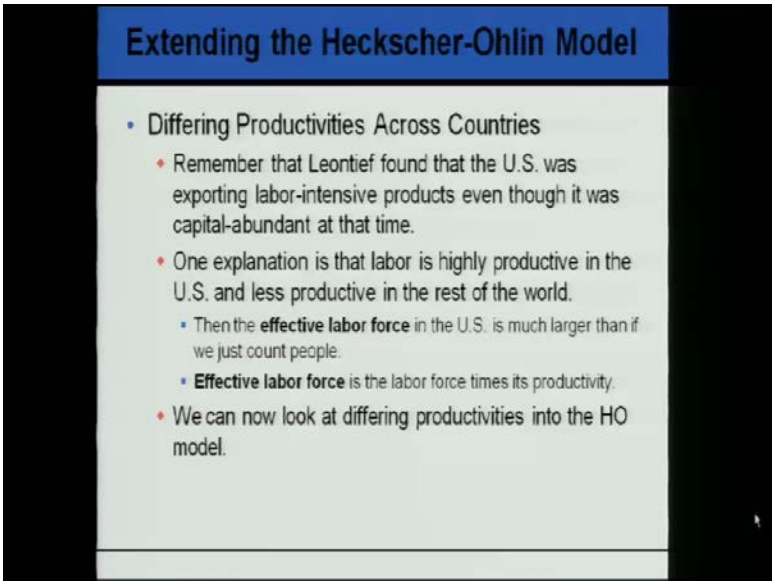


Now, how do you take into account these different productivities? You need to work out the effective labor force which is the labor force multiplied by its productivity. We need to work out the effective r and d scientists and to work out the effective r and d scientist we need to work out the r and d spending undertaken by each scientist multiplied by the total r and d scientists.

So, the effective r and d spending is the total r and d spending which is done and then you have to get the total r and d spending of the world and then this would give you the effective share.

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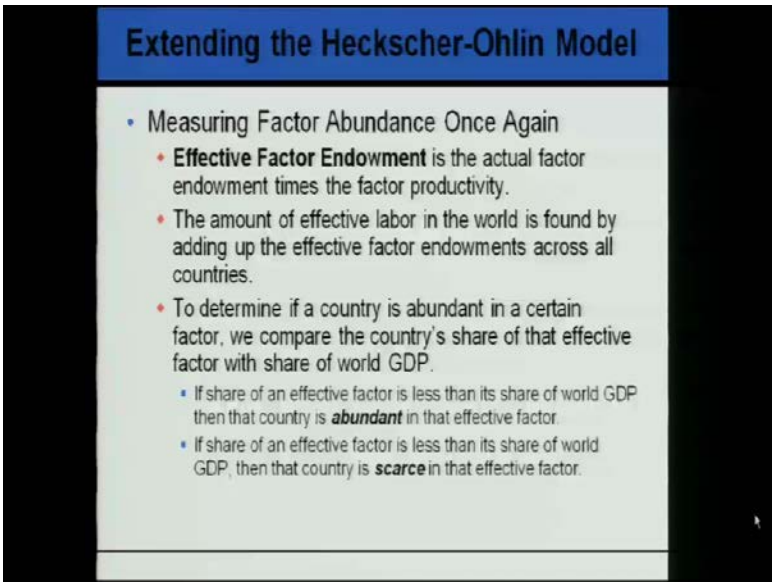


So, effective factor endowment is the actual factor endowment times the factor productivity. The amount of effective labor in the world is found by adding up the effective factor endowment across all countries to determine if a country is abundant in a certain factor, we compare the country share of that effective factor with the share of world GDP.

So, if this share of effective factor is greater than some correction is not less its more than its share of world GDP then the country is abundant in that effective factor, if the share of effective factor is less than its share of world GDP then the country is scarce in that effective factor.

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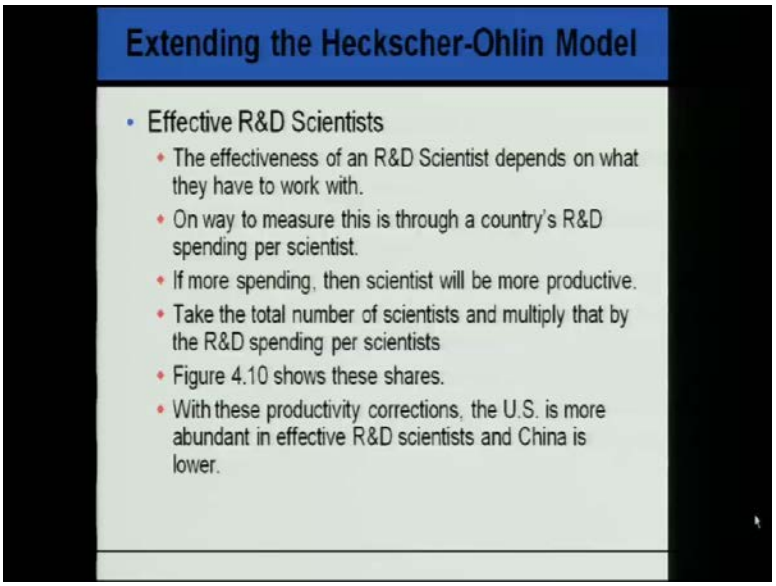


Now, effective r and d scientist. The effectiveness of an r and d scientist depends on what they have to work with, how many laboratories they have, how many equipments they have. So, one way to measure this is through a countries r and d spending per scientists. So, this is the productivity measure if more spending then scientist will be more productive, take the total number of scientists and multiply that by the r and d spending per scientist. This will give you the effective r and d scientist. With these productivity corrections the U S is more abundant in effective r and d scientist and China is lower.

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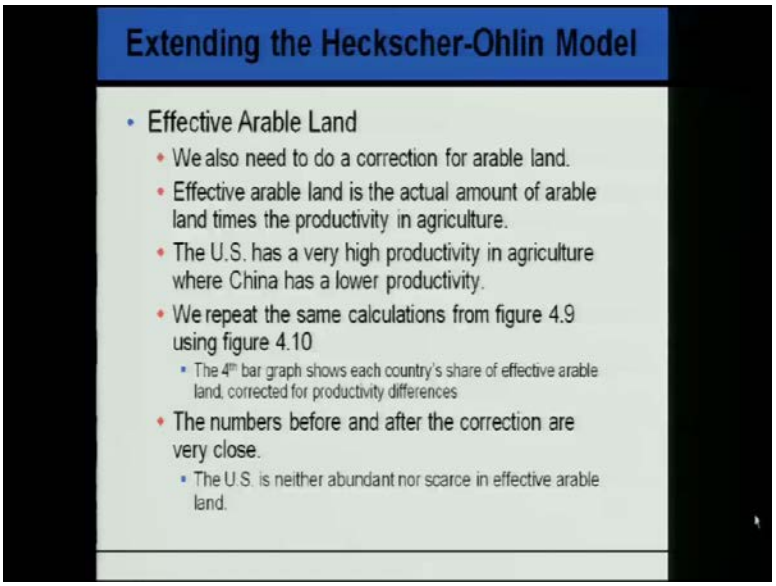

Now, the same set of arguments you can put for India and the United Kingdom. Everyone thought that a from 18 to 19 century everyone thought that India is rich in labor it would export cotton textile and import say raw cotton from outside, but to the contrary what happened was India was exporting raw cotton and importing cotton textiles from the United Kingdom.

Now, if you have to take into account this you have to work out the effective labor which is labor multiplied by its productivity which was lower for India and you have to work out the effective labor for United Kingdom which was labor into its productivity. So, that is the reason that India despite being rich in labor, it was unskilled labor. It was not able to export cotton textiles, it was exporting raw cotton. So, India was rich in say land, but scarce in effective labor because United Kingdom then took it over, it was effective in labor.

So, this is the extended by extending the Heckscher-Ohlin model we can work out the effective factor endowments and you can see the number of scientists for China, it works out to be 14.1 and its GDP share is 11.2 that is number of scientists, but if you look at the effective scientists its works out to be 7 percent and its GDP share to be 11.2 percent. And if you look at the effective arable land for U S it works out to be 20.7 and its GDP share is equal to 21.6. So, it is more or less same. You cannot say that U S is land rich or its land scarce it is more or less equal, but for China that is true that it's effective scientists are less than its GDP share. So, it is China is scarce in effective scientists.

So, this way we can talk of the Heckscher-Ohlin model, the modified Heckscher-Ohlin model which takes into account which can explain the empirical facts of international trade and second it can take into account the differences in technology across countries. So, the Heckscher-Ohlin vanek model takes into account the empirical facts of international trade and then the modified Heckscher-Ohlin-vanek model can take into account differences in technology. In this way the HO model is modified and it can explain the empirical facts of international trade.

So, this is where I would end. Next time when we meet we will talk more about the Heckscher-Ohlin-vanek model and how HOV model was used by Leamer to question the methodology used by professor Leontief. So, Leamer was saying that there is no question of having a paradox because Professor Leontief was using the wrong methodology and

again Leamer worked on the HOV model to prove that particular thing. So, we end up here. Thank you so much.