Strategic Trade and protectionism Theories and Empirics

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Lecture – 13
H-O-S Model in Trade and Income Distribution

Welcome once again to the module NPTEL module on Strategic Trade and protectionism Theories and Empirics, where we have been landed through may various issues of international trade; especially the classical theories and already started explaining new classical theories and international trade. So, especially in the new classical you know views on international trade emphasizes the production function.

And, in this context we are supposed to recapitulate the previous lectures, as well as we are going to emphasize certain you know implications of new classical economics and their contribution to international trade to identify how the trade facilitates income and their distribution to different countries, especially for the developing countries context and India in particular. So, in this context this particular class is mean for an extension to the Heckscher Ohlin model called Heckscher Ohlin and Samuelson model, HOS model in trade in Trade and its the Income Distribution.

So, this is a you know lecture number 13, week number 3rd where we are explaining the extension of new classical model. So, without you know discussing so much, we already discussed the background of it. So, let us start with the explanation and we are supposed to recapitulate all the you know things discussed before. So, myself Dr. Pratap Chandra Mohanty faculty member of Department of Humanities and Social Sciences, IIT Roorkee. So, let us have a recapitulation in detail you know or in short not in detail for sure, in short we have already discussed comparative advantage, then we discuss HO model.

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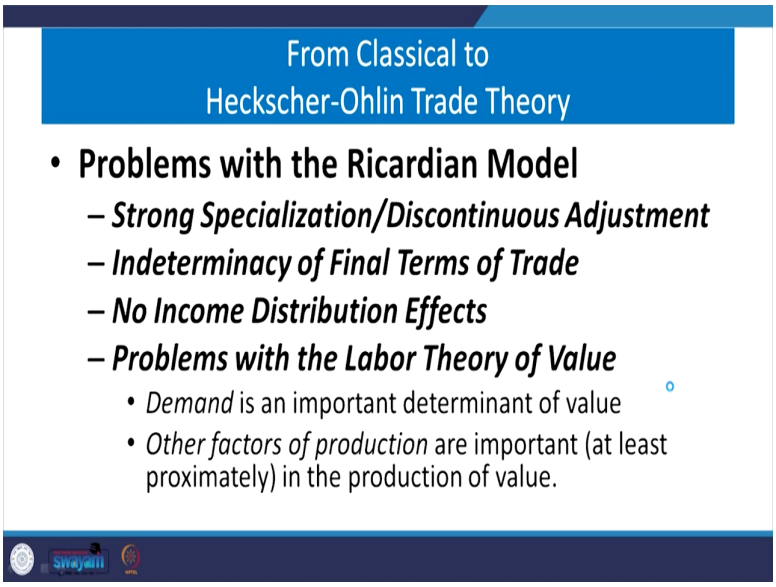

Let us understand what are the problems with the Ricardian model and why the new classical is so important and the specially the new classical and HO theory is so important. First one is the; you know new classical they only talked about strong specialization ok. So, there was basically no discontinuous adjustment in between, basically on a diagram since you know we followed or in the classical framework they follow you know a linear production possibility frontier; the corner solution was the obvious outcome.

So, therefore, you know there was case of you know corner solution and no in between solutions possible. So, they did not actually talk about any discontinuous adjustment or any you know flexible or the movement and the adjustment of specialization. Similarly, there was indeterminancy of final terms of trade, terms of trade you know there are since there is no such

adjustment. So, just the final one is actually not emphasized; so, it is purely static format as prescribed earlier, we discussed these things in detail earlier.

So, you can go play back to the slides and check those discussions I have emphasized. Similarly, no disc income distribution effects were discussed and regarding the labor theory of value, there are couple of problems; specially demand is an important determinant of value, it is not emphasized so much, only the supply side factors emphasized. Other factors of productions are also important not discussed to define the labor theory of value. And, you know most importantly the new classical framework is actually based on the increasing opportunity cost principle which says that your cost of production actually you know follows an increasing pattern, every successive unit of production requires little higher you know marginal cost of production. So, which is quite realistic therefore, we you know boil down with boil down to have the production function with you know concavity on its shape.

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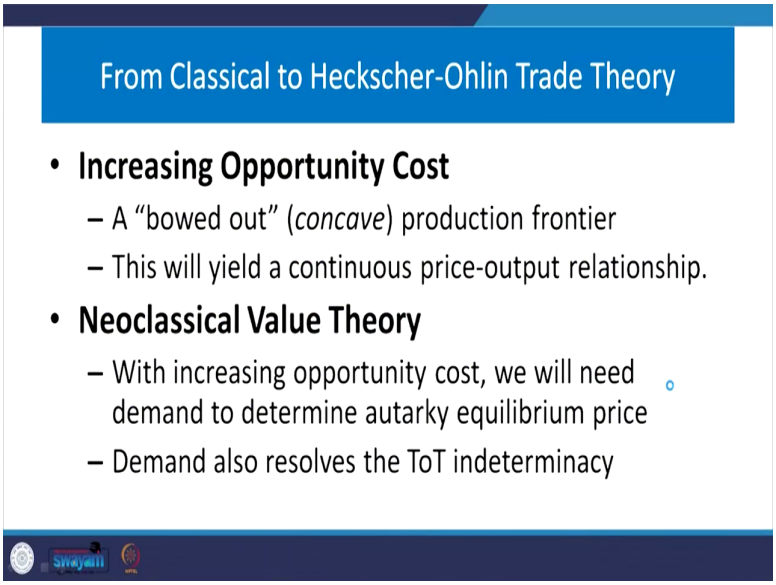

And so, they yield a continuous price output relationship because since it is non-linear there are too much of change in the pricing and output behavior so therefore, it is very important. So, new classical value of I mean value of theory is purely on you know increasing opportunity cost and demand also resolve the terms of trade terms of you know trade indeterminancy which was the problem with the classical.

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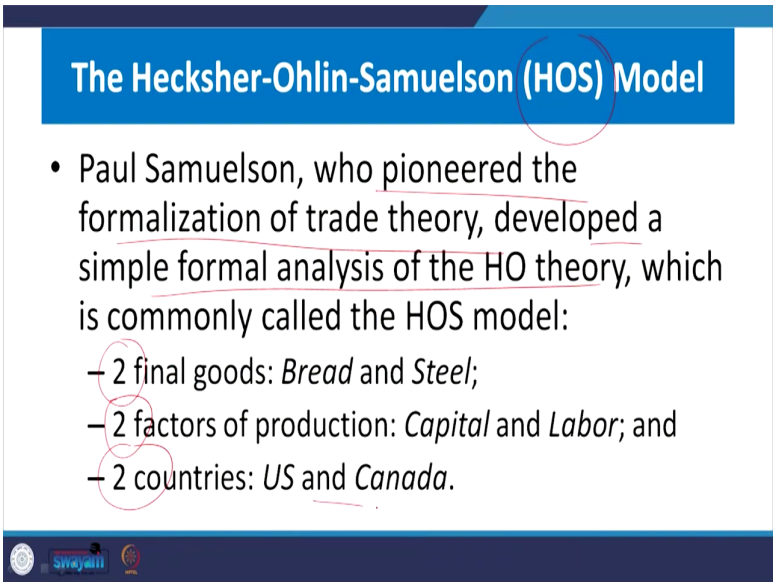

Similarly, now if you are adding to the Heckscher Ohlin model with Samuelson contributions to it its own you know basically Heckscher Ohlin model were not formalized and the coverage was not so in detail. Say for a clear formulation of the Heckscher Ohlin model and its implications to different countries are actually you know discussed in Samuelson's additions to the existing HO theory. So, therefore, this model is now, called you know I mean after that regime especially after Samuelson's it is called HOS theory.

So, it is mentioned in this heading. So, it is purely Samuelson's who pioneered the formulation of trade theory and developed a formal analysis of the HO theory which I just talked about. And, since you are referring to Samuelson here then who is there any kind of you know changes to the assumptions. Now, again 2 goods are considered, 2 factors are considered, 2 countries are considered; in this context, let us explain without for US and Canada a bit then we move to other.

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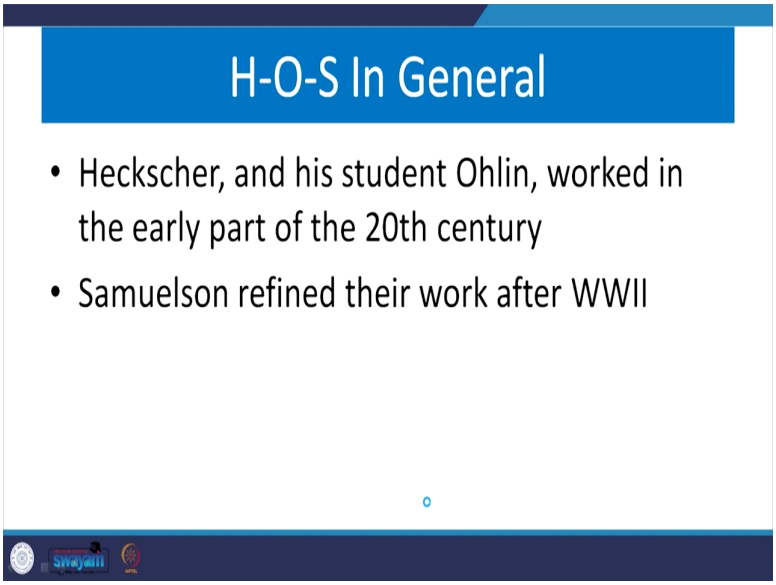

Now, Heckscher Ohlin worked here in the early part of twenty 20th century. We were referring to the 1990 1910 1915 around timing and Samuelson refined their work especially after the Second World War. And so, say you know Samuelson contribution has been or has been counted in the economic literature for international trade, since World War II. And,

closer attention is actually paid in this model to countries with variety of endowment you know or resources.

So, the assumptions to revisit for our better understanding our 2 countries, 2 communities, 2 factors for simplicity it is you know probably labor and capital and perfect computational is also assumed in all the markets.

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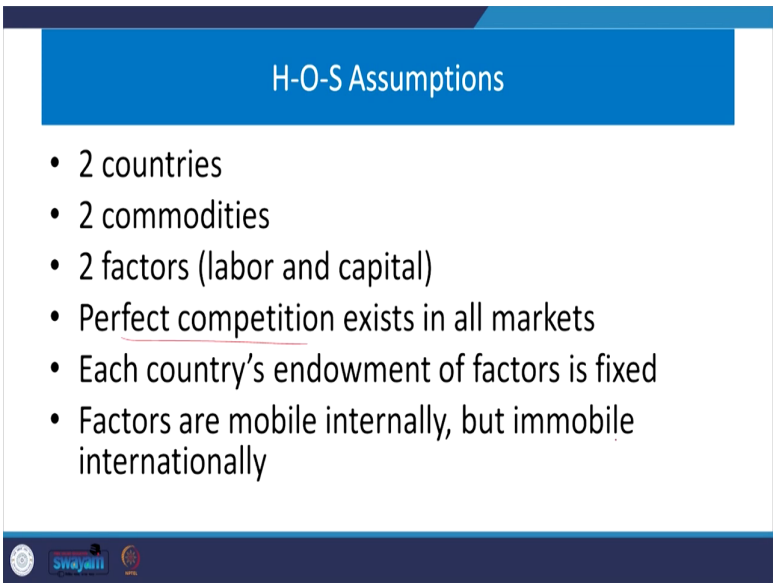

Each country's endowment of factors is fixed, its not like the case that you know the factors are changeable or the endowment is changeable which will be too difficult for the researcher to model. And, the postulation of the model is very difficult to derive out of if the endowments you know is getting changed. Now, factors are also these are the assumptions already made in Heckscher Ohlin model. Now, in the Samuelson edition also these are considered to be the same; factors are mobile internally, but not internationally.

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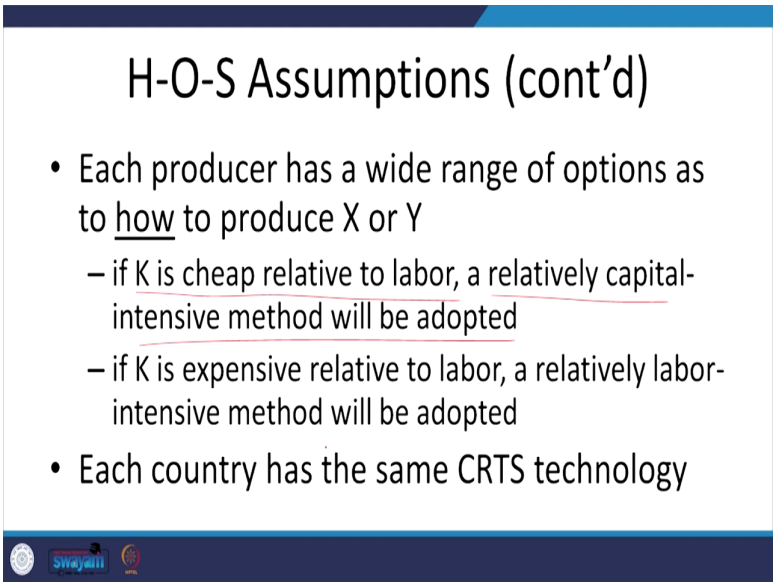

So, to count down further each producer has a wide range of options as to how to produce X and Y, this is very you know common to understand. So therefore, if K is cheap relative to labor basically now the assumption is based on American case. And, relatively capital intensive method will be adopted if K is or capital is cheaper. Similarly, the reverse is true if K is expensive you know then labor intensive technique will be adopted.

And, accordingly the assumptions are actually made in the HO theory; we said that a cheaper factor available or endowed in a particular country, the country will adopt that kind of intensive technique. And so, so the country will specialize according to the given technologies.

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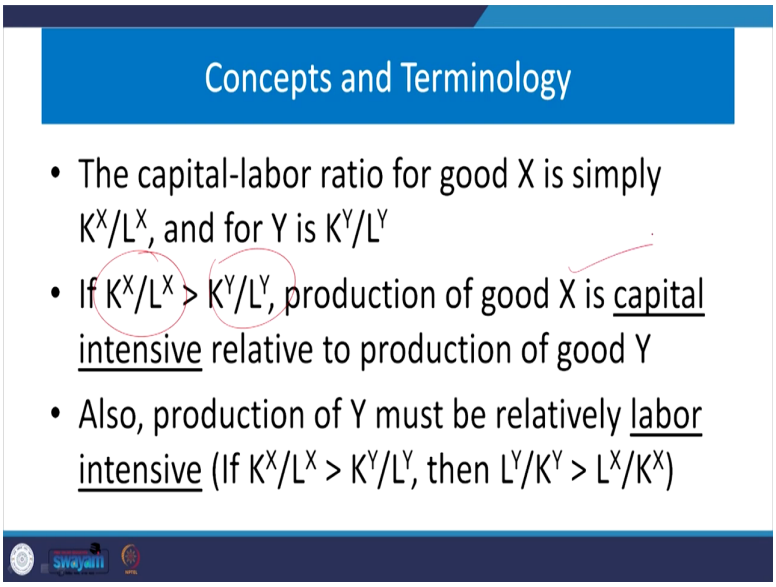

Now, some of the concept or terminology we have already discuss, but for your simplicity if K and K with respect to L for the production of commodity X is higher than that of Y, then it is simply called X is capital intensive, otherwise it is labor intensive; can be explained from these. Further concepts or terminology used are called capital abundance, abundance we mean by total availability of capital with respect to total availability of labor in a particular country; it is not specific to a product, specific to a country.

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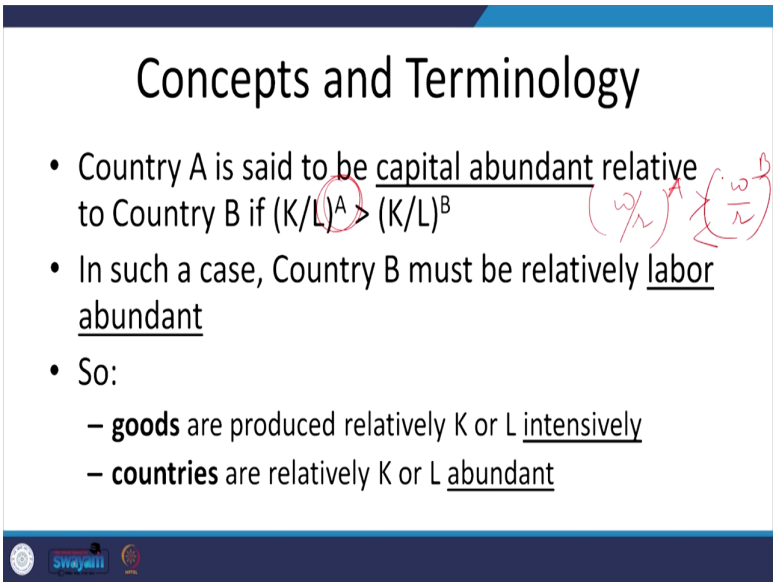

Now, also this can be you know alternatively defined as defined as prices of the factors. Maybe you know ways by rent in country A, if it is greater than or equal less then we can define it in country B, we can say it accordingly whether it is capital intensive or labor intensive. So, by availability endowment is defined through capital abundancy through you know physical capital abundancy or through prices, we did already that in the previous lecture. So, accordingly goods are defined as intensively use or abundantly available for their use.

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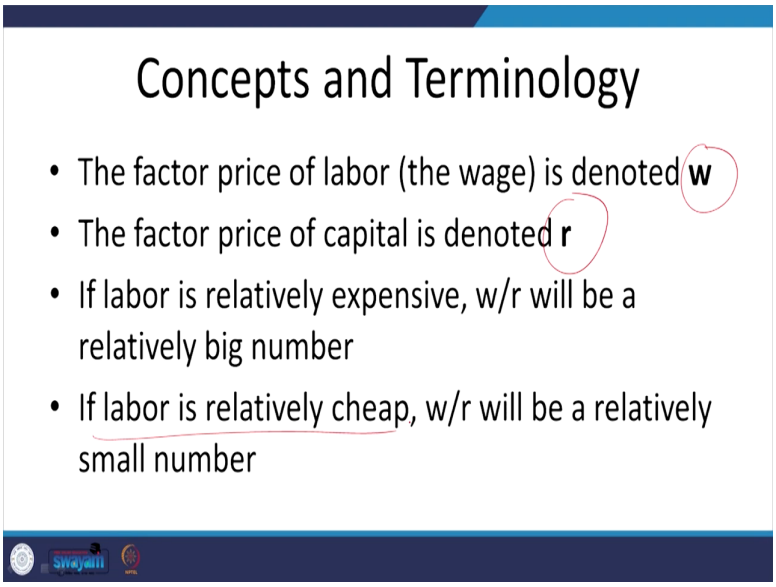

Some other can be reflected through prices as I just said maybe in terms of w, maybe in terms of their rent for other factors. And, the labor if the labor is relatively cheap then w by r will be a relatively you know small in number.

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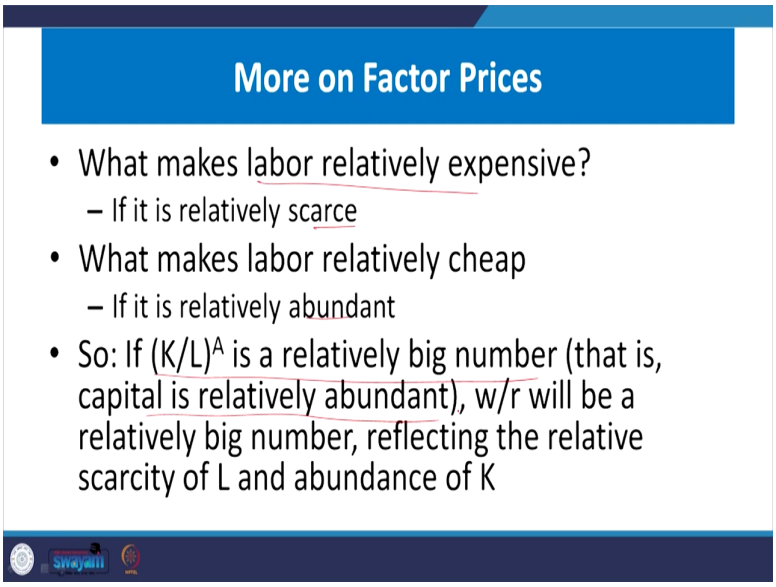

Now, there are more on you know, there are some more issues related to factor prices. So, what makes basically how to understand HOS theory? What makes labor relatively expensive? We need to understand you know carefully, if it is relatively scarce then labor might be actually defined to be expensive. It is one of the factors behind defining labor to be expensive, then similarly what makes labor relatively cheap. If then it is abundant in that particular country abundant as compared to scarce, it is very you know easy to understand.

Now, if K by a L is relatively big number that is higher or we can define it as abundant. So, w by r will be relatively you know big number reflecting the relative scarcity of you know L and in abundance of K ok. So, accordingly we can define it. So, what are the results we derived in the HO model? We said in the last class a country abundant with capital will specialize in the production related to capital and vice versa. Vice versa means, if end out with more labor and

labor is intensively used then the country will be specialized in labor intensive production exposed to another country and it an input other variety outputs for another country.

So, for US usually defined is the country poised with you know higher capital so, capital intensive products are expected. Now, relatively labor abundant country compared to you know in US, Mexico is generally defined as labor abundant country likewise India. Similarly, labor intensive products are produced; textile is one of their major varieties. Now, it is not just the product they are exporting those are reflected in the prices actually prices on the products.

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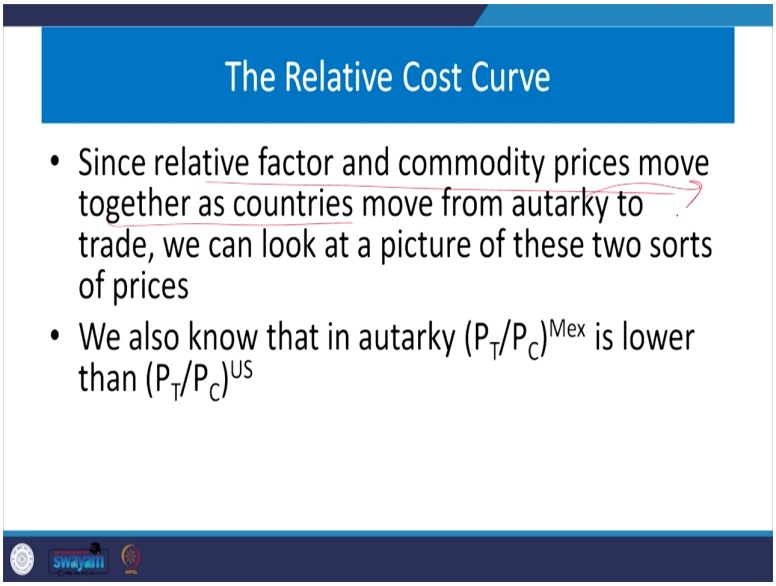

So, the relative factor I mean relative we know prices of the product that determine the movement of product from one country to another country. Since, relative factor and commodity prices move together as a as countries move from autarky to trade, I have already clarify autarky basically is a closed economy closed economy. So, we can look a picture of

these you know two sorts of prices because you know whether the factor prices are commodity prices, once really affect the deciding factor behind trade.

We also know with the fact that autarky you know in Mexico since we considered for the case of you know for the case of Mexico's specialize in labor intensive product. So, textile T stands for textile here, C stands for clothing. So, price of textile as compared to you know clothing is lower in Mexico since they are labor intensive product and then compared to US. So, Mexico will be happy to export with a specialization relative specialization in the production of textile products.

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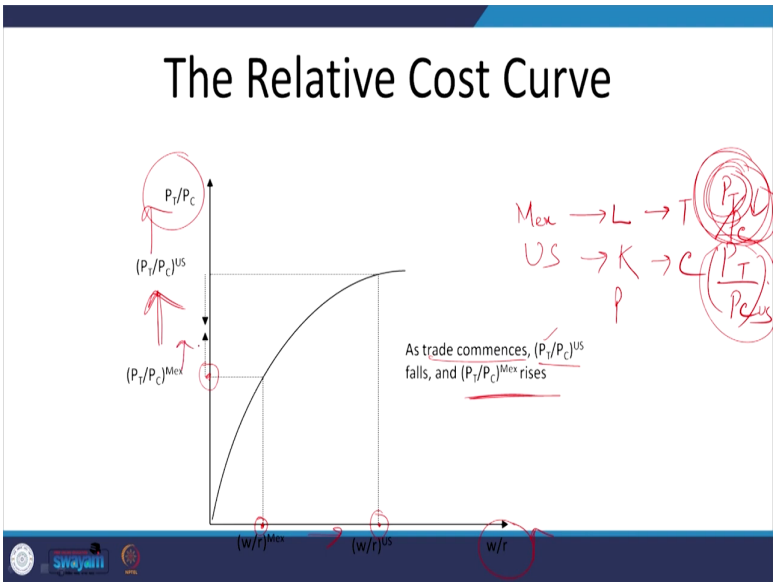

So, accordingly things are defined and let us explain this one a bit on with the help of a diagram. So, these are relative prices in the vertical axis, we defined relative prices of textile to that of clothing. And, here we are defining there you know ratio of prices of the factors that is

you know wage rate to rent and the prices of factors, now they offer sloping you know the relationship offer sloping. When the relative prices of you know ways as compared to rain increases; so, prices of these and also increases. Why did so? You know now there are two facts given.

First of all we divide into two you know locations, first here now look at mark the gap; now it is corresponding to a certain price label; higher the wage higher the wage rate is compared to you know rent as compared to the previous one in these two. So, higher the wage rate so, higher will be the prices for the textiles. So, it is obvious when these in these increases, these also increases so, they are positively related. Now, as trade commences when trade starts we do expect that when the; you know do expect that price of textile is going to fall and you know whereas, I mean especially in one country it falls in another country it rises.

Why is it so? Initially we said max in Mexico, Mexico has higher or labor intensive, it is more labor intensive for the textile products. So, usually what happens the since Mexico specialized on textile so, relative prices of textiles would be less in Mexico. So, price of textile as compared to price of clothing should be less in Mexico. So, after trade what really happens demand for textile will rise due to the you know US due to US demand. So, US is more capital intensive and they produce more cloth varieties. So, price of textile is compared to P P C in US is higher than that of is higher then that of in Mexico.

So, due to trade you know the prices whatever in US that will be reduced because, they are getting better supply from Mexico. And, the price which was used to be lesser in Mexico now, due to higher demand price of P T will start rise. Now, this one we will start rise initially this will rise and it will reach to it to that level to a certain level, where it gets equated with equated with the price ratio in US ok. So therefore, as trade commences P T of US; since it is to be higher in US so it will reduce. For US it will it will reduce, for Mexico it will rise and for Mexico it rises ok; I think this is pretty clear.

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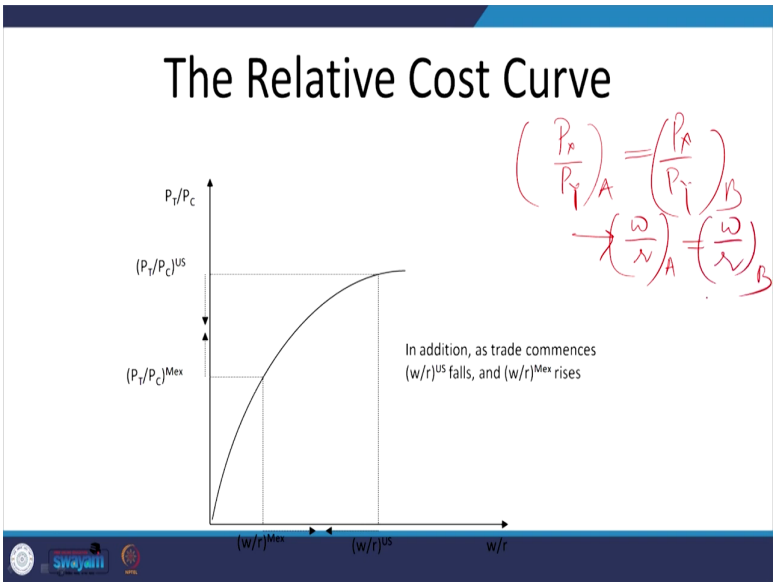

Now, what really happens? It will rise to some extent where the ratio gets equalized with the their factor prices. And, why is it so? Because, you know if it keeps on raising till its US prices then probably US is not going to receive the product from Mexico. So, there must be a midway on between in between which is actually going to be demanded by US and therefore, there will be international equalization of prices. Now, this I have already presented the convergence issues in the last class, how the you know prices of you know US and or prices of one country with another country will converge.

So therefore, I mean basically we said earlier in the last class let me point it out again, price of one I mean price of X with respect to price of Y should be converged in country A; should be converged to price of X in place of Y with country B. So, this is what we discuss, when this

converges this also equated the ratio of their factor prices in country A with ratio of factor prices in country B.

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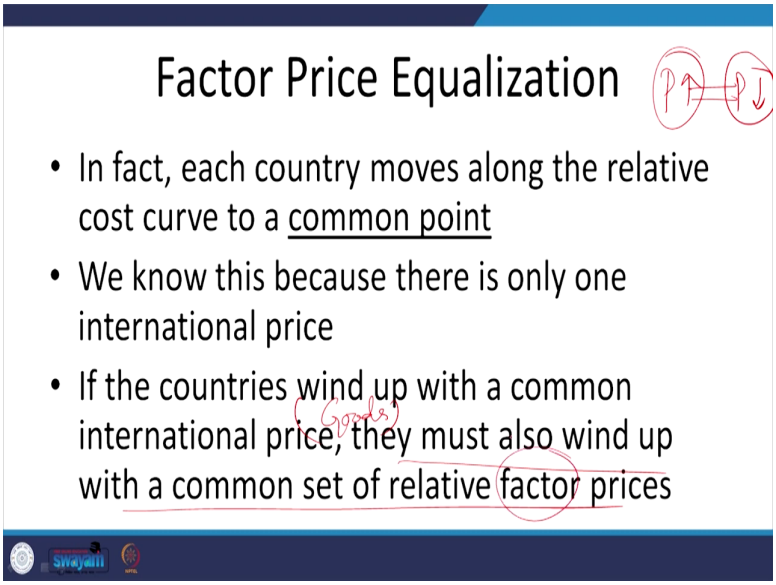

So therefore, we define this as factor price equalization. Why is it so again? Whichever the factors are relatively you know less expensive in one country or in that abundant country, that due to trade demand externally for their product that that lead to higher demand for their product and higher you know prices for their product. When there is you know higher demand, higher prices of the product their factor resources or the factor resources which are engaged for the production of these are also demanded in higher percentage.

So, they are the factor price is also rises, but these rise will not be you know infinite. This will be to a limited context where you know in one context price of one price increases, in another country it falls. Because, in another country that prices are actually higher, in one country

prices are higher in another country it is lower. So, therefore, there will be possible to equalization due to trade. So, let us read you know those factor price equalization as the result of HOS theory which says that each country moves along the relative cost curve to a common point.

And, we know that because there is only one international price so and one internal price of the product; so, factor prices are also expected to be equalized. If the country is wind up with a common international price, they must also wind up with a common relative factor prices. So, price here would remain goods, price here remain factors. So, since common prices are possible so, common factor prices are also possible; so, this is what is explained here.

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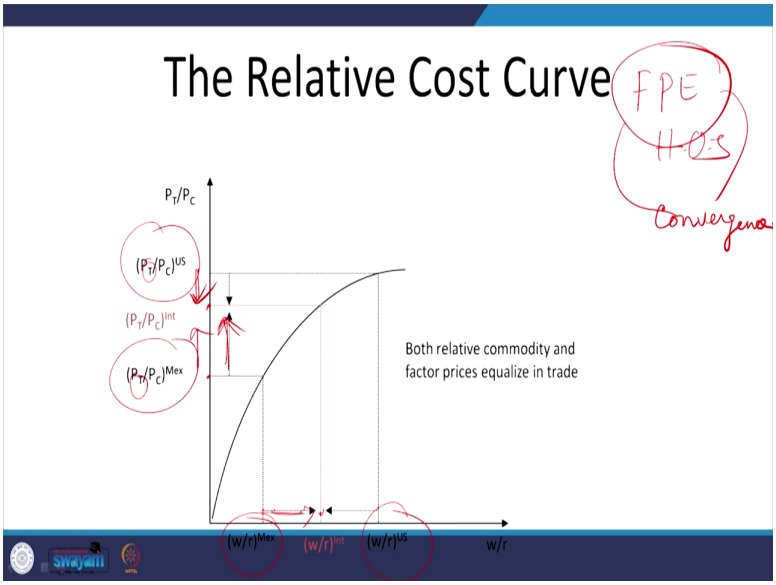

So, here we are taking you know wage rate as a relative price to that of rent; in US it is here it is US here, it is Mexico ok. So, usually what happens the relative prices in you know wage

rate is lower in Mexico where it is higher in higher in US. So now, since you know demand for so, accordingly the prices of textile is lower as compared to clothing in Mexico.

So, due to demand this will rise, this will lead to increase in needs wage rate. And, similarly when these increases now whatever the price is earlier was in US, now they receive at a lower price from Mexico. So, they will be incentivized to purchase from at a lower price from Mexico. So, their relative price is actually declines, here it increases for Mexico whereas, for US it decreases.

So, therefore, there is a possibility of single price which were said, similarly on the horizontal axis; there are possibility of convergence. So, this diagram you know factor price equalization, diagram factor price equalization diagram as a result of you know HOS theory Heckscher Ohlin Samuelson theory boils down to the fact that there are strong possibility of convergence, convergence. And, convergence means in terms of prices and in terms of the factor prices.

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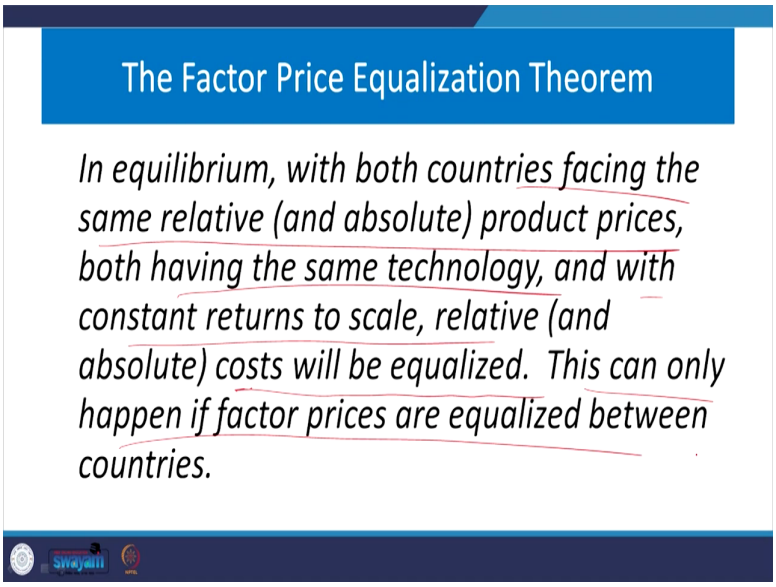

So, now in equilibrium both countries facing the same relative product prices having the same technology because, these are assumed and with constant returns to scale is the production function we assumed earlier and relative you know cost will be equalized. This can only happen if factor prices are also equalized between the countries this is what we have already said. So, HO theory has an implication for distribution of income.

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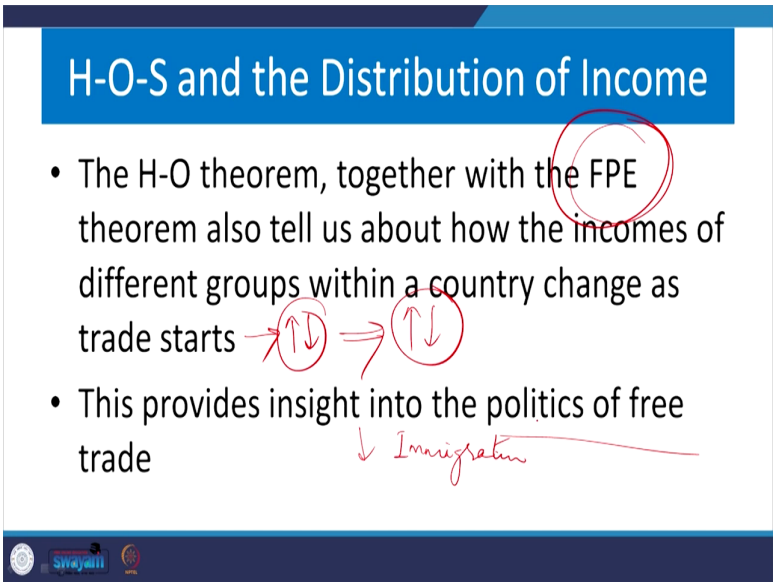

So, HO theory along with you know the factor price equalization theorem tells us about the income of different countries or the groups within a country change a trade starts, within a country change a trade you know starts. And, then the which means here we try to say that within a country there are ups and downs, across the countries also there are ups and downs that will need to convergence. This provides insight into the politics of free trade. What do you mean by politics here? Because, you know the pre the, you know factor price equalization lead to prices equalize across the country.

If there are any kind of imbalances between the prices of the factors, there will be high expectation of movement of factors. So, why politics? Now, the country might politicize their they may restrict other factors to enter to their country; like stricter immigration policies, immigration policies are implemented by some of the countries, not to enter. If they enter then

you know not just the product prices are getting different, other country might tap the benefit in terms of factor prices.

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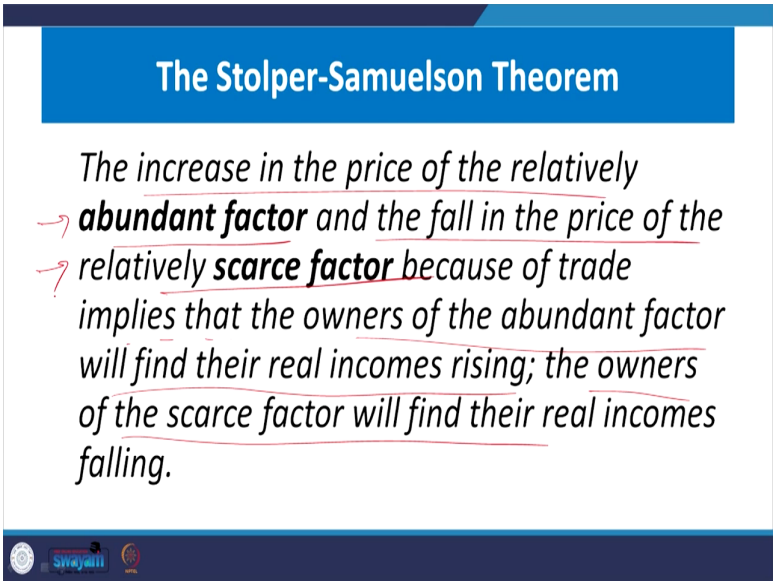

Now, in short again Stolper-Samuelson theory says that the increase in the price of the relatively abundant factor and the fall in the prices of this scarce factor because of trading trade imply that the owners of the abundant factor will find real incomes rising and the owners of this scarce factor will find the real incomes falling. So, basically here the comparison between abundant factor and scarce factor.

The factors which are you know boils with huge and abundancy within the country and factors which are abundant by structure within the country, the country will certainly you know get higher prices for their abundant product and higher return to their factors. Similarly, this

scarce factor will get you know relatively lower return because; they already used to get higher prices. Now, what you know other statements are there?

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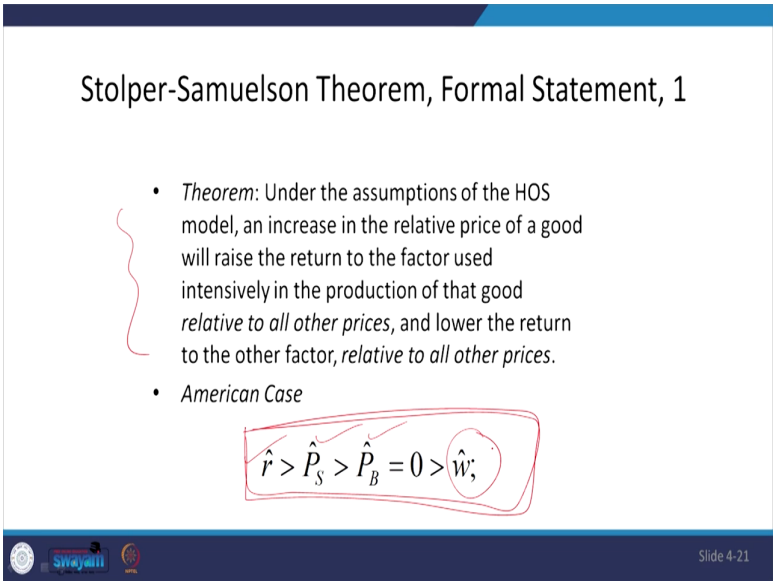

Now, insert here you can read in between these lines can be written as a part of the theorem, we can explain it like this. Since, US used to be you know labor capital X capital abundant; so, what happens that you know expected rent; rent is greater than that of the prices. And the so, prices now this will be equalized with the w, now these change were there this can be reversed. So, we wanted to mean that you know if these are who they are as per the product prices so, this can be actually reversed; as a notation I have already said.

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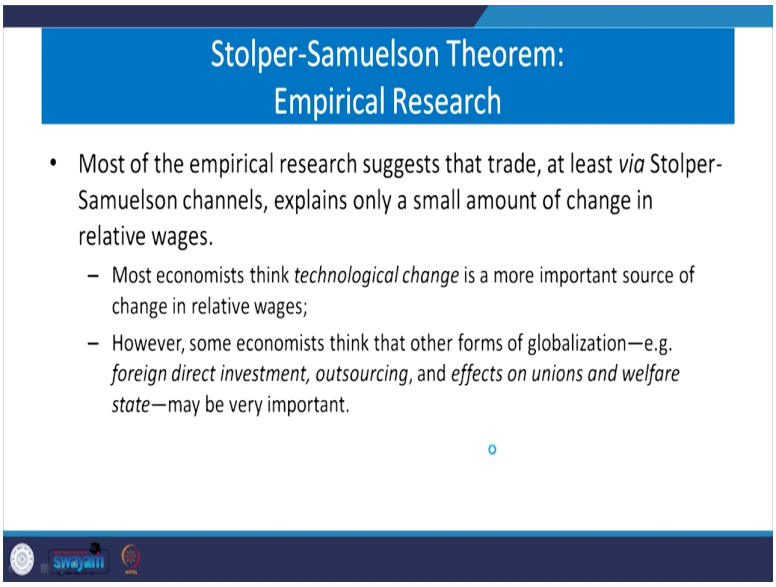

Now, there are a number of empirical research made, most of the empirical research actually you know suggests that at least through you know Stolper-Samuelson model you know a small amount of change in the relative wages can be expected. So, it is very important for the developing countries to think about and they use to receive must benefit due to these channels. So, most economists think that technological change is more important source of change in the relative wage.

Because, you know the technological change has actually undermine the huge demand for you know labor especially for the developing countries particularly in India, where labor supply is you know much higher. And, in US labors labor is very expensive, since the technology or the automation or even the platform economy has already achieved in different sectors in US so, they demand very less units of labor. So, over the time it has it has lots of implications for fall

in the relative wages and the labor demand has been falling. So, this is a bigger concern for developing countries, where the countries are you know populated.

Now, second aspect is some economists also think that you know other forms of globalization like foreign direct investment, outsourcing, effects of on unions and welfare state may be also very important because you know, if you do not have other channels it might be problematic due to high extent of automation. So, now could the question arises here it is so far we have discussed factor price equalization by HOS model or a Heckscher Ohlin and Samuelson model. Now, our duty is to also talk about some other you know extension to this HOS factor price equalization, where some of the factors are actually fixed in nature; like land is very fixed, it is not at all mobile.

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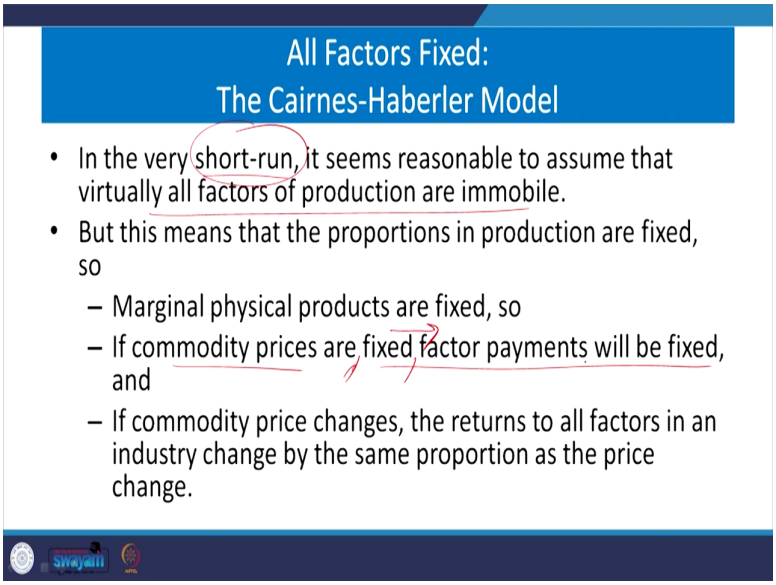

So, economics like Haberler, kens Cairnes and Haberler studied very carefully on the factors, but their approach is for the short run. It seems reasonably to assume that virtually all factors of production are immobile. So, especially in the short run their approach is for the short run. So, far we only talked about the long run phenomena what is going to happen overally. But, these economists are very important to refer only because, they studied for this purely for the short run. They assume that all the factors are actually immobile in the short run.

So therefore, what could be the impact? Impact to those factors which are quite immobile, especially in the short run. This means that the proportion of the you know productions are fixed, the marginal products are fixed since they are they are proportional fixed. If commodity prices are fixed you know if commodity prices are fixed factor payments will be also fixed, if commodity prices are fixed; so, this means fixed factor payments will also be fixed. If commodity fact you know prices are fixed, factor payment will also be fixed ok. So, basically here we mean the payments for the factors are also fixed. We are now saying you know the factors payment due to international trade, due to you know HOS model payments will vary and that will equalize.

But, actually in reality especially in the short run they are they are not changing. So, if commodity prices price change changes, the returns to all factors in an industry changed by the same proportion as the price change. So, basically if commodity prices change, it will also change to the industry as an equal proportion. So, the concern here is you know if factors are fixed, then it will be too difficult to define and HOS model may not be fully applied.

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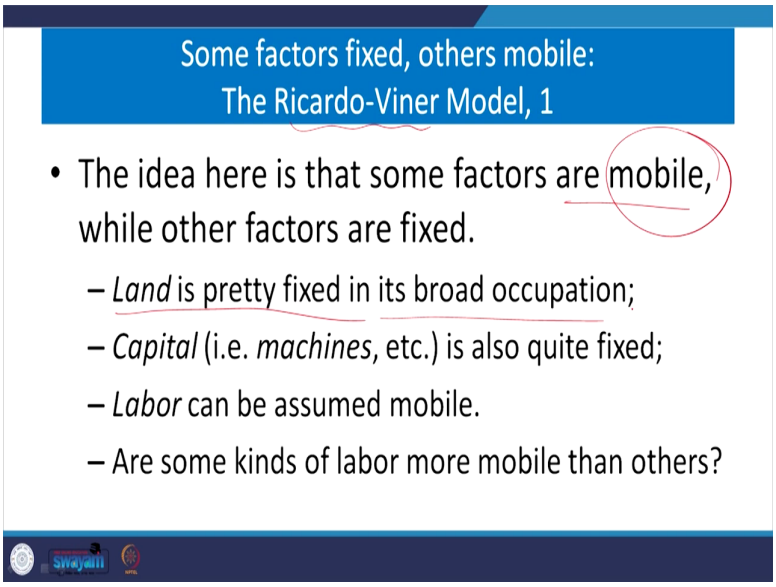

Now, another model by Ricardo and Viner as an extension to the HOS model. They studied for some other factors like you know the idea here is that some factors are mobile, by structure they study some factors are mobile while other factors are fixed. So, they categorize clearly on the median term that you know all the factors are actually some factors by structure are mobile and others are fixed. So, land for example, pretty fixed in its broad occupation, capital is also quite fixed.

Especially in the short run they are fixed, but capital such as machines are fixed whereas, labour are assumed to be mobile and they are actually mobile. So, all some are some kinds of labour which are mobile then other, not necessarily all fact all kind of laborer are mobile. Some other you know variety like techies they you know procure knowledge, they cannot just be mobile you know immediately. They cannot just solve immediately, they have to take time.

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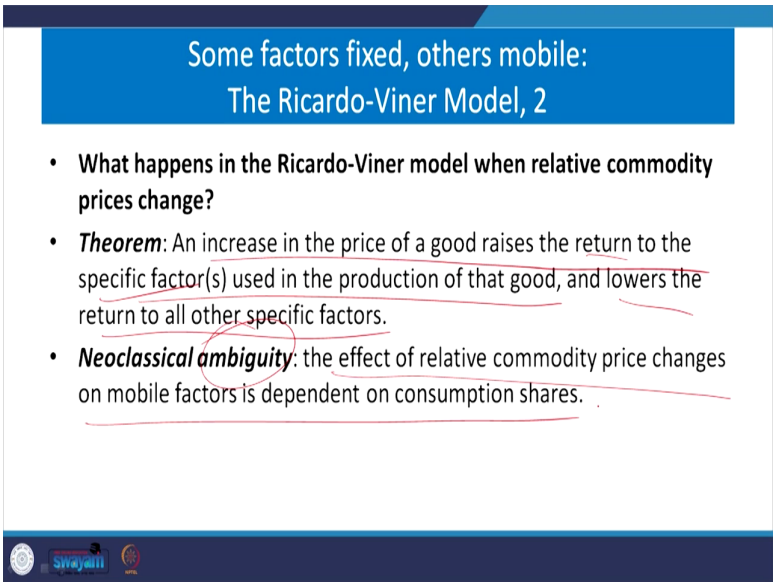

Now, what happens in the Ricardo-Viner model when relative commodity prices change? So, it says that you know returns to the specific factor used in the production of the good, lowers the returns to the other specific factors. It says that an increase in the price of good right is the return to the specific factor. The specific factor the returns will be good; because they are very specific and their contribution and their demand is actually you know increases. So, they will be getting and lowers the returns to all other specific factors.

But, those who are mobile you know we do not know if they already got their movement to another country; so, their impact are ambiguous. The effect of relative commodity prices changes on mobile factor is dependent on consumption shares. So, those are fixed we can easily understand that they are now they are being demanded, but those are mobile we do not know what is going to happen with them.

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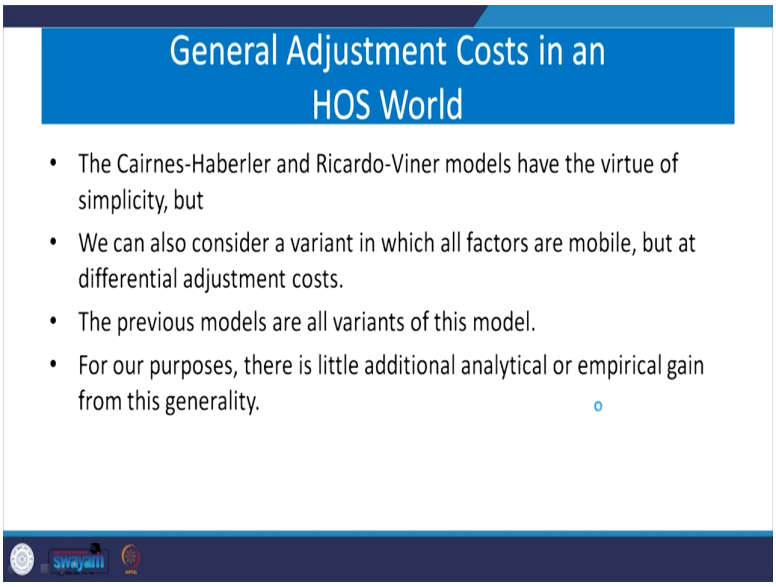

So, therefore, it is ambiguous. So, similarly there are some one or other adjustment in the world and there are number of other empirical testing made.

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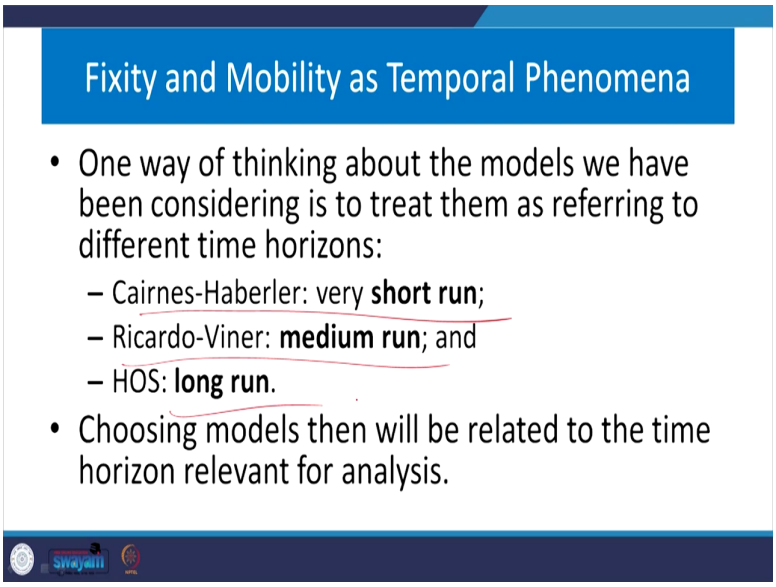

So, made let me put it in simple term here of the previous slide: Cairnes-Haberler talked about short run which I said, Ricardo-Viner in the medium term, but is long run we can easily categorize which are mobile and which are fixed. So, according impact can be defined.

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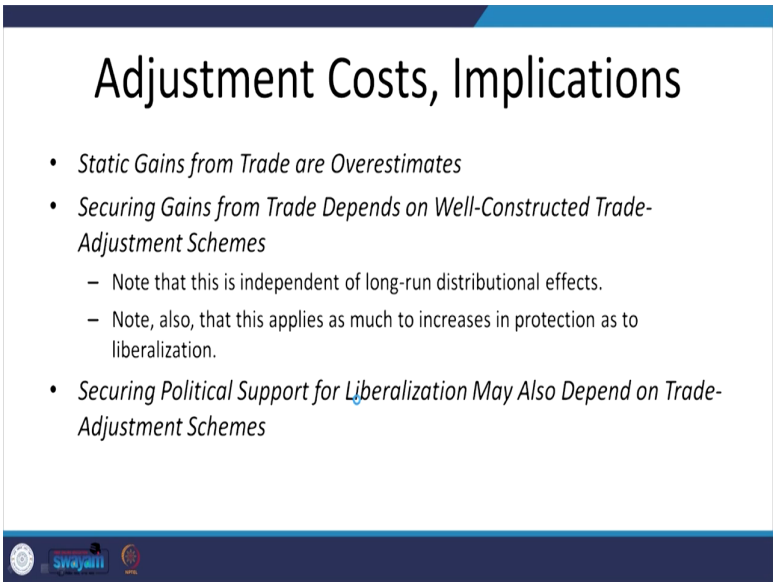

So, so, you know static gains from trades are over are overestimated sometime. And, we need to think about also politically on their implication in different countries.

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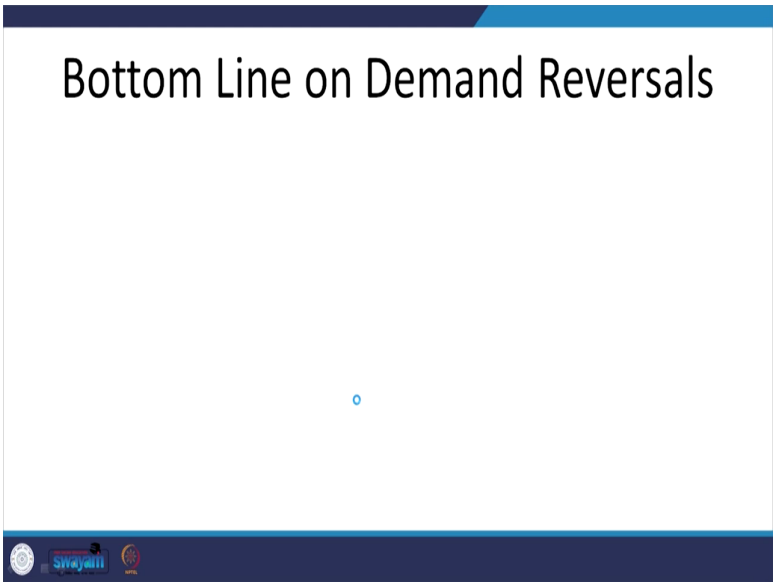

So, bottom line here for these particular theory is to the fact that you know if the factors are actually reversal in nature, like you know one factory labor abundant in one you know particular industry. And, if that gets reversed then the HOS theory is not applied. We will take it forward these things in the next class; this factor intensity reversal will be discussed in detail in the next class. And, we will continue from here basically the comparing HOS and Stolper-Samuelson in detail from the next class. With this let me stop here.

Thank you.