

Commodity Derivatives and Risk Management

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Lecture 37


Physical Market for Freight, Freight Exchanges, Freight Indexes

Hi all, today we are going to discuss the different aspect of freight rate and freight rate derivatives. So let us first understand what the physical market for freight rate is. So all of us we know that freight rate can be for road, freight rate can be for railways or freight rate can be also for sea freight. Now, today in our discussion, we will be focusing more on the freight rate aspects of seaborne trade, and why would we would be focusing on the seaborne trade, it is because it is 90% of the total freight transaction happens through sea. That is the global export import of major bulk cargo happens through sea route so that is the reason why we will be discussing predominantly the different aspect of sea um sea freight and how companies can mitigate the risk associated with the fluctuating freight rates.

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Freight

- 90% of World's total export import (by volume) happens by sea.
- *Charterer* is the party needing a ship to transport cargo from one place to another place.
- Charters are producers/consumers/exporter/importers bulk commodities
- Bulk cargo can be divided into two categories
- Dry Bulk Cargo: Coal, Iron Ore, Wheat, Rice, Soybeans, Sugar, Cement, Steel
- Liquid (or wet) Bulk Cargo: Crude oil, Petrol, Diesel, LNG, Cooking Oil



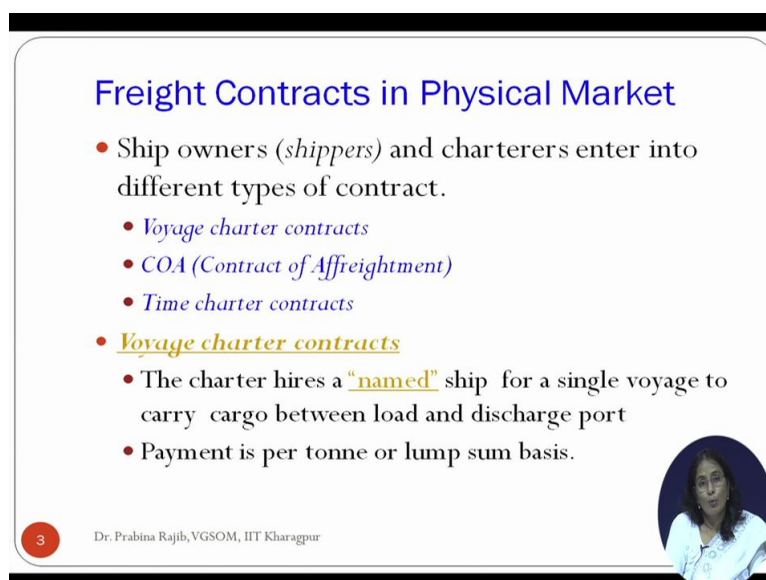
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Now, let us go to so as I mentioned, 90% of the world's total export import by volume happens by sea and when we are talking about the word freight, so freight rate means the rate which a charterer or hirer of a ship pays to the to the company which is owning the ships or the shipper or shipping company, so charterer is the party which needs a ship for transport of cargo from one place to another place. And who are the charterers; charterers are the bulk producer of commodities and consumers of commodities as well as exporters and importers of bulk commodities. And when we are talking about bulk cargo, this bulk cargo can be categorized into 2 different categories so that is your dry bulk cargo and your liquid or wet

bulk cargo and why are we making a distinction of between dry bulk cargo and wet bulk cargo, because the kind of ships required to ferry these 2 types of cargo are different.

And when we are talking about dry bulk cargo, it is predominantly used to carry coal, iron ore, soybean, sugar, cement and wheat etc, these are steel, these are your major bulk goods which get transported across sea route. And when it comes to the liquid bulk cargo, it is predominantly crude oil and crude oil derivatives such as petrol, diesel and liquid liquefied natural gas and cooking oil and soybean oil, etc. And out of this liquid cargo, a humongous portion or a large portion of the total cargo is for the crude oil, so crude oil through tanker ships constitute a major portion of the total weight cargo which gets transacted.

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Freight Contracts in Physical Market

- Ship owners (*shippers*) and charterers enter into different types of contract.
 - *Voyage charter contracts*
 - *COA (Contract of Affreightment)*
 - *Time charter contracts*
- *Voyage charter contracts*
 - The charter hires a “**named**” ship for a single voyage to carry cargo between load and discharge port
 - Payment is per tonne or lump sum basis.

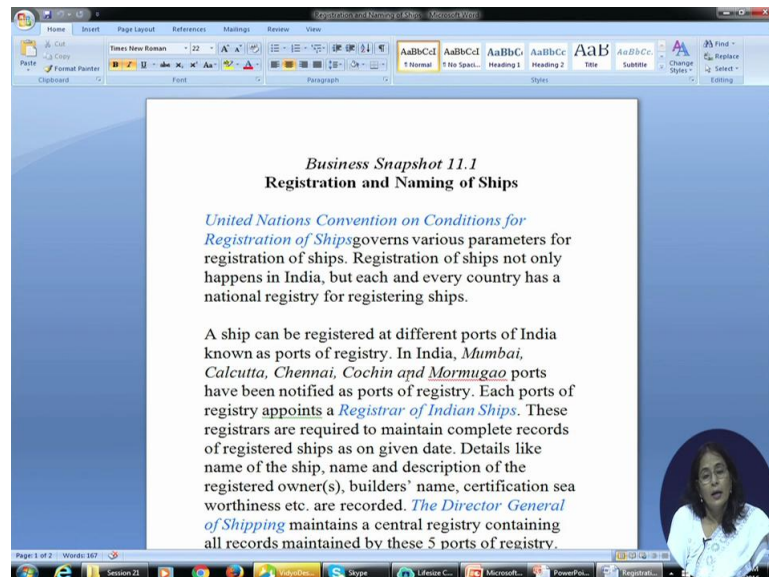
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Now, let us go to let us discuss little bit of different types of contract which is signed by the ship owners and the charterers for transporting these bulk goods so this freight contracts, physical freight contracts can be categorized into 3 different categories. So these are your Voyage charter contracts, contract of Affreightment and Time charter contracts so let us go one by one, what do you mean by a voyage charter contract? In a voyage charter contract, the charterer and the shipping company enter into a contract for transacting or transporting goods for 1 voyage so that is the that is why these are known as your voyage contracts and also the name of the ship in which these goods are going to be transacted, that is also very very categorically mentioned and normally payment is per turn or a lump sum basis.

In fact, if we can draw a parallel, it is like taking a taxi for a hire for a day we just either per kilometer basis or a fixed some amount may be whole day morning till evening we take and

we pay let us may be Rs. 3000 and that is a kind of agreement we do when we are hiring a local taxi so that is exactly a voyage contract in the shipping parlance. Now, let us focus little bit of our understanding on what is what do you mean by name and why ships needs to be named?

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Please see this attachment; this is again a snapshot which is from the commodity derivatives and risk management book of mine. please see this one, this is a this particular snapshot is titled as a registration and naming of ships and this is this naming of ships is not a requirement by Indian government or any country specific government, there is a United Nations convention and condition for registration of ships govern the need for registering each and every ship and as you as you can see more details.

In case of a India, a ship can be registered at different ports in India and these are known as ports of registry and in India, we have 5 ports of registry these are your Mumbai, Calcutta, Chennai, Margao port and each registry port has to appoint a registrar of ships and that registrar will take keep a record of all ships which are getting registered under that port and who is the owner, where it was constructed, what is the what is the tonnage it can take and what is the age of this particular ship, so all these information are recorded in the industry. And the Direct General of Shipping maintains a central registry containing all records maintained by these 5 ports of registry.

Now, just as a trivial, nothing very important but just out of curiosity, I try to find what was the names of the ships which were owned by shipping corporation of India, these are if you

can see these are some this Desh Aman, Swarna Kamal, Vishva Ekta, Desh Vishal, Desh Vibhor so you can go to this corporation website. And you can browse through to see the different kind of vessels, different kind of tankers, and different kind of ships Shipping Corporation of India owns and what are their names, the date of registration the tonnage and all. If you are interested, you can go to that website and learn more about it. Now, this let us focus couple of minutes on understanding what is exactly a voyage charter contract, how does voyage charter contract looks like so again this is a sample document.

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HYDROCHARTER		Voyage Charter Party. Recommended by The Baltic and International Maritime Council (BIMCO), Copenhagen. Issued 1st January 1923. Last amended July 1997.
1. Shipbroker.	2. Place and Date. Oslo, 21 June 2001	
3. Owners. Shipowners, Ltd	4. Charterers. Charterers, Ltd	
5. Vessel's name/type. Saratoga		6. Cargo carrying capacity (about in mtons).
7. Cubic capacity (grain/bale).	8. Owners' P&I Club.	9. Built - Class - Flag - GT - IT.
10. Present position. Rotterdam		11. ETA Loadport. Sunday 5 August 2001
12. Laytime not to commence before. Wednesday 1 August 2001		13. Cancelling date. Friday 10 August 2001
14. Sailing telex/telegram to sent to.		16. Discharging Port(s). Rotterdam
15. Loading Port(s). Porsgrunn, Norway		


I have downloaded from the website internet, internet so if you see, let me see increase the size a little bit. Who is the who is charter party, voyage charter party means the party who is taking on lease and place and date where it has been signed, who is a ship broker and who is the owner of the ship, who is the charterer, detail, what is the vessel name, type, what is the cargo carrying capacity um of the vessel so all these information are clearly mentioned.

Even if it is for a 1 time transaction, one time voyage, but still both charterer as well as the shipping company has to enter into a contract and this is the other details about this particular journey or this particular voyage is also needs to be identified and both parties like ship signature of the owner and signature of the charterer so it will be there. So this is how both charterer and the shipping company enter into a contract for voyage, single voyage charters.

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Freight Contracts in Physical Market

- **COA (Contract of Affreightment)**
 - Charterer and shipping company enter into contracts for more than one voyage for a specified route.
 - *Without naming a ship, the charterer pays per tonne of cargo*
 - **For example** an iron ore exporter has to send 12 monthly consignments of 20,000 tons from Kolkata port to China. Instead of 12 voyage contracts, the charterer and shipper enter into COA contract and the shipper ensures the monthly consignments are sent in time.



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Now, let us go to the next kind of a contract which is your contract of affreightment so what exactly do you mean by contract of affreightment, contract of affreightment is a contract in which the charterer and the shipping company enter into contracts for more than voyage but for a specific route. So let us say like let I have given in this example here if you see. An iron ore exporter from India may be is interested to export iron ore to some Chinese company and at the end of the every month for upcoming 12 months so instead of entering into 12 voyage contracts, this company can enter into 1 chartered contract.


And normally these kind of contract do not have a name of the ship mentioned in the contract because the shipping company may have many ships and depending upon the availability and depending of other conditions the shipping company is going to deliver the required goods at the designated port by the designated day and these contracts, that is why these contracts normally do not have a name of a specific ship mentioned, so this is the contract of affreightment.

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Freight Contracts in Physical Market

- *Time charter contracts*
 - Charterer hires a ship for specific period of time.
 - All costs (**bunker cost** , crew cost, port cost) are borne by the charterer.
 - The charterer may carry its own cargo/ cargo for other companies/ re-let the ship to another party to earn profit.

The bunker fuel is used in ships and is distilled from crude oil. Bunker costs are considered as the most significant operating costs for cargo shipping operation.

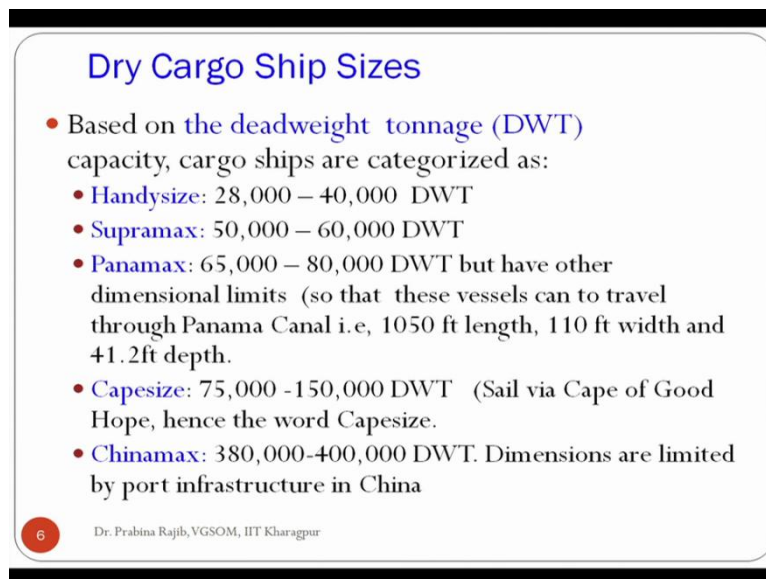


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So now let us come to a little long term contract that is known as your charter time charter contract so in case of a time charter contract, the charterer completely hires the ship for a specific period of time. So in this kind of a contract, all costs that is bunker cost, crew cost, port cost, all these are borne by the charterer, so what do you mean by bunker cost? Bunker cost is the fuel cost basically. The fuel which is used for ferrying these big large ships are known as your bunker fuel and this bunker fuel is again distilled from the crude oil and it is little heavy and thick oil so it is um it is a thicker and little impure as compared to your petrol or diesel.

And this when a charterer takes a ship on time charter, the charterer pays for all cost of operating the ship that is your bunker cost, crew cost, port cost and any other attending attendant cost associated with running the ship and why the charterer will enter into a long term contract, the charterer will enter into a long term contract because it may be needed that ship for its own day to day operation or it can also become a um it can enter into voyage contract or contract of affreightment if it does not have a use for the ship for to the full extent or it can relate the same ship to another third party. So as far as the contracts are concerned, let me summarize as we discuss there are 3 types of contracts which normally charterer and a shipping is entering to. That is your voyage contracts, contract of affreightment and time charter contracts.

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Dry Cargo Ship Sizes

- Based on the deadweight tonnage (DWT) capacity, cargo ships are categorized as:
 - **Handysize**: 28,000 – 40,000 DWT
 - **Supramax**: 50,000 – 60,000 DWT
 - **Panamax**: 65,000 – 80,000 DWT but have other dimensional limits (so that these vessels can travel through Panama Canal i.e, 1050 ft length, 110 ft width and 41.2ft depth.
 - **Capesize**: 75,000 -150,000 DWT (Sail via Cape of Good Hope, hence the word Capesize.
 - **Chinamax**: 380,000-400,000 DWT. Dimensions are limited by port infrastructure in China

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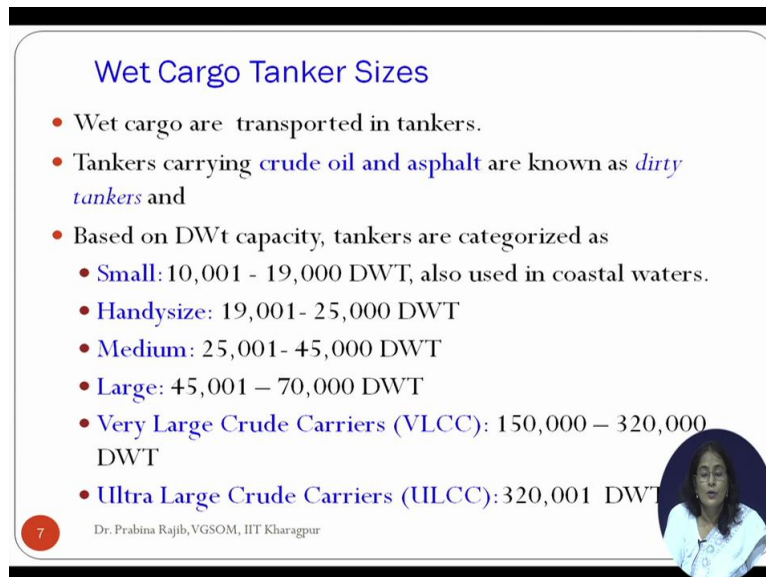
Now, before go into the derivative contract, it let us spend some time understanding little bit about dry cargo ship sizes. So this is very important because these fundamental factors will be used to used to discuss or will be used for when we will be discussing our derivative contracts on freight rates, so how we how do we categorize this dry cargo ship sizes. It is again it is a International Maritime Convention kind, it is not a country specific and it is based on the dead weight tonnage of a particular ship. And what do you mean by dead weight tonnage, dead weight tonnage indicates the carrying capacity of the ship, the cargo carrying capacity of the ship and it does not include the ship's own weight. So dead weight tonnage as I mentioned it is only the um the cargo carrying capacity of a particular ship.

So if a ship has somewhere within 28000 to 48000 dead weight ton capacity then it will be treated, it will be known as a handy size otherwise there are larger next larger ships will be known as Supramax and Panamax ships will have carrying capacity of 65,000 to 80,000 ton but there are also another interesting aspect to it, these ships have to have some specific dimension in terms of length and width and depth because these ships have to go through the Panama canal. So depending upon the size set by the Panama Canal Authority, these ships cannot have a longer dimension or bigger dimension than what has been mentioned.

Similarly, you have a bigger even bigger ships which have a 75000 to 150, 0000 deadweight tonnage capacity and they sail through Cape of Good Hope and that is why they are known as Capesize and there even bigger ships which are known as Chinamax and they carry normally 380000 to 480000 dead weight tonnage they have and these ships also has have certain dimensional restrictions because the port infrastructure of the China should be

accommodating these ships. So depending upon the dead weight capacity and the other dimensional requirement, this dry bulk cargo ships can be categorized into Handy Size, Supramax, Panamax, Capesize and Chinamax. Now, let us go to our discussion on how do these wet cargo ship sizes are categorized.

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Wet Cargo Tanker Sizes

- Wet cargo are transported in tankers.
- Tankers carrying **crude oil and asphalt** are known as *dirty tankers* and
- Based on DWt capacity, tankers are categorized as
 - **Small**: 10,001 - 19,000 DWT, also used in coastal waters.
 - **Handysize**: 19,001- 25,000 DWT
 - **Medium**: 25,001- 45,000 DWT
 - **Large**: 45,001 – 70,000 DWT
 - **Very Large Crude Carriers (VLCC)**: 150,000 – 320,000 DWT
 - **Ultra Large Crude Carriers (ULCC)**: 320,001 DWT

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Again, wet cargos are transported in tankers so we do not call these as ships, we normally use the word tankers and tankers carrying crude oil and this tar are known as Dirty tankers. So those tankers which start carrying this crude oil and asphalt, then these cannot be used for any other liquid or any other item. So these tankers are known as dirty tankers and other kind of a liquid like soybean oil or any other liquid natural gas and all, whatever they are other liquids which get transported in these tankers, they are known as clean tankers. Now, going to the size specification, you have small tankers which have 10000 to 19000 dead weight, Handy size has 19000 to 25000 deadweight capacity and I am sure you may have come across this word VLCC.

It is not that weight reduction clinic so it is VLCC is your Very Large Crude Carriers, so these are your they have a ton dead weight ton capacity of 150000 to 320000 tonnage and there is also ULCC that is Ultra Large Crude Carriers, 320000 dead weight tonnage capacity and are known as your ULCC that is ultra large scale crude carriers. Now, these where do these shippers or ship brokers and charterers meet? I mean where, there has to be a place somewhere international export import business somebody can anybody from let us say a company from India would like to export it to somewhere Saharan country or to China or it

could be USA or it would be any country in Europe so where do, how do they get to know, which ship to which ship to rent and or lease.

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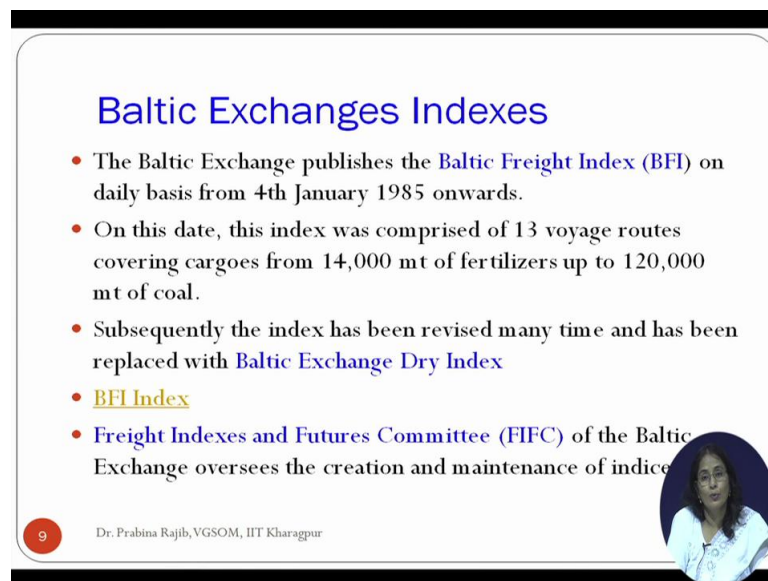


So there has to be exchange for it and in these exchange, you have a buyers and sellers of the freight rate and of course ship brokers will be the members and this exchange facilitates the buying and selling of there is lease or buying and selling or leasing of these ships. Now these 3 exchanges are well known in all over the world for and these are known as your freight exchanges so which these 3 are? The Baltic Exchange, the International Maritime Exchange and Shanghai Shipping Exchange, but today we are going to predominantly discuss about the Baltic Exchange because this is the largest exchange in terms of number of ship owners who are the members, number of charterers and number of ship brokers who have the ownership of who have taken the membership to operate in this particular exchange and this is also one of the oldest exchange all over the world.

It operated it started operating from 1744 onwards so it has a beautiful, very nice interesting history. If you go to Baltic Exchange website, there is an information section about how this Baltic Exchange has evolved through almost 250 years so that you if you are interested, you can learn more about it. Now, let us go to this Baltic Exchange so what exactly exchanges do, Baltic Exchange, Baltic Exchange provides a platform in which ship brokers try to arrange the or try to fix the buyers and sellers of the freight that means the charters will be informing the ship broker that they need some ship of this capacity or this tonnage and to carry goods from this place to that place and it is the responsibility of the ship brokers to identify a counter party.

So this exchange platform, Baltic Exchange platform or other 2 exchange platform provide that kind of a infrastructure so that the ship broker is able to identify, match the buyers and sellers interest. Now, besides matching the buyer sellers interest, Baltic Exchange also publishes certain indices and these are world over these are well known or it is reported which measures the activity the freight market if the index goes up, we this freight rates are going up. If the index is going down, the freight rates are going down in general.

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Baltic Exchanges Indexes

- The Baltic Exchange publishes the **Baltic Freight Index (BFI)** on daily basis from 4th January 1985 onwards.
- On this date, this index was comprised of 13 voyage routes covering cargoes from 14,000 mt of fertilizers up to 120,000 mt of coal.
- Subsequently the index has been revised many time and has been replaced with **Baltic Exchange Dry Index**
- **BFI Index**
- **Freight Indexes and Futures Committee (FIFC)** of the Baltic Exchange oversees the creation and maintenance of indices

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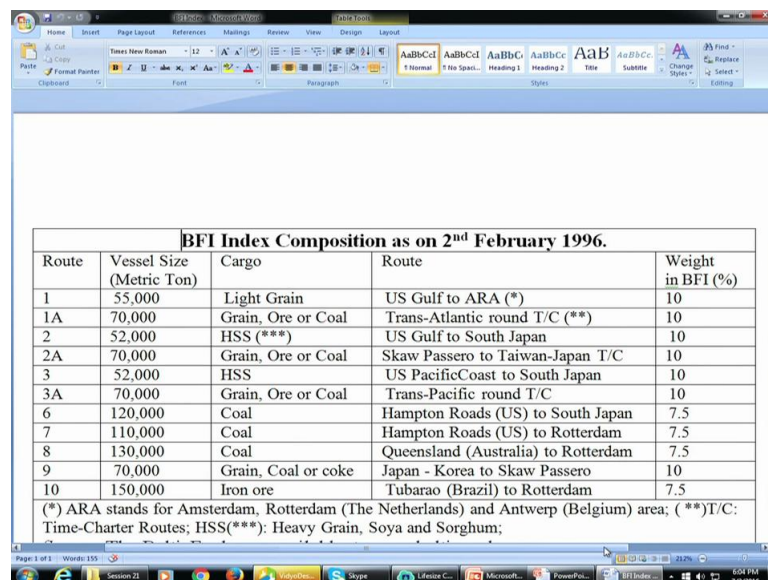
Now, let us spend some time understanding couple of index, how these are created and all because these are the basis on which these indices are the basis on which you have derivative contracts available for trading. Now, let us focus on this Baltic exchange indices so Baltic Exchange published Baltic Freight index on daily basis from 4th January 1985 onwards so this BFI was published for the first time on 4th January 1995 and 1985 and on this date, this index is comprised of 13 voyage routes covering cargo from 14000 metric ton of fertilizers up to 120000 metric ton of coal.

Now, all of that a index has to represent a underlying market so there has to be some way of collecting information with respect to the market so that when we prepare the index and report it to the market report it to in general, then people understand what is the condition of the underlying market. So what is the underlying market in case of Baltic Exchange, underlying market is the rate at which buyers and sellers that is shippers and charterers are entering into different kind of a contract so that is a physical market operation so based on that operation or based on those prices, the index gets calculated.

So it is nothing fancy or nothing more or less than the how stock exchange indices are calculated and reported. However because there are routes involved so and different kind of ships and involved, different kind of goods are involved so there is little bit of a different calculation. We will take a numerical example to work out how these indices is calculated and reported. Now, this Baltic freight index, it started in 4th January 1985 and it was subsequently many a times this index has been revised like any equity index, new company joined and old companies are asked are removed. Exactly, new routes were identified and which routes gets added to the exchange.

The route which is probably having a more export-import, more cargo transaction happening in that particular route, so that is going to be incorporated into the index and a may be older route, another route which is does not have that much of cargo volume probably will be dropped from the index. Now, this Baltic Freight Index was rechristened or renamed it is now known as a Baltic Exchange Dry Index. Now, let us go and I hope you are able to see this particular page. Yes. Now, this is the index composition of BFI index as on 2nd February 1996.

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Route	Vessel Size (Metric Ton)	Cargo	Route	Weight in BFI (%)
1	55,000	Light Grain	US Gulf to ARA (*)	10
1A	70,000	Grain, Ore or Coal	Trans-Atlantic round T/C (**)	10
2	52,000	HSS (***)	US Gulf to South Japan	10
2A	70,000	Grain, Ore or Coal	Skaw Passero to Taiwan-Japan T/C	10
3	52,000	HSS	US PacificCoast to South Japan	10
3A	70,000	Grain, Ore or Coal	Trans-Pacific round T/C	10
6	120,000	Coal	Hampton Roads (US) to South Japan	7.5
7	110,000	Coal	Hampton Roads (US) to Rotterdam	7.5
8	130,000	Coal	Queensland (Australia) to Rotterdam	7.5
9	70,000	Grain, Coal or coke	Japan - Korea to Skaw Passero	10
10	150,000	Iron ore	Tubarao (Brazil) to Rotterdam	7.5

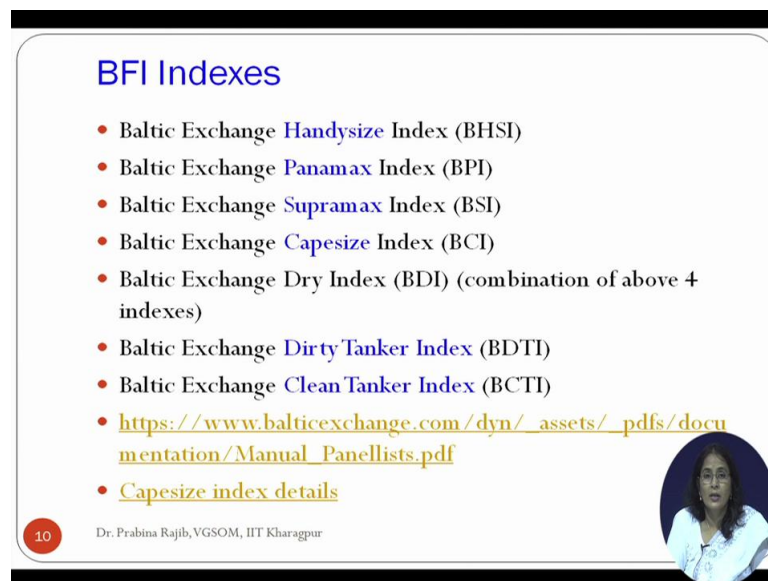
(*) ARA stands for Amsterdam, Rotterdam (The Netherlands) and Antwerp (Belgium) area; (**)T/C: Time-Charter Routes; HSS(***) Heavy Grain, Soya and Sorghum;

If you can see this had 10 routes so the Exchange Committee, Index Management Committee had identified these 10 routes and what are the vessel size in these 10 routes and what cargo normally is going in these routes and what is the route so this is your let us say US gulf to south Japan so this is 1 routine. You have SRO to Taiwan Japan, you have Hampton roads to south Japan so different routes were identified and each route has been given a weightage, so

depending upon the total cargo being transacted in that particular route, different routes were given different weight.

So and who calculates and reports these indices, so you have Freight Index and Futures Committee, the Baltic Exchange has a Freight Index and Futures Committee. That committee is responsible for calculating and maintaining each of these indices so what are the besides the Baltic Dry Index, what are the other indices which are reported by Baltic Exchange?


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BFI Indexes

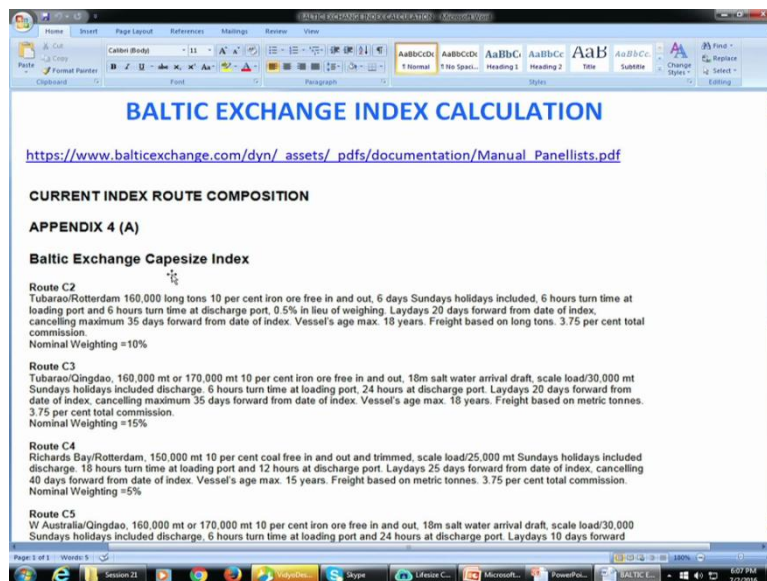
- Baltic Exchange **Handysize** Index (BHSI)
- Baltic Exchange **Panamax** Index (BPI)
- Baltic Exchange **Supramax** Index (BSI)
- Baltic Exchange **Capesize** Index (BCI)
- Baltic Exchange Dry Index (BDI) (combination of above 4 indexes)
- Baltic Exchange **Dirty Tanker Index** (BDTI)
- Baltic Exchange **Clean Tanker Index** (BCTI)
- https://www.balticexchange.com/dyn/assets/pdfs/documentation/Manual_Panellists.pdf
- [Capesize index details](#)

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If you can see, these are handy size index, that is Panamax index, Supramax index, Capesize index and Dirty tanker index and Clean tanker index. And here this is the link which if you want to know how exactly each of these index is calculated, the complete document is available with this link, at his link. Again, as this a proprietary document and I will not be able to upload this particular document when you would be seeing this video, so you have to if you are interested, you have to download this document and spend more time on understanding how this and these indices are calculated. And I will just take you through I have just done I have taken some extracts from this particular um this particular document so Baltic Exchange calculation and this is the index calculation for the Baltic Exchange Capesize index.

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So if you can see route 2, it has got. If you can see this is route 2, some route to Tubarau to Rotterdam that is mentioned, what is the weight; 10%. Similarly Tubarau to Qingdao 15%, Richards Bay to Rotterdam 5%, so different routes are given and now who is going to give the quotation. I mean what price is prevailing when a particular ship is traveling from route is traveling in the route 3 let us say. So the ship brokers, it is not the ship owners or the charterers who give the quotation, it is the quotation which is collected by the Baltic Exchange from the ship brokers and all this information, the prices, it collects and then the weight is available and it calculates the index and reports this index value to the world in general.

So we will be winding up this session today at this point of time. We will be continuing with the next session of taking an example of how this one of these index is calculated and also the different other aspects of how what are the derivative contracts on this freight rate are available and as usual, thanking all of you, looking forward to meeting you all in the next session.