Strategic Trade and protectionism Theories and Empirics

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Lecture - 19
Measuring Intra-Industry Trade- I

So, hi guys, what are you are doing, how is things going? So, welcome once again to the course on Strategic Trade and you know Protectionism Theories and you know Policies or you know Theories and Empirics on it. We have now landed into the session on Measuring Intra Industry Trade. This is our you know 19th lecture and we are explaining now the end of fourth week.

So, far we have discussed so many things, so many you know strategies based on classical to neoclassical and to modern. Now, we are actually explaining the modern theory. Modern theory of international trade where we are actually catering to the modern realities, the modern complexities, the modern issues which are very much you know essential in the present day's discussion of international trade.

Now, in the previous couple of lectures, we have tried our best to understand the monopolistic competitive you know market and its connection with trade. So, and the connection we discussed how monopolistic competition or the number of firms can able to you know differentiate the product. The differentiation of the product actually you know raise various scope for further change in the choices of consumers preferences.

So, which has actually raised many important dimensions for international trade. One such dimension of international trade, which is much better than the existing literature is called intra industry trade. And intra industry trade we have already discussed what is the need for it what are the types of it, why it emerged for the historical note on, it what are the stand of India on it and how the developing countries has emerged in this context.

So, many gamut of information we already talked about. So, therefore, the last lecture must be on how to measure it how to systematically measure it what are the different you know

impacts based on intra industry trade and. So, this therefore, this class is completely dedicated to understanding the measurement ah. So, therefore, I am I feel very privileged to explain this; myself Pratap Mohanty, faculty member at Indian Institute of Technology Roorkee and working at present day at the department of humanities and social sciences.

So, I already covered this session to the trainee you know, in Indian revenue service servant trainee in Delhi and also to some trade houses explaining how intra industry trade is connected to a different forms of policy changes and regulation in the present day context. So, therefore, this will be more interesting to note and further expectations on this aspect can be derived from the references. So, let me go into the deeper insights of the measures.

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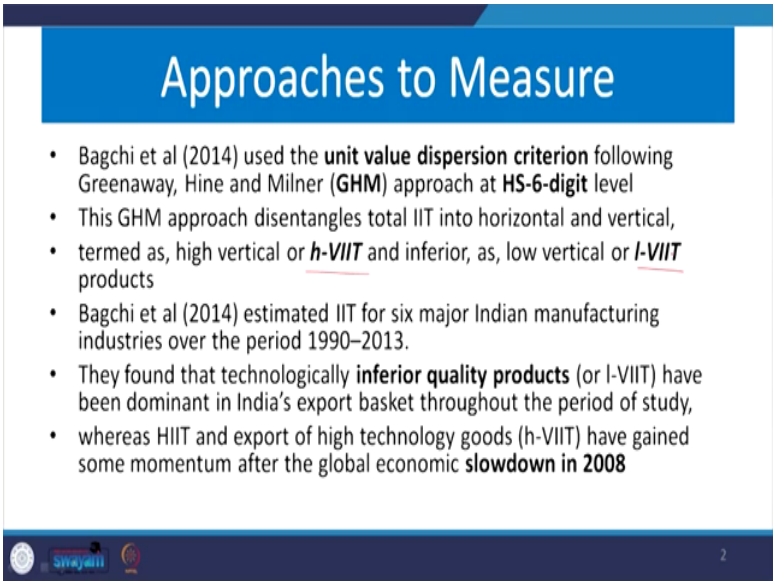

So, what are the approaches? Then, what kind of approaches are actually followed so far? So, one by one we have already explained this particular slide, but it is better to start with once

again because this has connection to the present I mean today's lecture. So, we have said that in 2014 especially by Bagchis article, which are followed based on as a 6 digit classification of industries of India.

Where you know they used Bagchi you know article used unit value dispersion criteria following which GHM approach was developed. GHM stands for Greenaway Hine and you know Milner, who actually initiated the discussion on IIT in detail intra industry trade in detail and GHM is very famous, so, far as discussion of IIT is concerned. Now this GHM approach, disentangles total IIT into horizontal and vertical you know directions and actually more you know largely they divided into two types.

The term it has high vertical stands for with a notation h V double IT h V double IT then what we wanted to emphasize here are the following. So, let me select the pen here to emphasize this V double I T. And also to l double I T l V double I T, V stands for vertical intra industry trade, l and h stands for high and l stand for inferior.

Now, why these cut offs are divided why these segments are divided? Only to identify where the country has leverage in you know procuring external benefit out of trade. It has been observed that based on the Bagchi article 2014 published in 2014, based on 6 you know major Indian Manufacturing Industries over the period 1990 to 2013, where they observed that you know Indias products which have been exported largely of IV double I T variety.

So, IV double I T variety which means you know majorly the products are of inferior in nature and those are inferior by technological you know content on it. So, the technological content in that basket of export exportable commodities are of major concern for India; because our steel you know terms, so, trade in the international basket.

So, far as you know within the industry is concerned or within intra industry trade is concerned we are at you know marginal side. Similarly while examining you know the you know the intra industry trade, specially understanding the high quality high end you know technological goods specially from 2008 out of the crisis period slow down the subprime crisis

we have which we have a witness in the world. This has raised India's position better and especially gain you know India's expose gained momentum from this period onwards.

Because India was not affected by the crisis and India has taken a better position on it. Now, in the last class we also explained how you know number of industries those are trading in IIT in Intra Industry Trade, the data as is mentioned earlier that we are referring to the EPW article recently published, which calculated and estimated these results. And for Indian context they collected data from 1978 till 201 whichever the data available in the wits database world intellectual trade solution database. These talks about you know intra industry trade is increasing steadily increasing over time.

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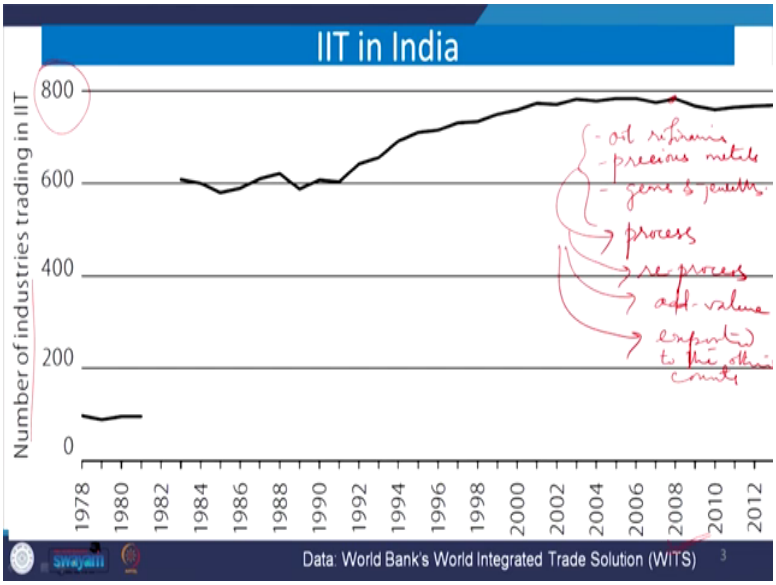

But recently there has been little sluggish rate, rate is little sluggish, but still it is positive much better. So, number of industries on the in the vertical axis we have where it is observed that

near about 800 industries who are practicing you know in intra industry trade. So, what do you mean by these? I think for a better for better example for our clarity let me refer oil sector oil you know refineries.

Then you know precious metals precious metals, then there are some you know gems and jewelry jewelries segments. Those industries particularly have been largely taking inputs the raw material the crude form in the crude form and they refined it process it reprocess it or reprocess it and add value to it add value and exported again exported to the countries two or the other countries. So, this actually rises huge revenue for the government and now the number of industries which are involved.

Here is near about 800; which is quite good and we are actually adding huge value. So, therefore, our input content in the export basket is very very high and so, therefore, this segment is adding much higher value for our exports. Then what are the measurements to understand very carefully.

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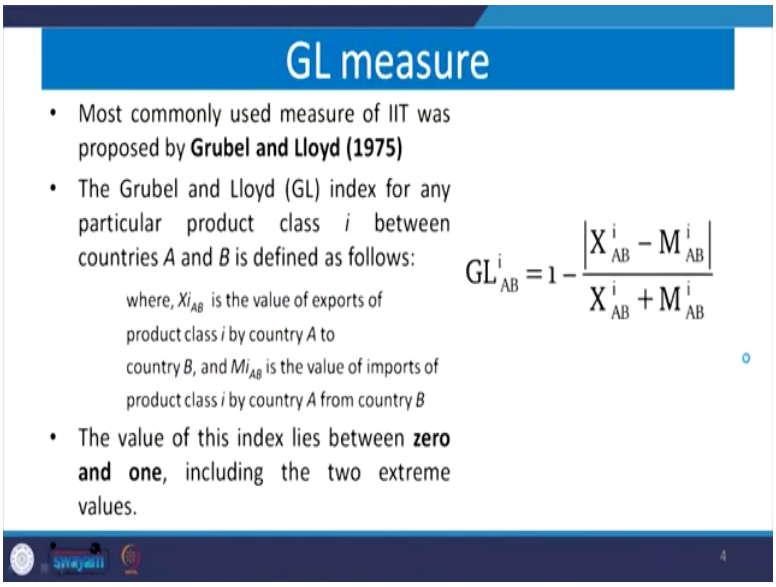

Let me start with the most common you know common instrument of measurement called you know of IIT by initially by Grubel and Lloyd, Grubel and Grubel and Lloyd they initiated in the year 1975. And they develop an index based on export and input basket or they take a ratio of you know the net trade to the total exports or the total you know trade net trade divided by you know total trade or the volume of trade.

So, based on that they defined the index. Now why it is important? I have two slides to talk about on this particular matter.

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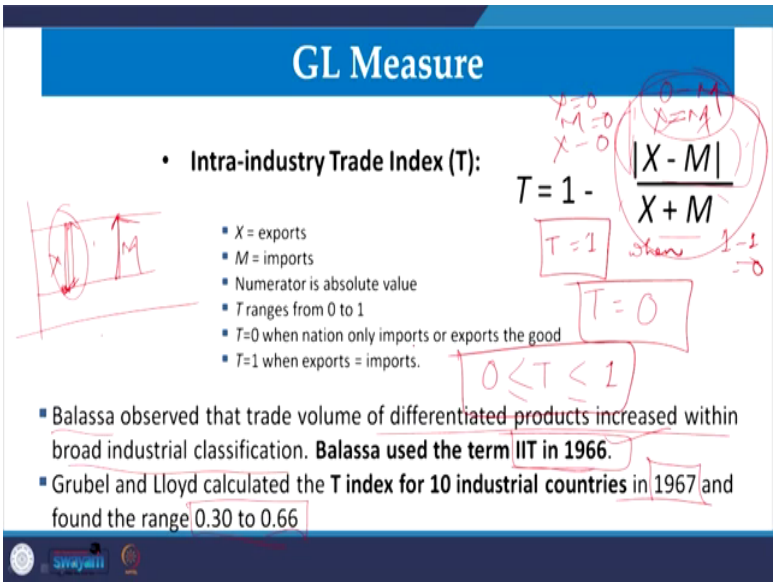

Now, let us start with this then we will come back to the previous one and explain its you know subscript correctly. Now, the Grubel and Lloyd measure initial now initially are observed by Balassa; we also discussed earlier, Balassa that total volume of differentiated products increase within broad industrial classification. So, Balassa used the term IIT in 1966 even prior to the complete framework made by Grubel and Lloyd.

So, Balassa contribution is also you know significant, where he has used this term for the first time. Whereas, Grubel and Lloyd calculated and index therefore, the index name is actually attributed to Grubel and Lloyd Grubel and Lloyd, but Balassa initiated the term.

So, calculated the I mean ended the term with the T component on it, Grubel and Lloyd calculate the T index the term it is a T index for 10 industrial countries. In 1967 and found the range between 30 percent to 66 percent that they found the range of trade actually takes place

between 30 percent to 66 percent. Now what do mean by this? The index I will explain. So, in the this I mean look at 66 introduced, but the index was actually systematically calculated by Grubel and Lloyd, therefore, Grubel and Lloyd learning index is more famous.

Now, what it stands for? So, T stands for I mean look at export and import. We have already presented the diagram earlier like this. This is from one country to another country this is from another country to the first country. Now, if we say this is export and this is import, now if 100 percent of export are actually taken, but import is not from thus the segment.

So, rather actually you know it is in another segment that one; that means you know the export is not containing any imports from another country. Now here X stands for exports, M stands for imports. So, and the here we are taking the you know mode value of it to neutralize the negative component of it. And which states that any sector which is composed of imports as well as exports; that means, we are de exporting with the imports as inputs.

So, if it is 100 percent for example, if it is here only, we are exporting as well as importing 100 percent; that means this is equated to this X is equal to M. So, these boils down to be 0. What do you mean by these for the interpretation of it? This states that when we are exporting with the help of imports 100 percent import from another country, we are actually adding no value addition after import from another country of the raw materials. So, this is that we are no adding, but our import quantities almost 100 percent. So, our value addition is not there, but so, far as intra industry constant it is 100 percent.

Now, 100 percent we are getting it. So, these boils down to be 0, X minus M equal to 0 0. So, 0 divided by whatever the number export plus import it will this segment is 0. So, 1 minus 1 is 0. So, T value stands for 1, when we have 100 percent you know intra industry trade. So, T is equal to 1, if intra industry trade boils down to 100 percent. Whereas, on the other extreme if you are not actually importing or export in one sector or import in other sector no; I mean other than this particular exported sector then exports are not equal to imports. Rather so, far as the same industries concerned important export either equal to 0 or import equal to 0 ok. So, export minus import is 0 or 0 minus import.

So, both the possibilities are there. So, that leads to here in though the if it is only export no question of imports in that particular sector. So; that means, only export by export, this boils down to 1. So, 1 minus 1 equal to 0 or if it is only of import we are not you know adding value to it. If you are not adding value then so, M divided by M stands for I mean again M is absolute value boils to be only positive M; M plus M divided by M equal to 1; 1 minus 1; so, this 1 minus one equal to 0. So, T stands for another value called 0 extreme values we are referring too.

So, when T stands for 0 what do you mean by that? Either only export or only import. So, what are the interpretation of only export or import? This state that the sector does not take imports or if the sector taking imports is not re exporting, so; that means, there is no component of you know no single component of intra industry now within the industry trade is not taking place.

So, when T stands for 0 it is actually there is no evidences of or there is no single evidence of intra industry trade. So, this is all about the interpretation. So, extreme value stands form T from 0 till 1. So, this is the extreme values of intra industry trade.

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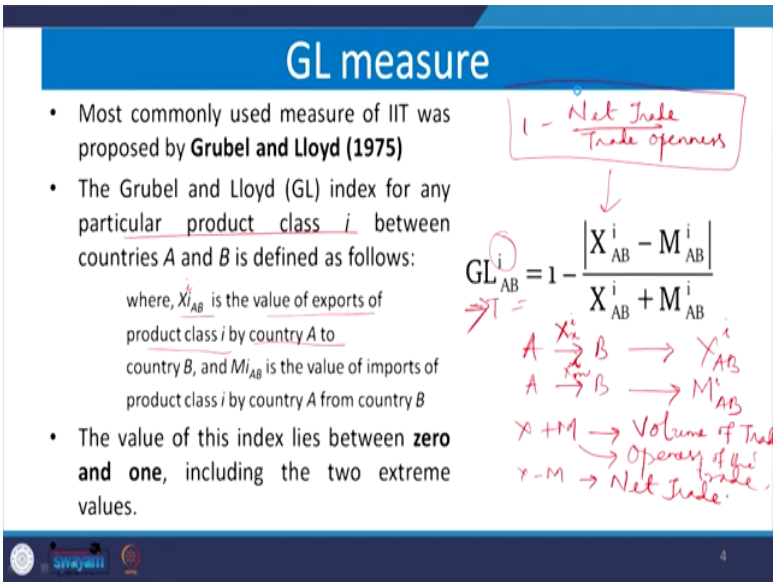

Let us come back to the previous slide where we started. Now we are saying the Grubel Lloyd T index this can be also interpreted as T index like this T index stands for 1 minus. So, let me interpret here. The index for any particular product class i, this stands for i between country A to B between country A and B is defined as follows.

So, now here X a component like this is defined as X i, i should be here; X i A B is the value of exports or product class i, we are referring to a particular product class or a particular firm where I mean product i by country A to B. So, exports are from country A to B, so, this as exports where with product class i. So, this is called X this is basically noted as X A B i alright.

Now, similarly imports if it is A to B with the product class X i B. So, if I mention is like here if it is X i here, M is here, X is here then this is defined as imports of i th particular you know

product categories from A to B alright. Now in the denominator they are the same number, we are just trying to find out when only a complete export plus import are there this is called volume of trade, this is also called trade open total openness of the country. So, far as of trade openness of trade, so, far as total trade is concerned whereas X minus M is called a net trade.

So, these are the two important component; we have already discussed. So, a broadly I mean you know in a in a null cell we are basically trying to find out net trade divided by total openness total trade or trade openness; 1 minus this; that means, I mean how the net rate is proportion of the total openness within the industry is all about the equation.

So, the value of this index actually you know lies between 0 and 1, 0 and 1 which we have already discussed including the two extreme values. So, this is what I have mentioned here extreme values are also included 0 and 1 both are included in the model. So, therefore, this is the foundation you know model of intra industry trade and this is the standard model of measuring intra industry trade.

Well there are large number of limitations raised by you know other economists those limitations are presented here.

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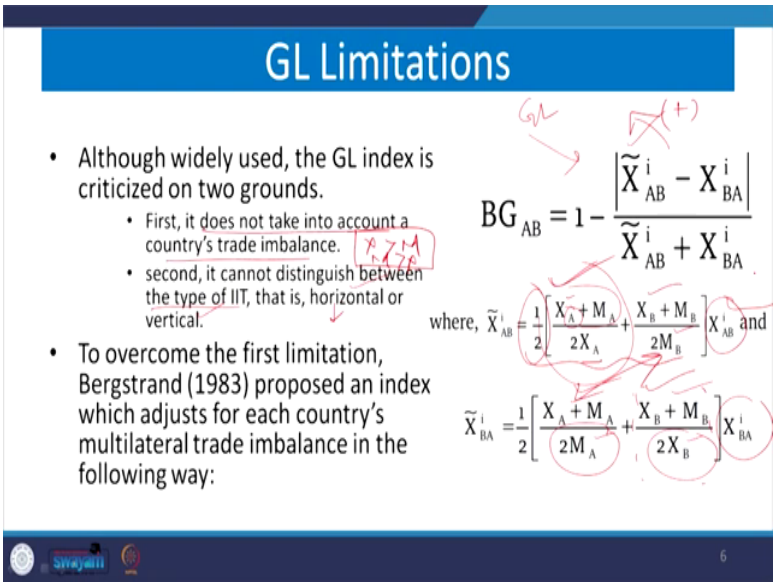

Now, we will actually you know extend these discussion in a detailed format in our you know next lecture. Specifically identifying is shortcomings, it is you know you know new I mean advanced models or updated models; then what are the updated models and how they you know contribute to the calculation of inter industry trade, but at this moment let us understand the limitations.

What we said here simply, we try to find out the balance trade balances X minus M. We do not actually attach the you know trade imbalances. So, the first limitation is it does not take into account a country's trade imbalance. So, how where how we can able to emphasize, if there is any possibility of trade imbalance? If you know trade imbalance what do you mean by this? Either export is greater than import or import is greater than export.

If these two things are there, but here what we take? We take the mod value of it. So, basically it is always positive. Is not it? So, export minus import whatever the value comes it boils down to a positive number after to converting into you know a mode of it. So, therefore, the trade imbalances are not actually covered. So, this is one of the important limitations of Grubel and Lloyd index of measuring intra industry trade.

So, there is no question of 100 percent trade balance between countries. So, and second one it cannot distinguish between type of IIT, type of Inter Industry Trade. So, the categories it simply says whether there is intra industry trade or there is no intra industry trade. So, or by its percentage; are there though I mean there are various interpretation if the range varies from certain limit to other limit then there are possibility of you know defining the types, but actually this is not clearly answering.

So, type oh here we are referring to horizontal type or vertical type. I already said horizontal where the characteristics and the features of the products are different within the firm or in the vertical one you know there are characteristics are different there by quality they are different. So, I mean just by quality they are different.

So, vertically I mean one can rank those qualities very clearly. So, this is rank 1 this is rank 2 and we can we can have a clear hierarchy in the orderings of the product. Now what is important? Here to overcome the first limitation. Bergstrand 1983 proposed an index which actually you know emphasize multilateral trade imbalances as for the following way. Now you can look at this.

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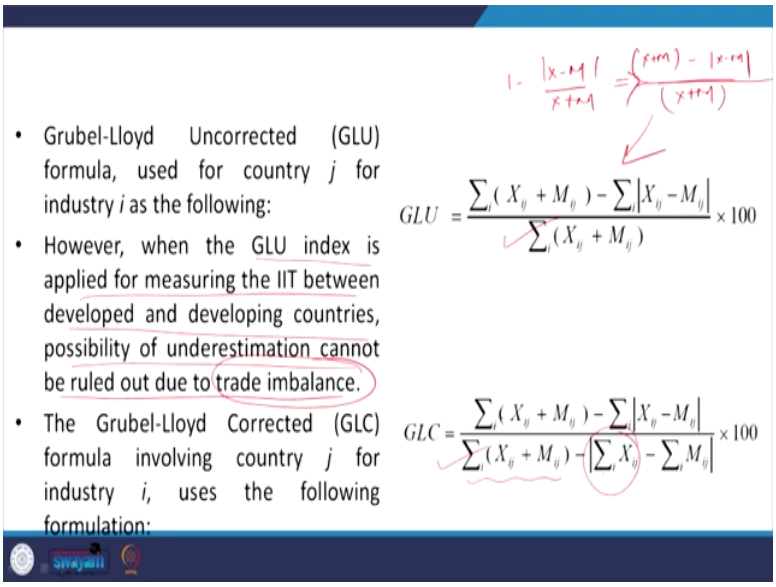

Now, this you know seems little complicated, but can be understood in our next slide we have another component, we will we will talk about I mean in a short while. So, what it includes? Component seems equal here like you know GL index, Grubel and Lloyd index. Now, you also please remember one thing this is initially emphasized by GHM approach GHM approach. So, now, later on by Grubel and Lloyd specifically, now we are emphasizing on Bergstrand; Bergstrand 1983 paper and emphasize another methodology. What this methodology stands for? Now look at the average of these is taken at the begin with.

Now, what is X A to B i? It is not just exports it is the average of something, well multiplied by its own exports multiplied by export, but average the world trade. Look at this ,what is this in total export total? Exports of the country A; as A as in the denominator exports of that country plus imports of their country A. So, total trade of the country out of that twice of the exports they have taken plus, you know what is the you know what is the total trade in the

world or by another country where we are referring to A to B or in the B country total trade out of their imports.

So, whatever we export to that country, whatever we export to that country first segment is actually considered as what is our openness out of our expose plus, what is their openness out of their total imports. So, from there we can infer one thing, what is the average openness. So, far these two countries are concerned.

So, average you know you know openness or average openness of both the countries and their trade imbalances can be captured very easily. Now from here we will by multiplying the ratio you know what is the average of it and who and what is the rest in you know first countries expose out of that ratio? So, is it actually I mean this is first component we have considered. And the second component stands for just the reverse from B country B to country A, from the country B our concern is actually from imports to an export.

I mean both the components are here. Again the exports imports their openness and openness both the components are actually mentioned here. Now what we are multiplying here is very very important, their export we are actually multiplying their export to these average. These average more or less are same, you can easily get it this is 2 X B; 2 X B, but the ratio they are taking differently.

Now, the right component is nothing, but the component in the first one. These component is nothing but the component of the first country and this component is nothing but the component of the second country. So, the average more or less by ratio are same, whereas, we are multiplying that ratio to the export of another country.

So, we capture the you know you know export of another country and we subtracting them and that will capture the trade imbalances correctly. Out of that, if we take the total you know as the ratio we will find out the possibilities. Now, this is one of the suggestions submitted by Bergstrand to capture multilateral trade imbalances; because we are including in the totally

openness to their individual as a ratio of individual import and export respectively and accordingly defining various instruments.

We will actually talk about these you know technique in detail with its shortcomings with its you know advantages disadvantages in our next class, but at this moment let us understand that Grubel Lloyd index once again. Seems we complicated, but can be understood very clearly the first equation which I said 1 minus X minus M divided more of it X plus M this is what we said.

Well, now if I just you know extend it further X plus M this is X plus M minus mod of X minus M ok, now , so, this is nothing but this equation. And this is you know why this is not? This is also called on corrected model because of the following reasons. Now so, let us see look at from this lines. GL index is applied for measuring the IIT between developed and developing countries, possibility of underestimation cannot be rolled out due to trade imbalance which I already discussed.

Now in order to correct that aspect some of suggestions are mentioned even Bergstrand suggestions are also noted. Now they included one thing little differently. Now how they accounted it; this part is same.

Now, they were included in the denominator of the net exports or the net trade. So, this is the total trade of that particular you know of the country minus the total imports total exports minus total import it divided. On the numerator it is same numerator it is largely same, but then the denominator that take the ratio out of I mean it is it is the net volume has also been also subtracted.

So, now, it seems as if you are here then denominator is extremely large whereas, here it is a net content we capture certain forms of you know trade imbalances; export minus import and its value is also subtracted from it to capture the net volume of trade as well. Now when we are looking at this what it exactly captures?

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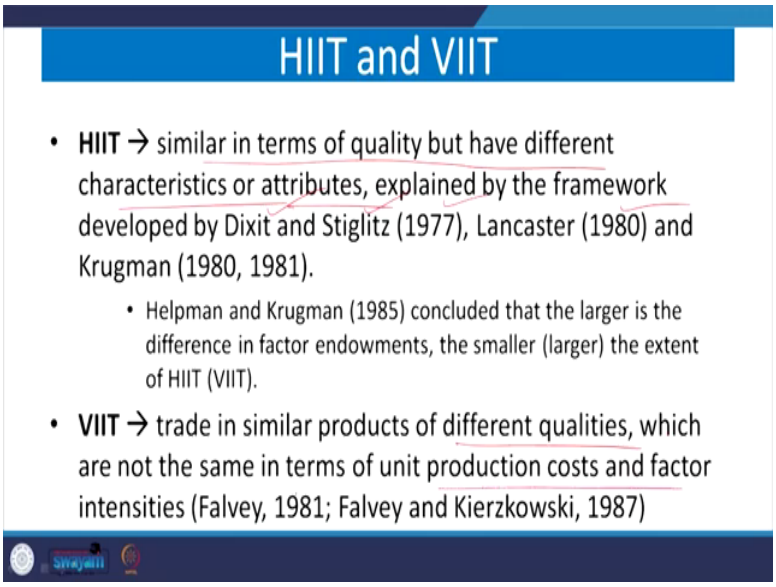

So, I mean how it gets interpreted we will actually discuss in our subsequent slides. Here how basically we are trying to capture the horizontal you know intra industry trade and vertical intra industry trade, the detailed calculation will also follow in our next lecture which is all about here mentioned as h I double IT stands for similar in terms of quality but have different characteristics or attributes we have already said. Discussed in different purpose by dixit and Stiglitz in 1977 paper, Lancaster 1980 paper, Krugman 80 and 81 paper. Helpman and Krugman concluded the larger is the difference in the factor endowments smaller is the extent of you know h double I T or V double IT.

So, larger is the difference in the factor endowment if the differences is very huge then the country will not actually trade you know then their overlapping content will be very less because they will not depend they will not depend too much on each other. Whereas, in V double I T vertical you know intra industry trade we say different in qualities, which are not

the same in terms of unit of production cost and factor intensities emphasized by different papers mentioned here.

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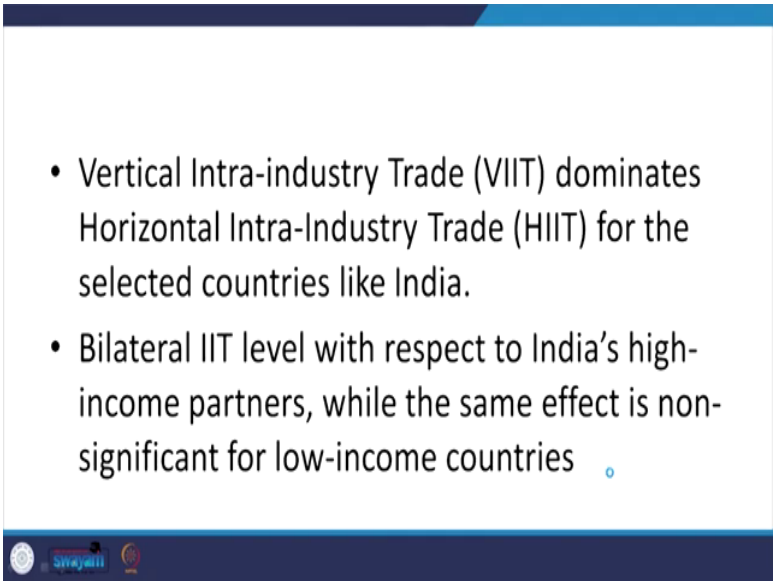

Now, vertical largely vertical we know intra industry dominants over horizontal one in the present days like Indian you know trade model baskets. Bilateral IIT level with respect to India's high income partners, where the same effect is not significant for low income countries we have already mentioned.

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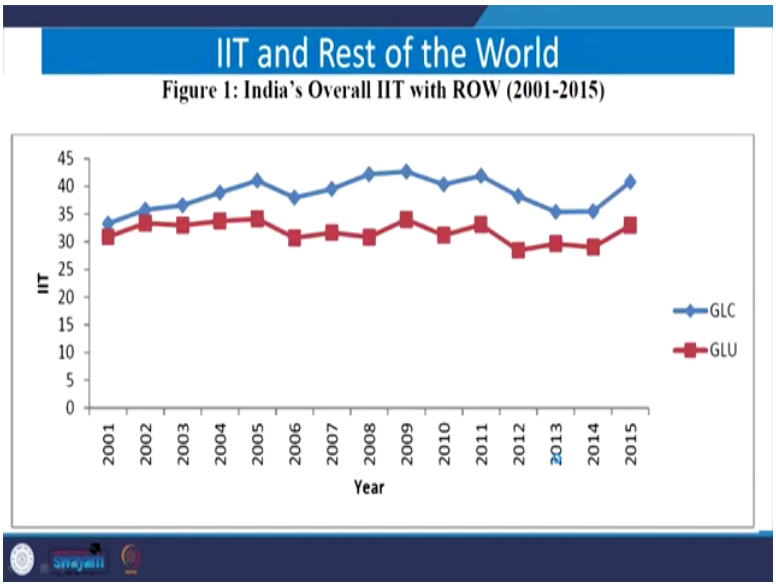

Now, looking at GLC and GLU, I have already said the corrected one is computed to on corrected one. On corrected one where the on the denominator, it is the you know total exports I mean total openness exports plus imports.

So, the I mean the volume or the value in the denominator is very huge. So, therefore, the as a ratio it is low. So, therefore, it is always low. In case of corrected one we are you know calculating the net part in the denominator as well. So, every time it is higher now especially in the recent years there has been a change positive change towards.

Now, India's overall IIT with rest of the world figures are from 2000 2015.

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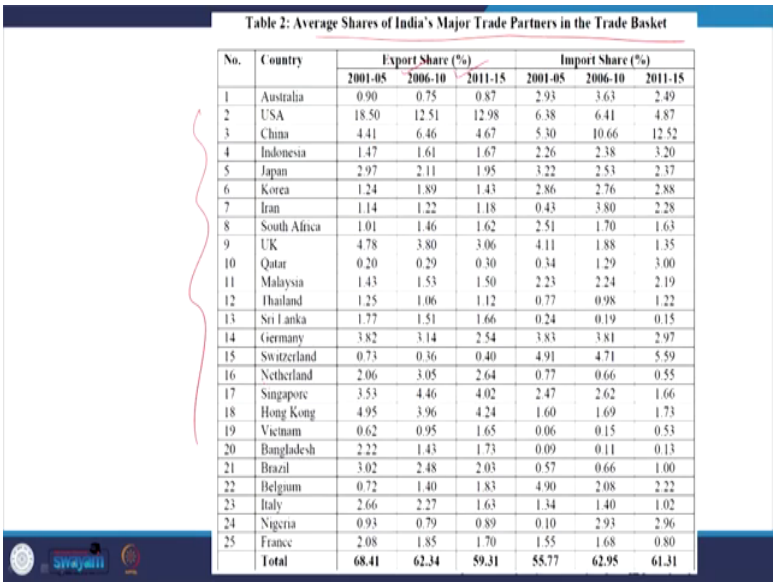

Table 2: Average Shares of India's Major Trade Partners in the Trade Basket

No.	Country	Export Share (%)			Import Share (%)		
		2001-05	2006-10	2011-15	2001-05	2006-10	2011-15
1	Australia	0.90	0.75	0.87	2.93	3.63	2.49
2	USA	18.50	12.51	12.98	6.38	6.41	4.87
3	China	4.41	6.46	4.67	5.30	10.66	12.52
4	Indonesia	1.47	1.61	1.67	2.26	2.38	3.20
5	Japan	2.97	2.11	1.95	3.22	2.53	2.37
6	Korea	1.24	1.89	1.43	2.86	2.76	2.88
7	Iran	1.14	1.22	1.18	0.43	3.80	2.28
8	South Africa	1.01	1.46	1.62	2.51	1.70	1.63
9	UK	4.78	3.80	3.06	4.11	1.88	1.35
10	Qatar	0.20	0.29	0.30	0.34	1.29	3.00
11	Malaysia	1.43	1.53	1.50	2.23	2.24	2.19
12	Thailand	1.25	1.06	1.12	0.77	0.98	1.22
13	Sri Lanka	1.77	1.51	1.66	0.24	0.19	0.15
14	Germany	3.82	3.14	2.54	3.83	3.81	2.97
15	Switzerland	0.73	0.36	0.40	4.91	4.71	5.59
16	Netherland	2.06	3.05	2.64	0.77	0.66	0.55
17	Singapore	3.53	4.46	4.02	2.47	2.62	1.66
18	Hong Kong	4.95	3.96	4.24	1.60	1.69	1.73
19	Vietnam	0.62	0.95	1.65	0.06	0.15	0.53
20	Bangladesh	2.22	1.43	1.73	0.09	0.11	0.13
21	Brazil	3.02	2.48	2.03	0.57	0.66	1.00
22	Belgium	0.72	1.40	1.83	4.90	2.08	2.22
23	Italy	2.66	2.27	1.63	1.34	1.40	1.02
24	Nigeria	0.93	0.79	0.89	0.10	2.93	2.96
25	France	2.08	1.85	1.70	1.55	1.68	0.80
	Total	**68.41**	**62.34**	**59.31**	**55.77**	**62.95**	**61.31**

Now, here is the table probably is not visible, but if you open my slide you can read between the you know columns and line; average shares of India's major trade partners with trade baskets.

So, here exports imports from 2001 to 5 2006 to 10 2011 to 15 are presented with different countries and how what is their exports share what is their imports share of their you know trading partners. Especially India's content from other countries are presented. So, accordingly we find different values and it is useful for better interpretation.

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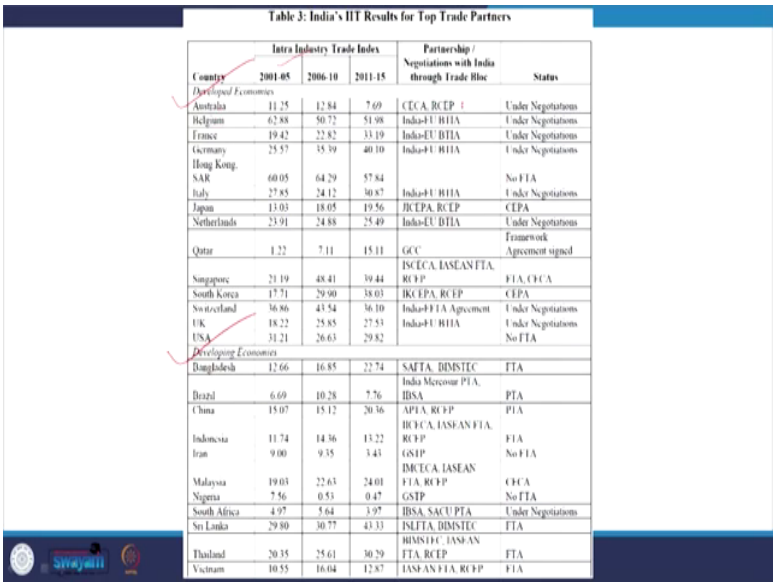

Table 3: India's IIT Results for Top Trade Partners

Country	Intra Industry Trade Index 2001-05	2006-10	2011-15	Partnership / Negotiations with India through Trade Bloc	Status
Developed Economies					
Australia	11.25	12.84	7.69	CECA, RCEP	Under Negotiations
Belgium	62.88	50.72	51.98	India-EU BTIA	Under Negotiations
France	19.42	22.82	33.19	India-EU BTIA	Under Negotiations
Germany	25.57	35.39	40.10	India-EU BTIA	Under Negotiations
Hong Kong, SAR	60.05	64.29	57.84		No FTA
Italy	27.85	24.12	30.87	India-EU BTIA	Under Negotiations
Japan	13.03	18.05	19.56	JCEPA, RCEP	CEPA
Netherlands	23.91	24.88	25.49	India-EU BTIA	Under Negotiations
Qatar	1.22	7.11	15.11	GCC	Framework Agreement signed
Singapore	21.19	48.41	39.44	ISCECA, IASEAN FTA, RCEP	FTA, CECA
South Korea	17.71	29.90	38.03	IKCEPA, RCEP	CEPA
Switzerland	36.86	43.54	36.10	India-EFTA Agreement	Under Negotiations
UK	18.22	25.85	27.53	India-EU BTIA	Under Negotiations
USA	31.21	26.63	29.82		No FTA
Developing Economies					
Bangladesh	12.66	16.85	22.74	SAFTA, BIMSTEC	FTA
Brazil	6.69	10.28	7.76	India Mercosur PTA, IBSA	PTA
China	15.07	15.12	20.36	APTA, RCEP	PTA
Indonesia	11.74	14.36	13.22	IICECA, IASEAN FTA, RCEP	FTA
Iran	9.00	9.35	3.43	GSTP	No FTA
Malaysia	19.03	22.63	24.01	IMCECA, IASEAN FTA, RCEP	CECA
Nigeria	7.56	0.53	0.47	GSTP	No FTA
South Africa	4.97	5.64	3.97	IBSA, SACU PTA	Under Negotiations
Sri Lanka	29.80	30.77	43.33	ISLFTA, BIMSTEC	FTA
Thailand	20.35	25.61	30.29	BIMSTEC, IASEAN FTA, RCEP	FTA
Vietnam	10.55	16.04	12.87	IASEAN FTA, RCEP	FTA

Similarly, India's IIT results for top trade partners are also important, top trade partners we have presented here different negotiation are there with developed countries with developing countries and developed countries Australia, France, Belgium, we have already discussed who are the groups.

You will please go through and we may take it forward in our next lecture in detail.

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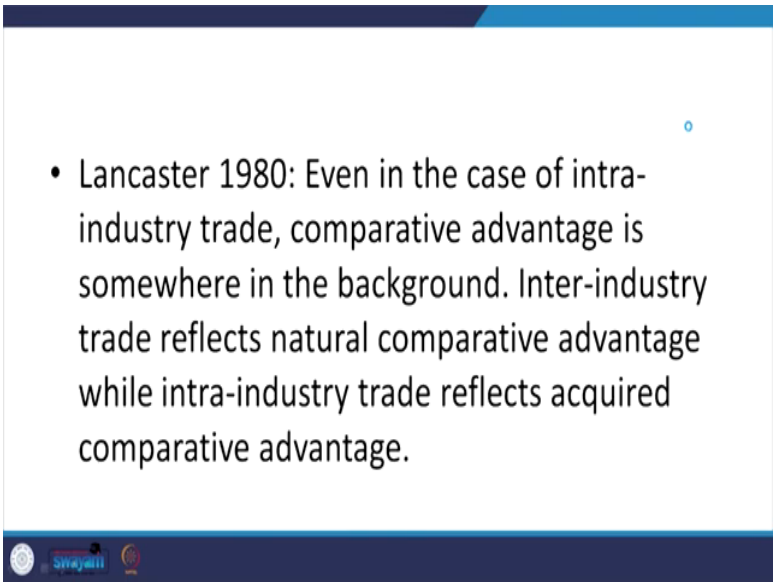

And these are just the interpretation we have already made, no need to repeat things, largely these talks about Lancaster paper we have already discussed. I think rest of the details we will continue with our discussion in the full phase you know measurement lecture on intra industry trade in the next class. With these let me stop here.

Thank you.