Strategic Trade and protectionism Theories and Empirics

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Lecture – 21
Partial Equilibrium Analysis of Trade

Hi guys, welcome once again to this trade module of NPTEL specifically on Strategies of Trade and protectionism Theories and Empirics. We are now on our 5th week 1st lecture, and this lecture number is 21st where we are emphasizing little bit away from the exit strategies to identify the you know kind of equilibrium while dealing with. It is a pure theoretical approach.

But, still important for the understanding of international trade theories, because whatever we have dealt so far not necessarily you know right or might be capturing you know some part of our understanding. So, therefore, you know a holistic understanding of the you know the mapping we are trying to derive is actually going to be good for our understanding of trade theories in a better way.

So, this week is mean for understanding equilibrium analysis of trade; though we have discussed many theories so far. So, the title of this lecture is therefore, kept is Partial Equilibrium Analysis of Trade. I think, we have read a bit on partial economic analysis earlier in microeconomic theory and microeconomic theory largely you know addresses the partial equilibrium aspects.

So, myself Dr. Pratap Chandra Mohanty, presently a faculty member at the Department of Humanities and social Science IIT Roorkee. I am in the discipline of economics and you know already explained this moduled in many forum. So, therefore, I can add any kind of queries you raise to a better justified you know answer. So, therefore, guys please you know keep on noting down all your doubts all your issues in between whenever you have any queries.

I will be very happy to address in our specific you know query section there are separate question answer session also will be added to each of the module. And, at least week wise module and in one week we are supposed to add it. So, let us go into the depth of equilibrium

analysis and you know to explore bit by bit. So, try to also understand you know what are the structure, what exactly we are going to do it. So, since this is a complete structure and you may not able to read it directly let me you know help you out.

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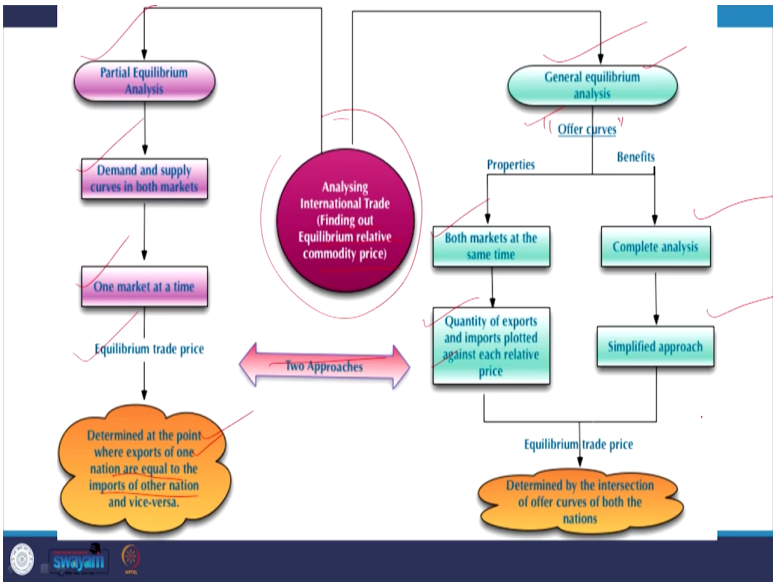

So, here we are discussing analyzing international trade finding out equilibrium relative commodity price. So, relative commodity prices there are two approaches broadly here we are discussing two approaches. One is here, this side is partial equilibrium, this side is general equilibrium.

And within partial what comes within general what really comes within partial analysis, we are emphasizing demand and supply curves in both the markets for the market stands for both the countries. And you know one market at a time, we are explaining one market and its price

equilibrium price and equilibrium trade price who is determined at point where exports of one nations are equal to the imports of other nation and vice versa.

Where is the general equilibrium set up. We are taking the help of offer curve it is one of the important instrument to measure the equilibrium price to address the; you know reciprocal demand the you know demand of both the countries simultaneously. Now, we will address its properties what is offer curve, how it is useful specially for general equilibrium analysis?

And where we are addressing both markets at the same time but whereas, in the partial we address a single market at the same time . And so, therefore, the benefits is it is a complete analysis, but bit hypothetical I must say from the beginning largely hypothetical unless it is getting tested. And testing requires you know advanced softwares we will discuss it.

Quantity of exports and imports plotted against each relative prices where we are discussing both the markets it is a simplified approach and the equilibrium price determines intersections of offer curves, I mean equilibrium price is determined through the intersection of offer curves of both the nations are touching both the markets ok.

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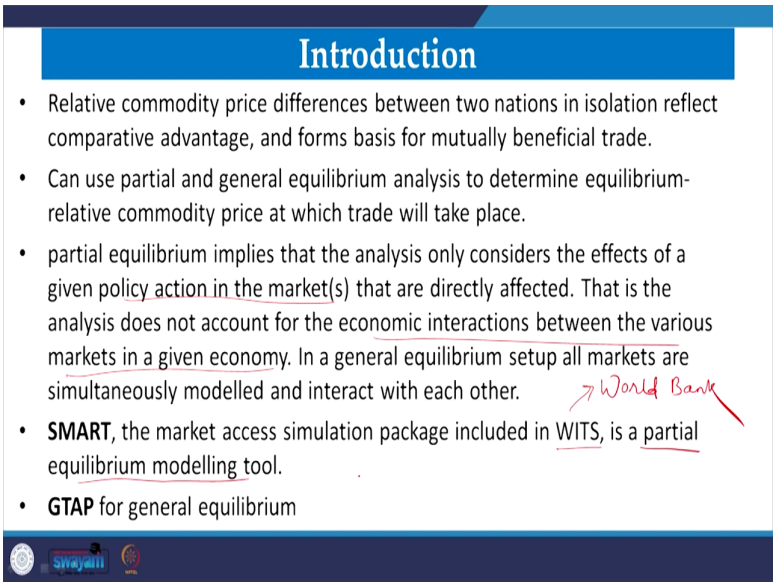

So, this is all about the capture we are going to have it in this particular lecture. Now, there is anecdote to the understanding of equilibrium analysis the context must be you know you know exploit it or explode correctly. So, what is the context? Context is you know the relative commodity prices and their differences between the 2 nations.

In isolation reflect comparative advantage and therefore, form the basis for mutually beneficial trade which we have emphasized which can use partial and general equilibrium setups and also determine relative price at which actually the trade take place between the countries. And the partial equilibrium analysis which we are implying here all about you know considering the effects of a given policy action in the market. At a specific policy action in the market that are directly affected by the policy.

And that is the analysis you know does not account for the economic interactions between the various markets in given economy. So, basically we talk about a single policy action and there will emphasize that particular assumption. So, for a partial is concerned where is the general setups like you know the equilibrium setups of other directions, other interactions, other policies, various other markets economy are not captured in the partial equilibrium.

Where is in the general equilibrium setup; all markets are simultaneously modelled and actually you know consider for interaction for a better you know relative price determination. What is important here? What is important here is the following. It you know important because of you know determining relative prices which is the basis for trade and the relative price is also the basis for terms of trade.

We will also explore the context of terms of trade in this lecture. A SMART is the market access simulation package included in the WITS database we have already discussed world intellectual trade solutions by World Bank. And this is not freely available this is a paid version and this is called a partial equilibrium modelling tool not a general equilibrium.

But whereas, a GTAP is another software a package is generally used for understanding general equilibrium you know analysis. The other general equilibrium package is also can be explored from the different sources.

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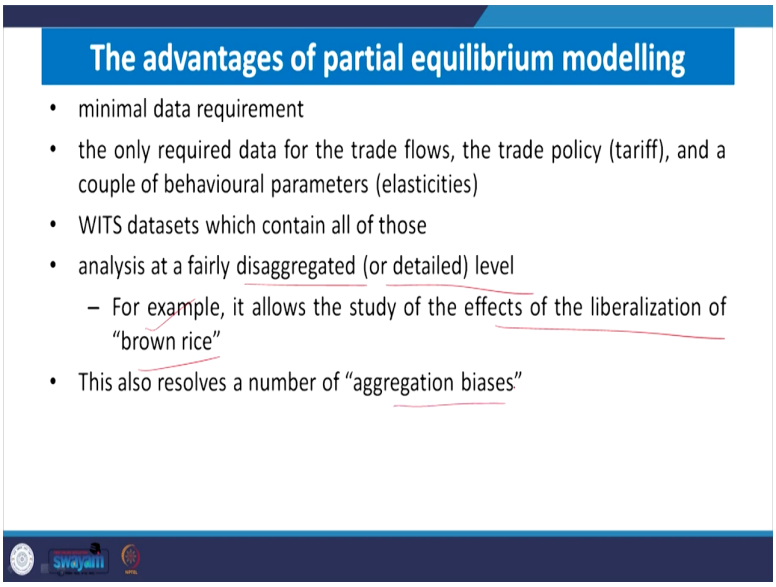

Now, then what are the advantages of partial equilibrium modeling? Now, I think so, far we have I have clarified why it is required I mean why we are analyzing these and we are specifically targeting a partial and general equilibrium analysis because of some advantages and disadvantages. So, we will attach our answer accordingly, now first of all when we have partial equilibrium modeling and deliberately chosen because of it requires minimum data.

The minimum data, but at least give certain you know suggestions for policy making and certain suggestions for you know better and systematic presentation. Now, the only required data for the trade flows and trade policy like tariffs and couple of behavioral parameters as well like, elasticity, responses, responsiveness of exports and imports and trade flows from one country to another country so therefore, it is very very essential.

As I already said WITS database you know contains all those things therefore, you know the analysis gets easier analysis a fairly disaggregated level, another important advantage here a very detailed level. Whereas, in case of general we are making it general you know considering all the variables simultaneously it gives certain you know specific directions, but not all.

Whereas, within the specific direction through disaggregated level or in the partial equilibrium set up we get a you know core analysis of the problem. Like for example, it allows the study of the liberalization of brown rice particularly whereas, effects of brown rice cannot be captured individually in the general equilibrium analysis. Because, it gets you know aggregate information may be in the rice segment. Here we are saying brown rice particularly. This also resolves a number of aggregation biases.

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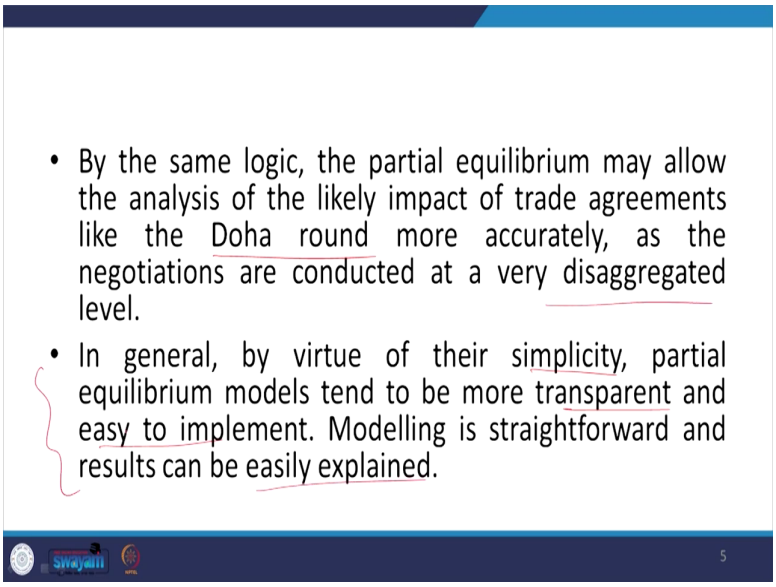

So, let us check what you mean by aggregation biases? How it gets you know capture in our partial equilibrium setup, whether partial equilibrium create segregation biases or not? To be understood carefully. Well this one we said advantage of partial equilibrium modelling.

Now, by the same logic; we can now in for that general equilibrium allow the analysis of the likely impact of trade agreements like specifically Doha round more accurately which is largely discussed Doha round is one of the round will actually talked about talk about the you know countries unionism or multilateralism, regionalism and going for trade blocs are separately dealt we have dedicated sessions for it.

We will unfold the discussion, but at this moment; the specific impact of a particular round of trade negotiation can also be identified in partial equilibrium setup since it is at the disaggregated level. In general by the virtue of the simplicity, you know we try to mention that partial equilibrium models tend to be more transparent and generally very easy to implement.

So, therefore, the modeling is quite straightforward and resulted in the explanation which are very easily explained. So, there, so many aspects simplicity, transparent, easy to implement, easily explained, disaggregate level and the single you know sentence. So, many aspects are mentioned.

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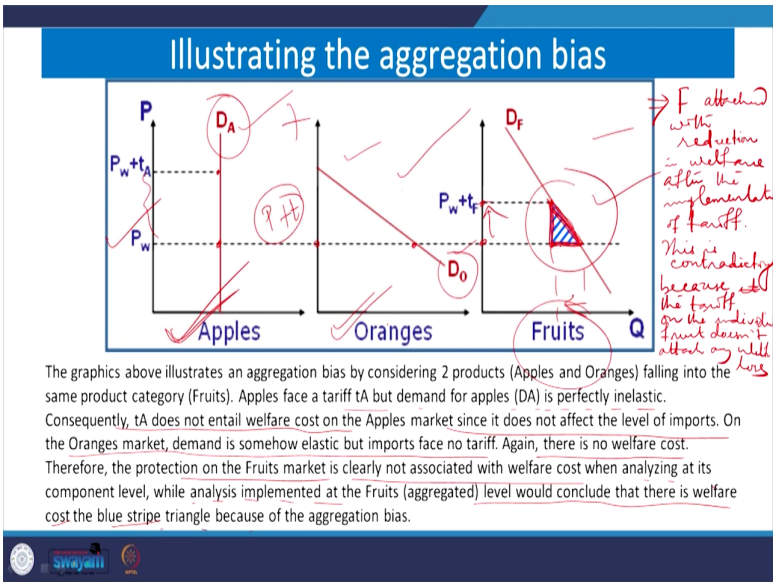

Now, let us check how things are actually explained with the partial equilibrium setup and that that leads to some kind of aggregation bias. Aggregation, if you are just forcing ourselves to make an aggregate because of an aggregation result or because of general equilibrium result through the demand and supply you know diagram or discussion I think you know the aggregation bias resulted.

Let us for example, apple market and orange market. Let us there are two you know fruits in the you know fruits market. Now for a assumption to understand the aggregation bias of the you know partial equilibrium setup. Let be the case that apple has a demand exhibited with inelastic you know nature.

Whereas, you know orange is orange is a fairly elastic demand market. Now, as we know elasticity of demand in the microeconomic analysis where you know, if it is elastic then the

responsiveness of prices are actually different accordingly where if it is inelastic you know the prices are actually responsive to the demand change in the demand of apple.

Now, based on this; when we have two separate market we have vertical demand curve for apple. Here it is explained by DA and you know inelastic demand curve you know relatively elastic demand curve or I mean if it is elastic then it is not a vertical this is you know, this is downward sloping demand curve for the orange market.

Now, let us be the fact that there is a world market for it and let us aggregate it when we aggregate both the you know market together it will be boiled down rate is you know fruits market. One is called you know inelastic another is where elastic. So, the combined will result in an error downward sloping demand curve. If we just combine it based on these two information. How to combine it then? I mean we can we know the aggregate demand how it gets calculated.

So, since it is inelastic this is relatively elastic just the addition of these two will result in a inelastic aggregate demand curve. Based on this limited information; we define this as fruit market because we assume there are only two fruits in the market. Let be the case that price, wall price is set after trade at PW and accordingly, different prices for the markets are set.

Now, if there is tariff; tariff in the individual market what it is going to happen. If tariff is there now, let me you know read it if tariff is applied in the apple market only not on the orange market. If tariff is implemented in the apple market because it is it exhibited non I mean inelastic completely inelastic demand.

Where is the orange market elastic therefore, imposing tariff is generally not suggested. Because, if tariff is imposed in the you know orange market plus t attached with this one if orange market is there then it will de incentivize the consumers to purchase oranges.

Whereas in case of apples, since it is fairly inelastic or it is you know infinitely inelastic demand completely elastic demand higher taxes will not demotivate the bias to purchase. Therefore, it is suggested to import tariff for on the apple market likewise there are lots of

example you know penicillin drugs and insulin for the diabetic patient where even, if prices increases they are not going to stop their consumption because it is too essential.

Similarly, so tariff is imposed in one market ok. So, what it happens really when tariff increases the consumption actually not demotivated in their market, but aggregate tariff aggregate total rise in the price in the agreement market by t F. Show, aggregate prices increases. So, that reduces certain extent of welfare; welfare in the fruits market.

Now, to explain these correctly let me read it, apples face a tariff t A, but the demand for apples is perfectly inelastic consequently t A does not entail welfare cost. Now, look at from here there is no change in the welfare cost since this that much of demand is still intact since it does not affect the level of imports. So, imports not reduced since it is inelastic.

Where is the orange market demand is somewhat elastic, the imports face no tariff again there is no welfare cost because, no tariffs is imports on the orange market. So, the protection on the fruit market as a whole if you just try to aggregate both the you know market protection on the fruit market is clearly not associated with welfare cost.

Because, here there is in the apple market there is no welfare cost, orange there is no taxes or tariff, there is no welfare cost in the apple market there are no welfare reduction because it is completely inelastic and the tariff is not demotivating their consumption. So, therefore, it is not reducing their welfare.

But the on the aggregate; fruits market due to tariff it is now clearly visible that it reduce welfare and this implemented at the fruits market would conclude that there is a welfare cost explained by the blue stripes or the blue triangle because of the aggregation bias. Now, what is why it is called aggravation bias?

Because, now we conclude from this analysis that fruits market, fruit markets attached with reduction in welfare. After the implementation of implementation of tariff which is, this is

contradicting this is contradicting because it the tariff individual on the individual fruits individual fruits does not attach any welfare loss.

Whereas, due to aggregation of the fruit market we have proved to the fact that; there has been loss in the welfare, consumer loss. Why this is called consumption loss? Because this is on to the demand when price increases our you know consumption falls. So, the willingness to pay I mean demand curve captures the willingness to pay.

So, now they are willing to pay less. So, the extent of utility already occupied with the low prices are actually not poised with the new choices. So, they are getting rid of the utility. So, therefore, so, the fruit markets has you know net consumer loss which is wrong to conclude. So, therefore, it is called you know aggregation bias due to partial equilibrium analysis once you are aggregating it.

Then what are the disadvantages of partial equilibrium modeling. So, since there is a loss. So, therefore, I need to emphasize it because there are many information hidden.

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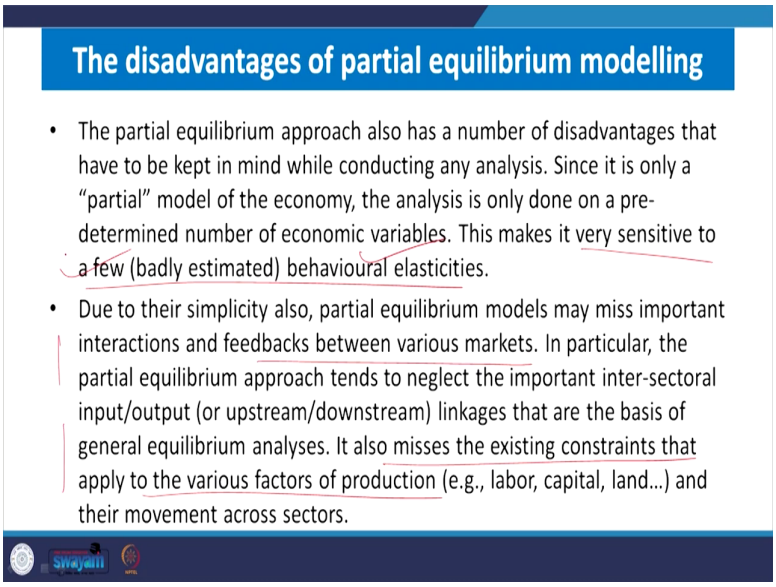

So, partial equilibrium approach also has number of disadvantages that have to be kept in our mind while you know conducting an analysis. Since it is only partial model of the economy; the analysis is only done on a free determined you know number of economic variables. This makes it very sensitive to few behavioral elasticities. So, I mean sensitivities of the elasticities are very very important, behavioral elasticities important to be taken down before aggregating.

Due to the simplicity partial equilibrium models may miss various important other variables which has large extent of interaction among the variables basically feedbacks between various markets. So, in particular partial equilibrium approach tends to neglect the important intersectionality among the variables especially upstream and downstream variables.

So, that are by a basis of general equilibrium analysis it also misses the existing constraints they are also applied to various factors of productions and their movement across the boundaries or across the sectors. So, these are also largely neglected in the you know partial equilibrium setups. Then let us understand the partial equilibrium pricing structure the relative prices we have already though taken off in one of our lecture. Earlier that time I said that will explain it categorically when we will unfold the discussion of partial equilibrium analysis.

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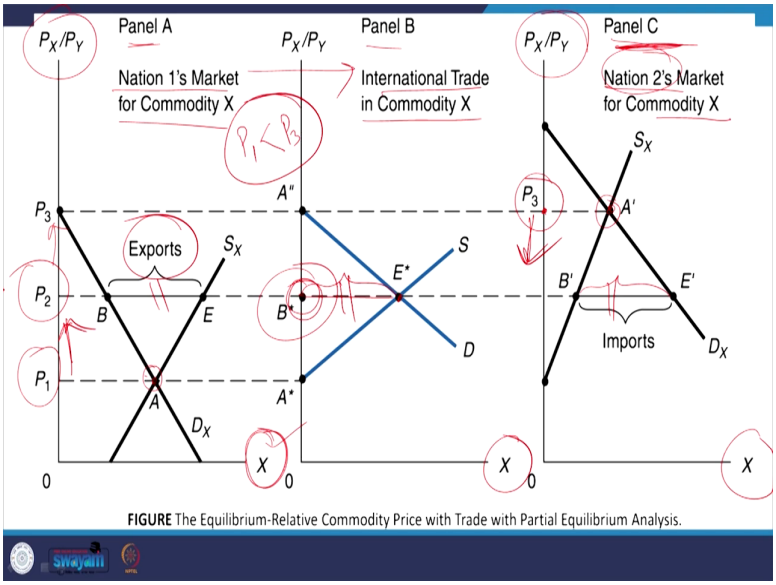

FIGURE The Equilibrium-Relative Commodity Price with Trade with Partial Equilibrium Analysis.

Now, in panel A panel B we have panel C out of all these three panels the middle panel stands for the world market or the international trade of the commodity X. Now, we are only looking at one commodity because, our approach here is sticking to the partial equilibrium setup. Now, here what is more important because you know now, we are looking at panel A, nation

1s market for commodity X panel C where we are emphasizing you know commodity X in nation 2s market.

Now, let us assume let us put our vertical axis in terms or relative prices; a relative prices of X as compared to the prices of Y in their domestic country. So, accordingly demand for X can be defined or we can also take the relative demand of X as compared to Y, but since it is partial purely let us stick to only partial equilibrium with X demand and supply.

Within the domestic country; with certain assumption, let us the equilibrium say it is at P 1. So, domestic price starts at P 1. Relatively I mean relative price of X is P 1 is against P Y where is in panel C specially for the know another country partner country in their relative price transit you know P 3.

And P 1, we know it P 1 is much lesser than that of P 3. So, far as the autarky you know situation is concerned. The autarky prices actually you know give a scope for trade, international trade. Now, the autarky situation define their relative prices.

Now, based on that now, since this is different relatively so, there be scope for trade, when there is trade what really happens you know from these we can easily infer that the relative price of X is low therefore, the country A will specialize in the production of commodity X. And return the other commodity may be imported from other country.

So, commodity X is now produced and exported to commodity I mean to another country that is country 2. Now, after trade; now there is a possibility of trade. So, after trade what will happens you know the demand for X is now rising because we are exporting there is import demand from country 2. So, demand for X actually gets higher and the demand for X gets higher. So, the country 1 will be actually expecting higher prices for it.

So, price is expected to be higher. Certainly not reaching till that extent, but it will be on the mid because of the fact that in country 2 simultaneous demand for I mean since their relative prices of X production is very high. Once they are getting you know imports from other

country, now their supply is actually getting higher and higher supply for X is getting higher and higher.

And supply exceeds relatively higher the prices for them actually reduces when price falls, one side there is a rise in other side there is a fall. So, there must be an equilibrium price that settles both the countries need for setting a relative prices. So, let us in assume that this is the place that is you know at B star equilibrium price you know settled and the exit gap is the export in country X.

And import in country 2. Country 1 it is export and import. So, therefore, the exit distance this one equal to this one should equal to this one. So, there have been no imbalance in equilibrium settled. These type of analysis is called partial, one again we are emphasizing because you are looking at one you know market at a go. Only we are sticking to X or we are sticking to I mean X or we are sticking to only one market one country you know at a go.

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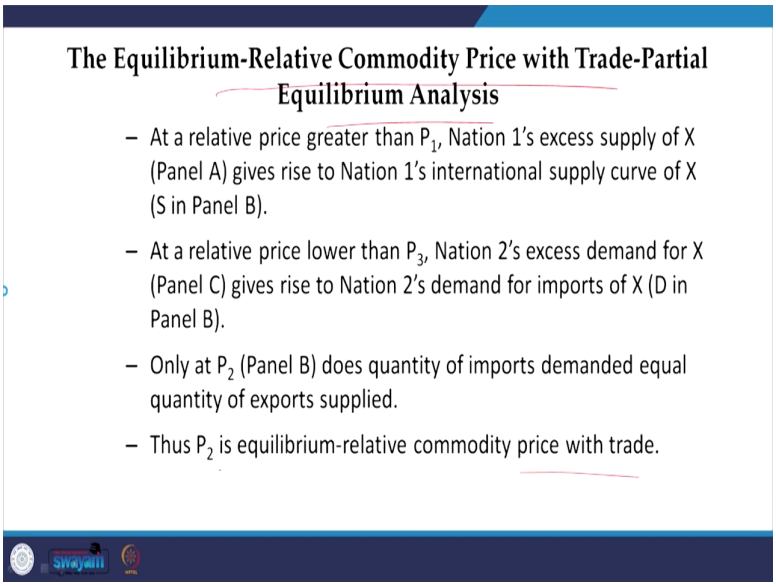

Now, these are the explanation I have already made. So, equilibrium relative commodity prices with trade and partial equilibrium setup. So, P 2 is the equilibrium price commodity with trade we have already said it and so P 2 this is the P 2 we have derived. So, equilibrium you know prices are derived based on this approach.

Now, let us move to our other segments. You know understanding how will the pressure determine, what are other approaches suggested one of the techniques for you know getting a price which is quite general in nature or called general equilibrium prices because of the fact that we have you know all the sectors and their informations are share together simultaneously.

Now, the instrument is called here called offer curve offer curve is also called reciprocal demand curve. Reciprocal demand curve because whatever we export; we have a reciprocity

of you know demand from another country. Initially introduced by Marshall Edgeworth and famously known as Edgeworth box diagram we have read in microeconomic theory.

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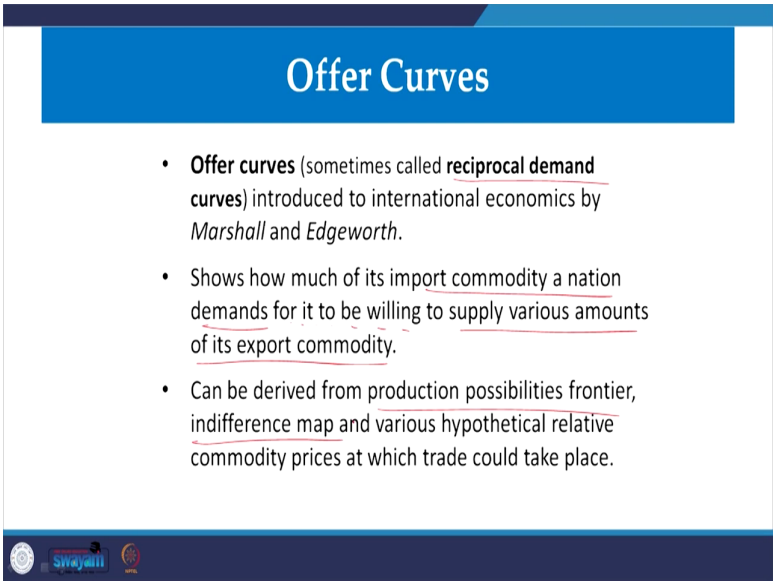

And you know, this shows how much of imports offer curve shows how much of import commodity a nation demands for it to be willing to the X supply various amounts of its export commodity. What do you mean by that? While you are importing; usually, that is called import demand. So, when are importing there must be a reciprocity attached to it, what you mean by that when we are importing we have certain conditions attached we have reciprocity to supply equivalent to the amounts we have imported. So, those are also exposed.

So, there are reciprocity attached therefore, there are general equilibrium solution is attached to it. So, these actually can be derived from production possibility frontier and indifference curve map both if you are taking together instead of just one information of commodity X

demand or Y demand individually through demand and supply that only captures partial information. Where is if you include PPF as well as IC indifference curve map.

And also including you know various hypothetical ld commodity prices at which trade could take place where actually cover a holistic approach of understanding you know relative prices. Now, here it is presented in detail with two diagrams.

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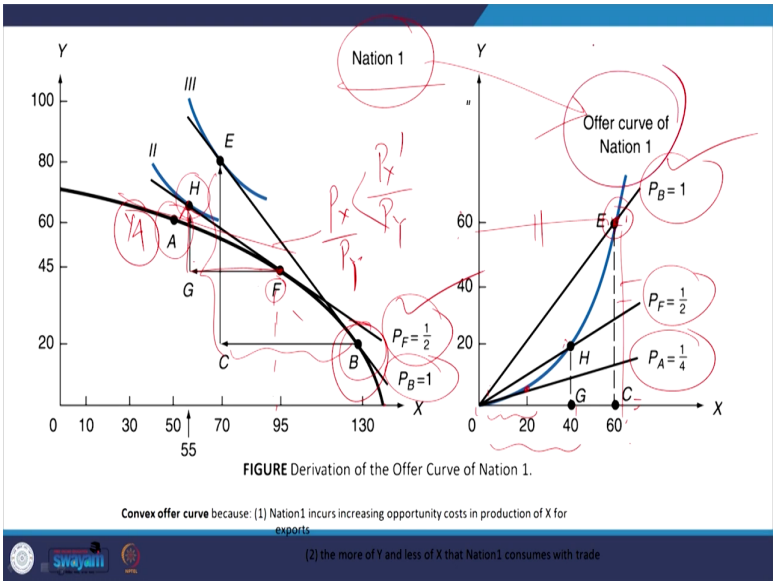

FIGURE Derivation of the Offer Curve of Nation 1.

Convex offer curve because: (1) Nation1 incurs increasing opportunity costs in production of X for exports

(2) the more of Y and less of X that Nation1 consumes with trade

So, let us explore the nation 1 and nation 2. So, here it is nation 1 and its offer curve is discuss here. Now, how offer curve is derived? If you go back and you know check our week 2 or week 2 species or lectures where we discussed with one example where we said commodity X in country 1 has specialization and they produce the product relatively cheaper they are you know the you know transformation curve is relatively you know less deeper and it is relatively more you know, now with less slope and the PX by PY is lesser in country or nation 1.

Now, starting with point A. If you remember we said that you know and this even in this diagram the P F is little tilted or biased towards commodity X. So, in the autarky situation stands with a notation A here where we said that country has a very you know less relative prices that means; P A this is PX by PY is lesser than that of any other points down the line.

Now, if there is trade; if there is trade then what really going to happen and trade takes place if and only if we have certain other contracts. Contracts means; if the relative price is increases and offered by another country P X O PX by PY is a new price PX 1 by P Y if it is greater than this then if then country 1 will prefer to export you know x of this variety in lieu of importing this much of for another country.

Since we are importing we have higher choices and we get more benefits or income again gets distributed. So, therefore, land with a higher conception function. So, we have a new equilibrium point F. If again the country gives you know let us be the case that you know the initial change is from one fourth here we are saying one fourth is a PX by PY.

Now, due to trade that says to half and the half we are offering like this. Now ultimately there are possibility of you know equalization of prices let it be only 1 PX by equal to 1. So, when it gets 1, we have you know even higher prices relatively of X. So, will be agreeing to offer more at the cost of another one.

So, the final equilibrium price is stands at B. Now look at these in a diagram when the price ratio is one forth. We are offering here 20 of X when it is half we are offering 40 because relative price increases when it is even 1 we are offering these much that is 60 and since it is prices of PX by PY equal to 1. So, 60 is you know shared with 60 so, this much with this one this one equal with equal distance. If all the points are actually plotted this is offer curve of nation 1 alright.

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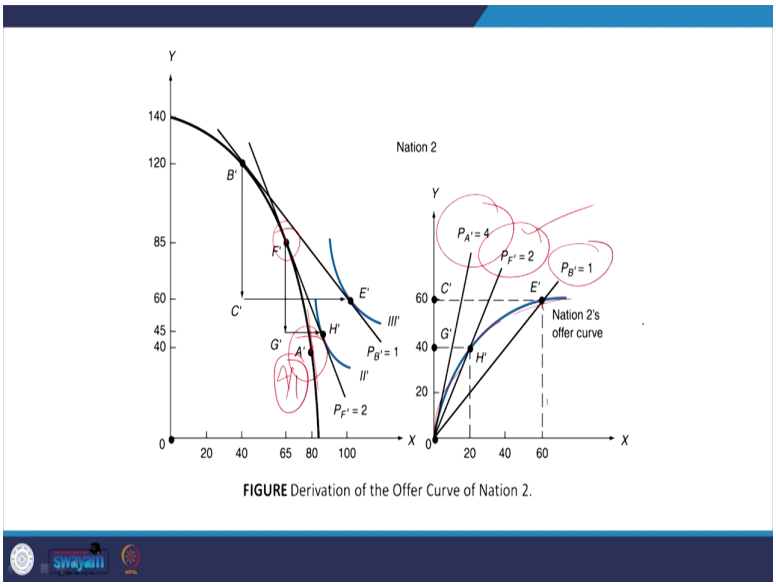

FIGURE Derivation of the Offer Curve of Nation 2.

Similarly, we can float the offer curve of nation 2; which is just the reverse because we start with from the autarky position A then accordingly price curve get steeper I mean gets its more flatter because initially it is steeper it is they are we will say you know 1 is to 4 here we saying a 4 is to 1 because terms of trade is just the reverse.

Now accordingly 4 is to 1 then 1 is to half we said now it is just the reverse 2 is to 1. Now 1 accordingly we have different plots. So, our offer curve looks like these for country 2. Now, we are including so, many markets together and arrive into some kind of transaction.

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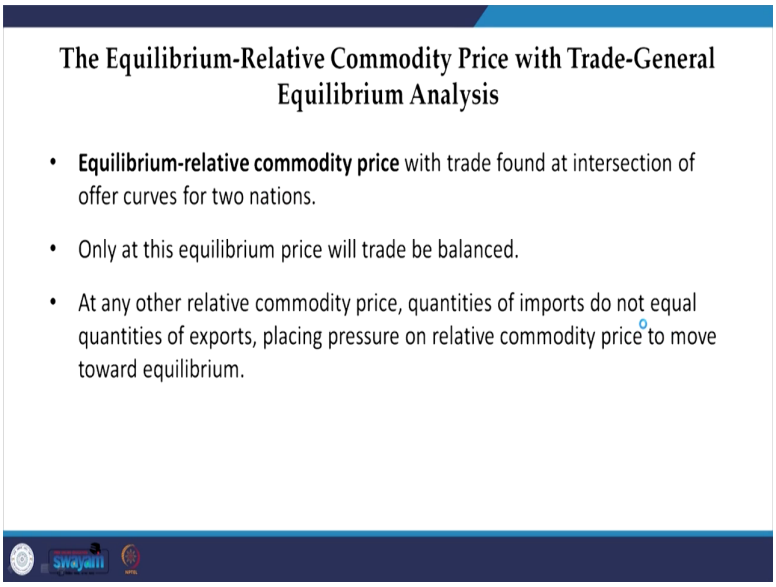

When we plot both the things together offer curve of 1 and offer curve of 2.

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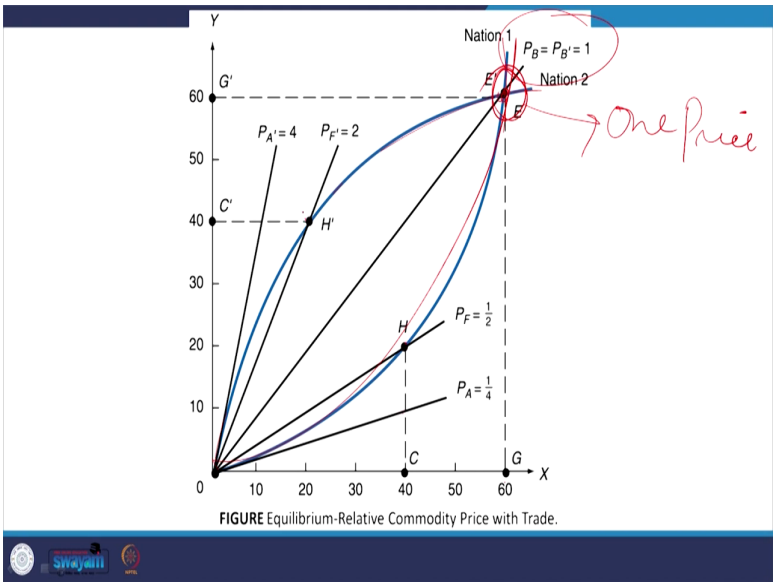

FIGURE Equilibrium-Relative Commodity Price with Trade.

Offer curve of 1, this is 2, this is 1, we arrive into one single equilibrium price that is one price situation and this settles both countries 60 is to 60 and where is a there is a price equilibrium situation all other points have partial equilibrium and gives very limited information.

So, therefore, offer curve is going to solve the countries trade and derive a single equilibrium price. So, the general equilibrium we are explaining here is actually explained with the help of offer curve. These are the explanation I have already discussed no need to emphasize.

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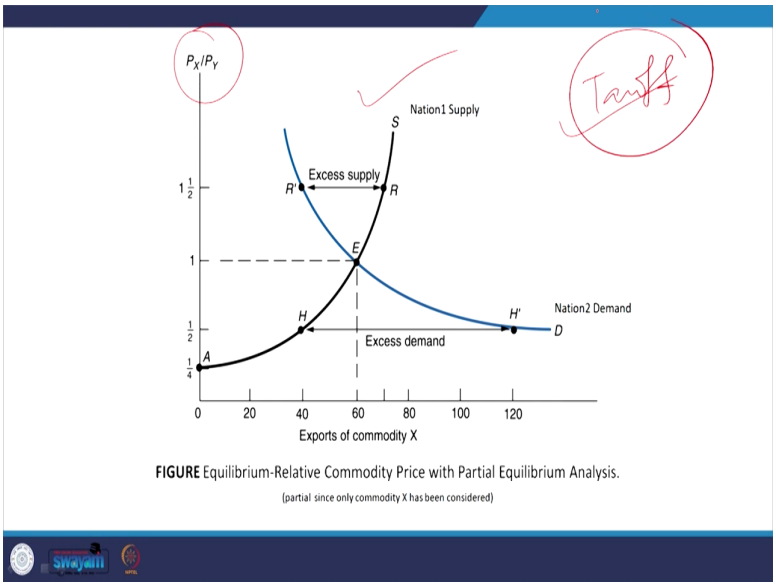

FIGURE Equilibrium-Relative Commodity Price with Partial Equilibrium Analysis.

(partial since only commodity X has been considered)

Based on the and you can take off the demand and supply accordingly. But I think you know we can discuss and defer it to our you know another lecture when we take off the you know tariffs in detail. So, we will talk about in detail.

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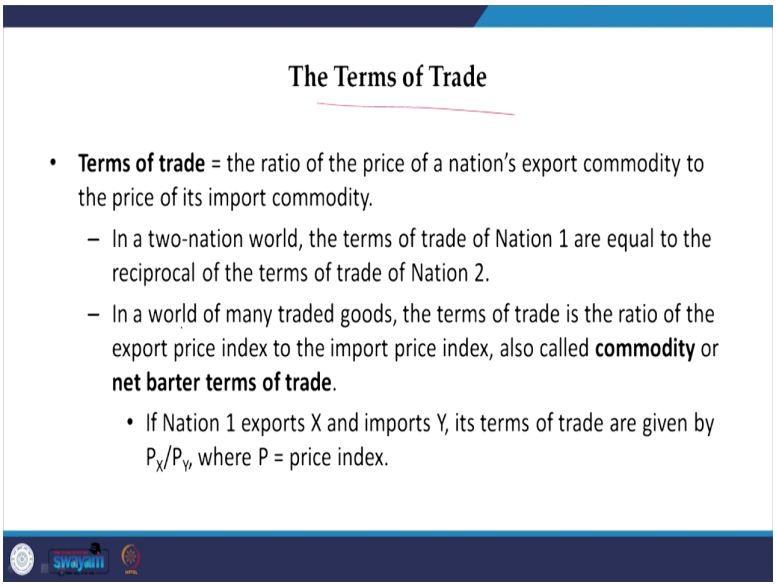

Similarly, terms of trade can discuss. Later on we have already discussed partly while I will take it forward to the next class I think you know I think you should go back and check offer curve and discussion. We will be very fruitful with this let me.

Thank you.