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On

Freight Derivatives & Risk Management: Potential for FFA's in the Dry Bulk Sector

Submitted in Partial fulfillment of the requirement

for the award of the degree in

MBA (Energy Trading)

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DECLARATION

I do here by declare that the dissertation work titled **"Freight Derivatives & Risk Management: Potential for FFA's in Dry Bulk Sector"**, submitted in partial fulfilment for the Master of Business Administration –Energy Trading in University of Petroleum & Energy Studies, Dehradun , and is a record of bonafide work done by me under the guidance of **Prof.Abhijit Singh of Port and Shipping Department, College of Management & Economic Studies, University of Petroleum & Energy Studies, Dehradun** and no part of it has been submitted for any other Degree or Diploma.

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21/09/2014

Noel Joseph William

Bonafide Certificate

This is to certify that Mr. Noel Joseph William, student of University of Petroleum and Energy Studies, Dehradun, pursuing MBA (Energy Trading), has successfully completed his dissertation project. As a part of his curriculum, the project entitled "Freight Derivatives & Risk Management: Potential for FFA's in the Dry Bulk Sector" submitted by the student to the undersigned is an authentic record of his original work which he has carried out under my supervision and guidance and no part of it has been submitted for any other Degree or Diploma.

I wish him all the best in his future endeavors.

21/4/2014

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Last but not the least I thank God and my Parents for being there for me during hard times.

-Noel Joseph William.

Executive Summary

The world shipping market is cyclical in nature and the freight rates generally tend to be volatile in nature. Freight rates & the earnings of shipping companies are basically and primarily based on the function of demand and supply in the world markets. The main demand drivers for shipping are a function of trade, geographical balance of trade, growth and the driving factors of supply are a function of new ship building orders and the scrapping of existing tonnage.

The major bulk cargoes comprises of two thirds of the dry bulk cargoes transported. The major dry bulk cargoes include Iron Ore, Coal, Bauxite, Phosphate Rock and Grains. The minor dry bulk cargoes include agribulks, metals, fertilizers, steel, minerals and forest products

During the year 2013, the minor bulk volumes accounted to 1.4 billion tonnes and the major bulk volumes summed up to 2.7 billion tonnes making the dry bulk's share two thirds in the global shipping industry. The net cash from its operations is the main driving factor of any shipping company and any hindrance to that can put the company into staggering losses. For a shipping company, the risk that may arise can be classified into three main categories: Credit risk, Price Risk & Real Risk

For a ship owner, higher freight rates are profitable and in case of a charterer low freight rates are beneficial. Hence, in a freight future market, the ship owner enters into a derivative contract to protect him from the prices going down and the charterer enters into a freight derivative contract to hedge the risk of prices going up. As the dry bulk industry comprises of two thirds of the world shipping. It is very important for the ship owner and the charter to secure the most beneficial freight rate for their operations. The freight rate market is highly volatile and the freight rates are prone to heavy fluctuations. Using Forward Freight Agreements the Ship Owner and the charter can mitigate the risk that arise due to freight rate fluctuations and possibly and hedge the price risks that may arise in the future.

In this study, I will be explaining how the FFA is beneficial for the Dry Bulk Shipping Industry in hedging the Freight Rate risks.

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Chapter 1: Introduction

Shipping sector is a global industry that its prospects are closely tied up to the level of all economic activity in the world. A high level of economic growth results generally to high demand for the industrial raw materials, which in turn boosts the imports and exports. The world shipping market is cyclical in nature and the freight rates are generally tend to be volatile in nature. Freight rates & the earnings of shipping companies are basically and primarily based on the function of demand and supply in the world markets. The main demand drivers for shipping are a function of trade, geographical balance of trade, growth and the driving factors of supply are a function of new ship building orders and the scrapping of existing tonnage.

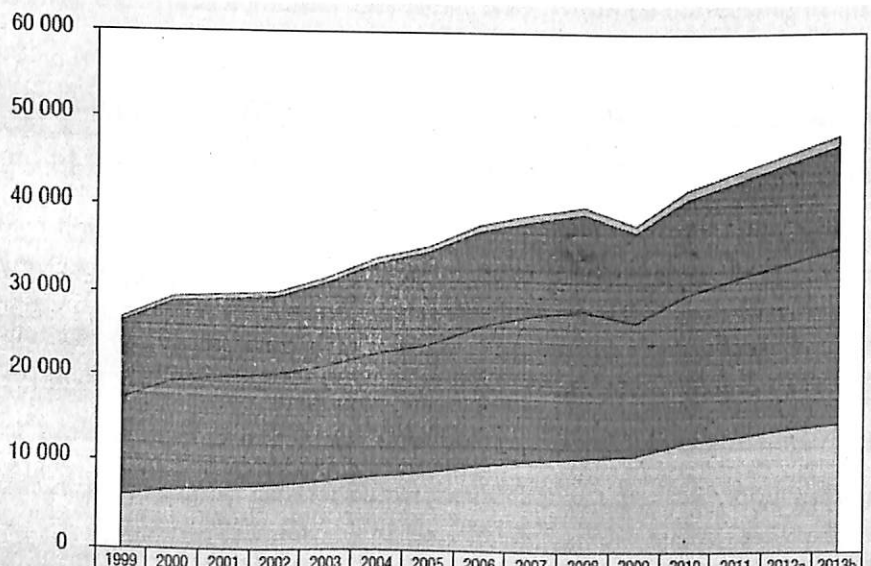
There exists different types of ship chartering contracts in the bulk shipping industry, these contracts provide charterers greater flexibility in securing their sea transportation requirements, meanwhile minimizing their costs. These contracts vary each other depending on the terms of agreement entered and the mode of service that ship owners agrees to provide to charterers. Broadly speaking, chartering contracts can be classified into five different types: Voyage Charter (VC), Consecutive Voyage or Contracts of Affreightment (CoA), Trip Charter (TC), Time or Period Charter (PC), and Bareboat Charter (BC) contracts. The main differences among these contracts are the: duration of the contract, method of freight rate calculation, cost allocations and commercial and operational responsibilities.

The world's dry bulk fleet of ships is broadly differentiated into five size classes: **Handysize** (20,000 to 35,000 dwt), **Handymax** (35,000 to 45,000 dwt), **Supramax** (45,000 to 55,000 dwt), **Panamax** (60,000 to 80,000 dwt) and **Capesize** (more than 80,000 dwt, normally 120,000 to 180,000 dwt). Capesize bulk carriers are almost exclusively involved in transportation of major dry bulk commodities, i.e., iron ore and coal, between exporting and importing regions. Panamax vessels are also involved in transportation of iron ore and coal in addition to grain. Midsize dry bulk carriers, using Supramax and Handymax vessels, are involved in transportation of grain, bauxite and alumina, and phosphate rock, in addition to minor bulk commodities. Handysize and smaller bulk ships are usually equipped with cargo handling gears (cranes) and transport small-shipment-size bulk commodities between ports with relatively shallow water depths.

The Baltic Dry Index is a number issued by the Baltic Exchange of London which shows the price movements of major dry bulk through the sea. The Baltic Dry index is a key indicator of the Dry Bulk Shipping Industry. The Baltic Dry Index is calculated by taking into account 23 major shipping routes on the basis of time charter contracts. The Baltic Dry Index is not limited only to Baltic Sea countries. Given below is a figure if the Baltic Dry Index from the year 2007 to 2013. As the Dry bulk shipping consist of Handymax , Handysize , Panamax and Capesize vessels, Handymax ad handy size are used for minor bulks thus having only a very small market share. Panamax and Capesize have a great importance in the derivatives market.

The Dry bulk industry is divided into two main parts: (a) Major Bulk (b) Minor Bulk. The minor bulk cargo is transported using Handymax, Handysize and Supramax vessels while the major bulk which has the tow third share of the dry bulk segment is transported using Panamax and Capesize vessels. Panamax vessels is the upper limit of the size of the ship that can pass through the Panama Canal and capsize vessels has to go around the Cape of Good Hope because of its huge size. "Major bulks comprise two thirds of the dry bulk sector and include iron ore (27 %), coal (26 %) and grain (14 %)." (ICMA DP2010-04).

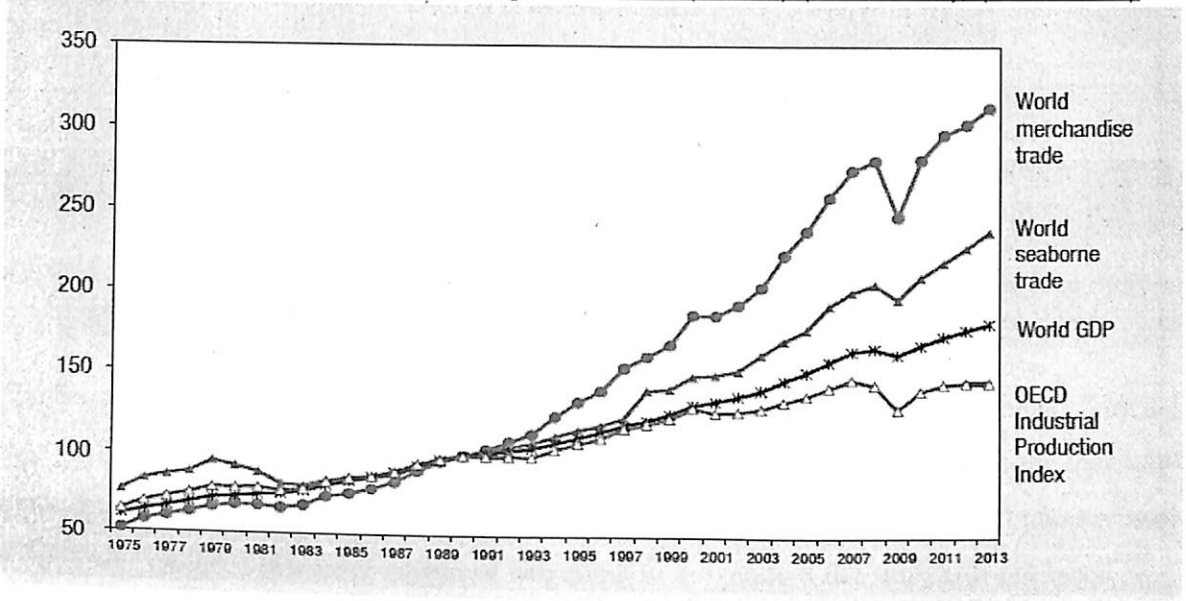
Figure 1.1: World Seaborne Trade in Ton Miles by cargo types



	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012a	2013b
Gas	456	490	498	527	559	596	608	706	790	846	840	1 041	1 069	1 076	1 133
Oil	9 249	9 652	9 390	9 144	9 714	10 430	10 727	11 033	10 967	11 166	10 501	11 018	11 207	11 471	11 832
Other dry cargo	11 191	12 580	12 903	13 098	13 721	14 641	15 236	16 491	17 077	17 359	15 705	17 564	18 744	19 476	20476
Five main dry bulks	6 046	6 845	7 100	7 416	7 955	8 601	9 035	9 804	10 449	10 895	11 207	12 609	13 264	14 137	14 749

Source: RMT 2013

Figure 1.2: The industrial production index and indices for world merchandised trade, world gross domestic product and seaborne shipments made (OECD) (1975–2013), (1990 = 100)



Source: OECD

1.1: Supply & Demand for World Sea Borne Trade

The world sea borne trade has been driven in particular by China's domestic demand increase as well as the increased intra-Asian and South– South trade, international seaborne trade performed better than the world economy this time, with volumes increasing at an estimated 4.3 per cent in 2012, nearly the same rate as 2011. About 9.2 billion tons of goods were loaded in ports worldwide, with tanker trade (crude oil, petroleum products and gas) accounting for less than one third of the total and dry cargo being responsible for the remaining lion's share Strong growth (5.7 per cent) in dry-cargo shipments remained the mainstay of the expansion in 2012, driven in particular by continued rapid growth in dry bulk volumes. Fuelled by growing Asian demand for iron ore and coal and in line with the long-term trend, major dry-bulk shipments expanded at the rate of 7.2 per cent. China, which has contributed significantly to the growth of seaborne trade in recent years, continues to generate impressive import volumes. Although iron-ore import growth has moderated compared with high previous levels, coal has stepped in to fill the gap.

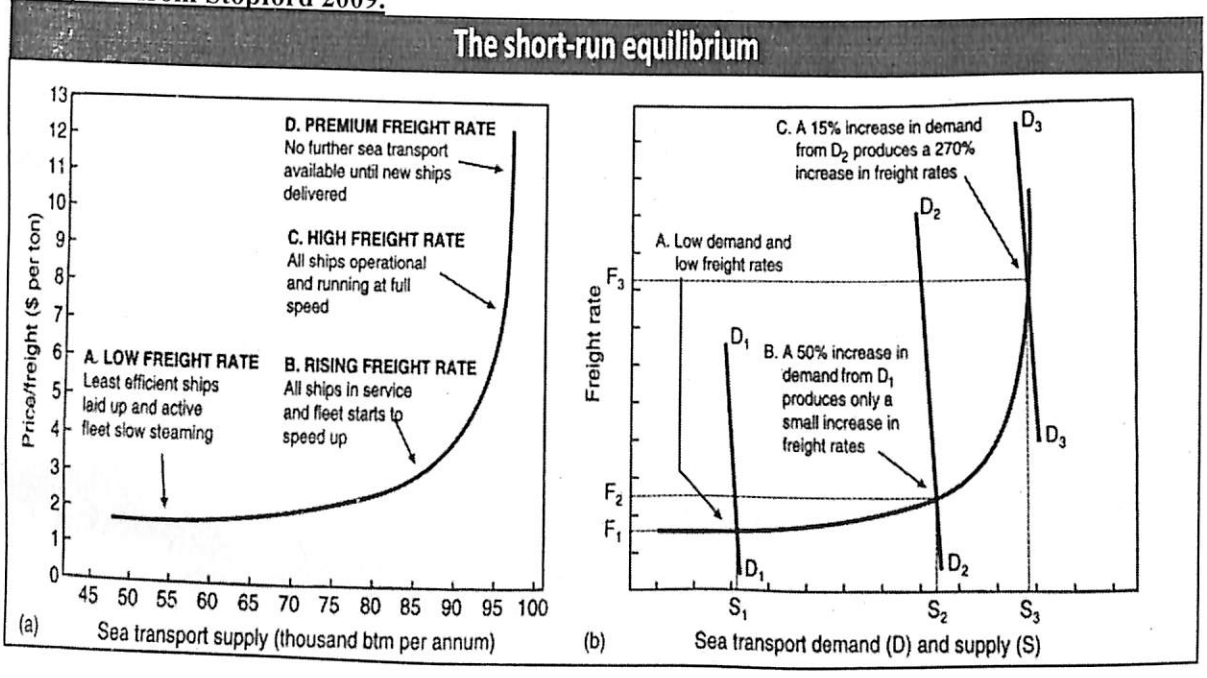
UNCTAD secretariat, on the basis of OECD *Main Economic Indicators*, May 2013; UNCTAD, The Trade and Development Report 2013; UNCTAD *Review of Maritime Transport*, various issues; World Trade Organization (WTO) (table A1a); the WTO press release 688, 10 April 2013, "World trade 2012, prospects for 2013".

Table 1.1: Supply & Demand Factors

Supply	Demand
The World Fleet Economy	World Fleet
Seaborne Commodity Trade	Fleet Productivity
Average Haul	Ship Building
Random Shocks	Scrapping
Transport Costs	Freight Revenue

The Supply starts with the volume or the size of the merchant fleet, and it is influenced by the ship owners, bankers, charterers and other regulatory authorities which govern the maritime transport. The fleet growth depends upon the number of ships built or scrapped. It takes around a full year to build a merchant vessel, or can go up to 2-3 years if the shipyards are busy.

Figure 1.3: Short-run equilibrium: (a) short-run supply function; (b) short run adjustment. Compiled from Stopford 2009.



The short-run supply curve is shown in **Figure 1.3**, illustrates the ton miles of transport/vessels available at various levels of freight rates, for a given size of fleet. At times when the freight rate is low, inefficient ships are laid up and as the freight rate increases, these laid up / stacked up ships enters into the market until all ships are operational, which eventually results in the increase in supply . Furthermore, we note that the above mentioned short-run supply curve becomes more inelastic when the freight rate increases. As and when the market reaches the

premium freight rate levels, the elasticity is almost or is perfect and no further supply is obtained by increasing freight rate. Market situations where there is high and premium freight rates, all the ships will be operational and running at full speed so as to increase their earnings. Additional supply will only be available when new buildings enters the market and as mentioned above, a new build will need at least one to two years for completion . While turning to the short-run adjustment with demand curves, we can elaborate how freight rates are determined.

Freight rates are settled were supply equals demand. **Figure 1.3** shows three equilibrium points, all with different supply/demand levels. When the demand is low, freight rates are settled at point *F*1 as the supply curve is elastic in the periods/levels with low freight rates, an increase in demand to point B will only result in a slight increase in freight rates. At point C, the supply curve becomes more inelastic and the shift in the demand is sufficient to treble the level of freight rates to point *F*3

Short-run supply and demand are also influenced by seasonal cycles, both short and long. Examples of seasonal cycles are the high volumes of grain transported from August and the end of the year, and high demand for shipments with oil to the Northern Hemisphere in the winter. Short cycles, also called business cycles, may have duration between 3 to 12 years. Long cycles are related to regional, economic or technological change (Stopford, 2009).

Table 1.2: The market tone from 150 years of shipping cycles.

Period	*Demand Growth*	*Supply Tendency*	*Market Tone*
1869-1914	Fast	Expanding	Competitive
1920-1930	Fast	Over Capacity	Weak
1930-1939	Falling	Over Capacity	Depressed
1945-1956	Very Fast	Shortage	Prosperous
1956-1973	Very Fast	Expanding	Competitive
1973-1988	Falling	Over Capacity	Depressed
1988-1997	Slow	Expanding	Competitive
1998-2007	Very Fast	Shortage	Prosperous
2007-2013	Slow	Over Capacity	Depressed

Source: Stopford, 2003

Figure 1.4: The projected Iron Trade flow in 2015 and the geographic trade route

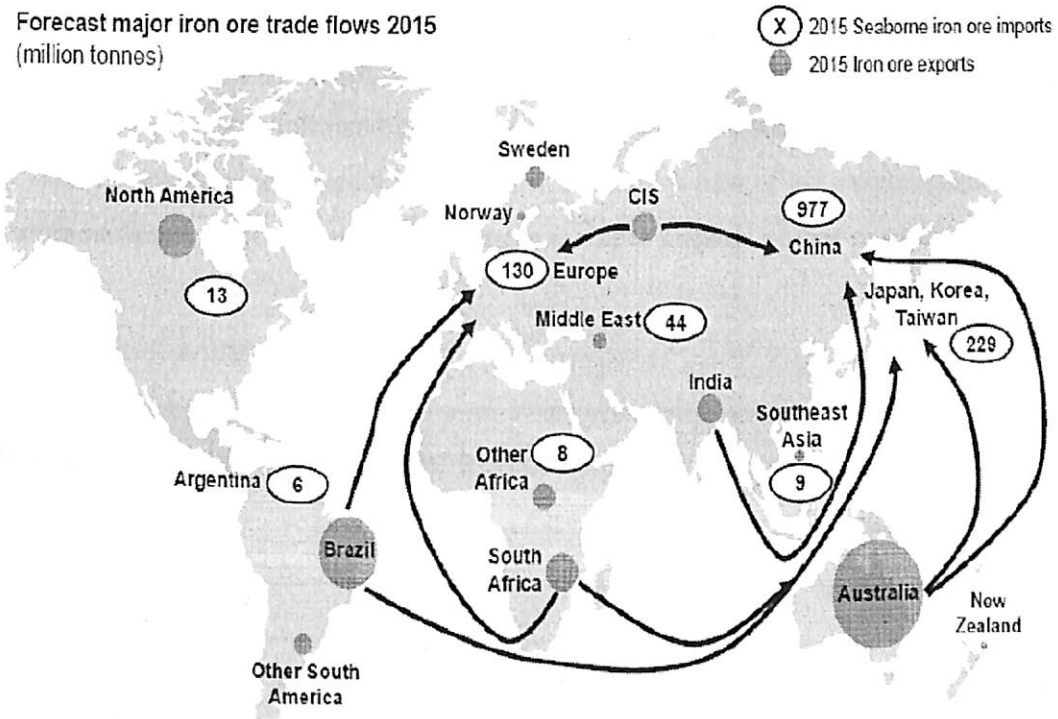
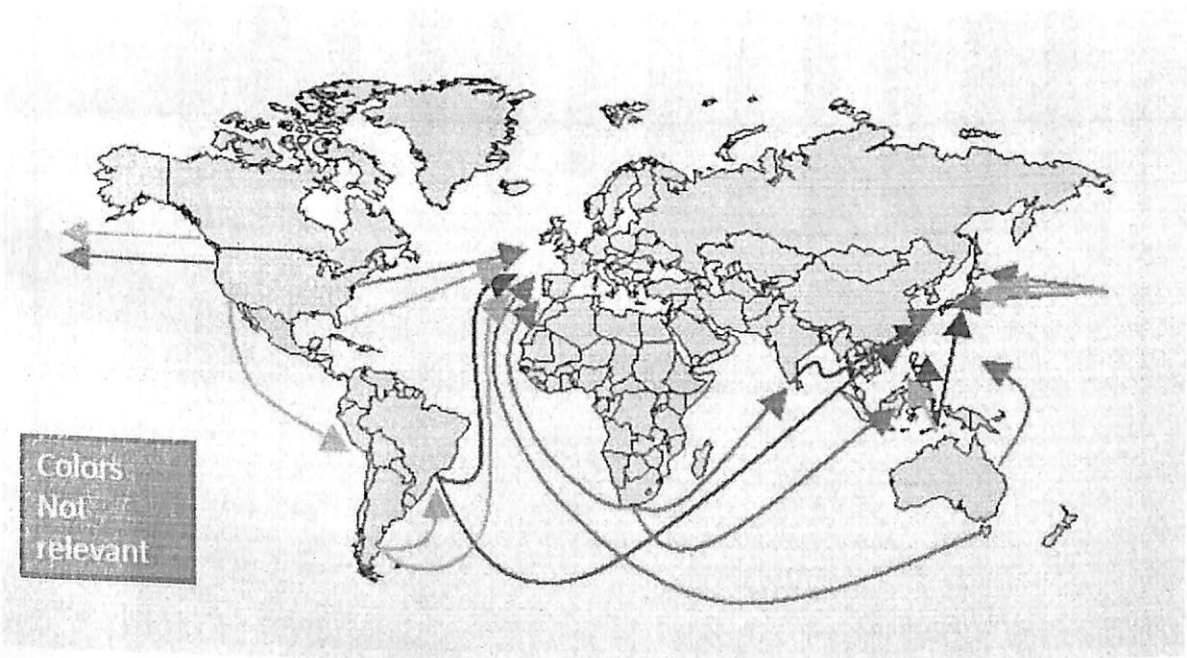


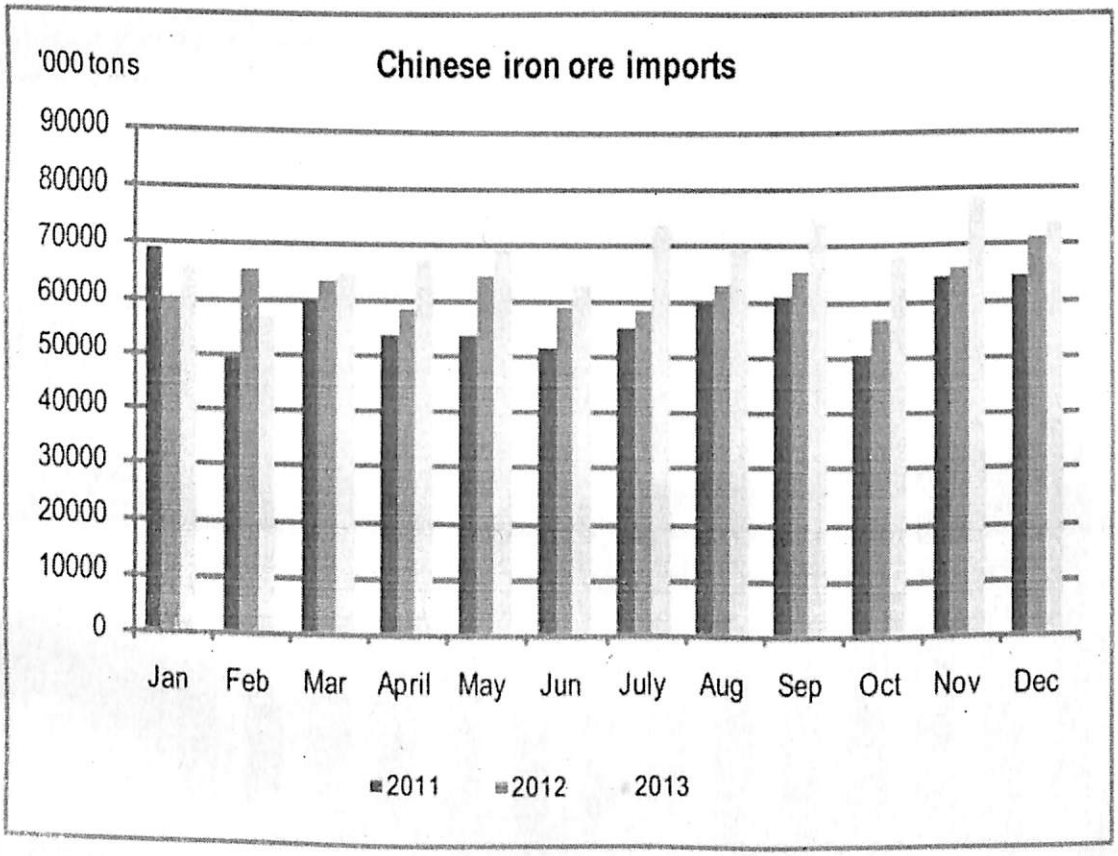
Figure 1.5: Iron Ore and Coal Trade route for Cape and Panamax vessels



Source: Ron Wilson FICS, 2013

Shipping cycles of the past 150 years are summarized in **Table 1.2**. It is evident that there have been two periods of prosperity, one in the 1950s and the second period from 1998 to 2007. Both are the result of growing demand for seaborne freight services and the shortage of shipbuilding capacity. Three of the periods have been characterized by unusual competitiveness, with growth in trade and increased shipbuilding capacity. The weak shipping markets of the 1920s, was followed by a decrease in trade, and shipbuilding overcapacity in 1930s. The last years shipping market are characterized by first of all overcapacity of ships. The growth has been positive, much due to large Chinese imports of raw materials.

Figure 1.6: Chinese Iron Ore Imports



Source: UIDB, 2013

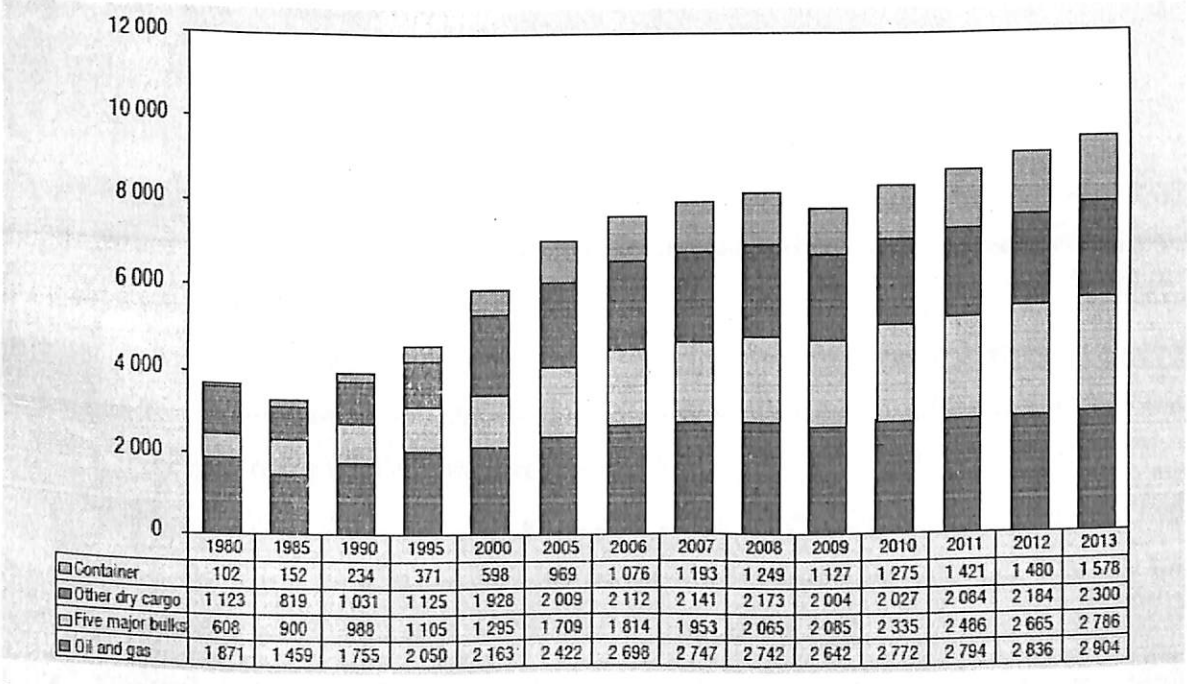
Figure 1.7: Developments in International Sea Borne Trade

Developments in International Sea Borne Trade(Selected Years)				
Year	Oil and gas	Main bulks [a]	Other dry cargo	Total (all cargoes)
1970	1 440	448	717	2 605
1980	1 871	608	1 225	3 704
1990	1 755	988	1 265	4 008
2000	2 163	1 295	2 526	5 984
2005	2 422	1 709	2 978	7 109
2006	2 698	1 814	3 188	7 700
2007	2 747	1 953	3 334	8 034
2008	2 742	2 065	3 422	8 229
2009	2 642	2 085	3 131	7 858
2010	2 772	2 335	3 302	8 409
2011	2 794	2 486	3 505	8 784
2012	2 836	2 665	3 664	9 165

Source: UNCTAD

Iron ore, grain, coal, bauxite/alumina and phosphate rock. Data from 2006 onwards are based on various issues of the *Dry Bulk Trade Outlook*, produced by Clarkson Research Services.

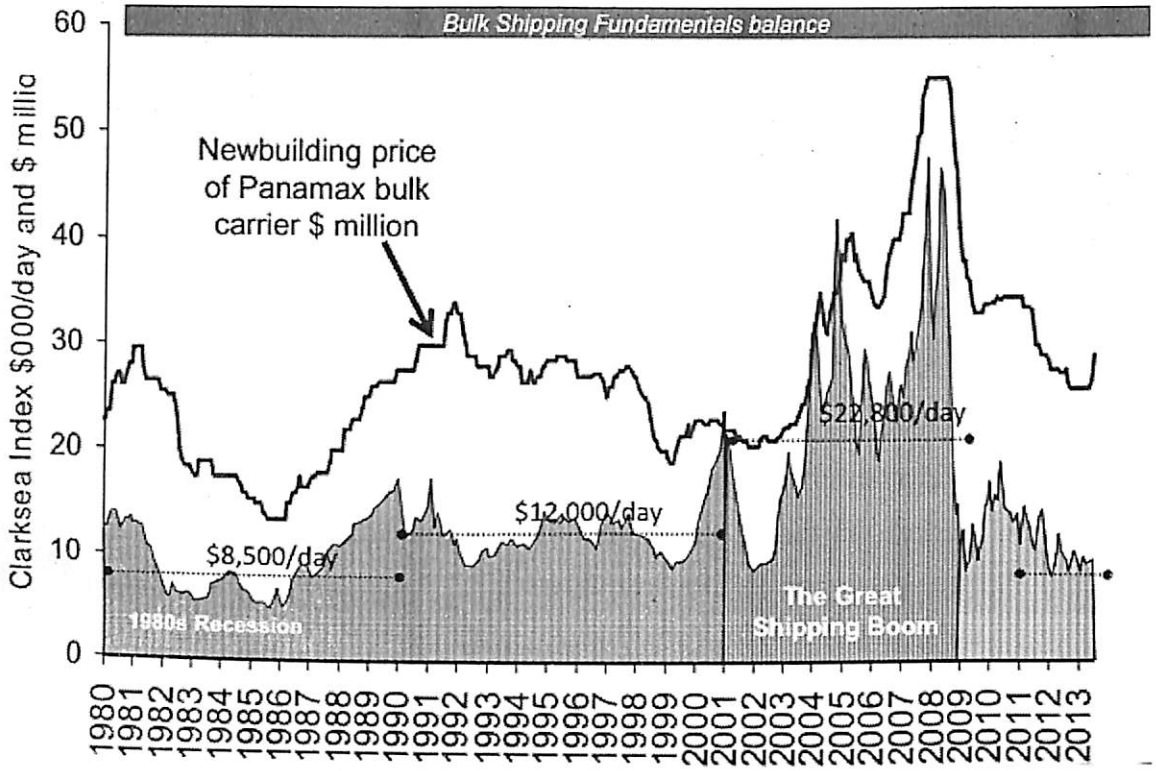
Figure 1.8: International Sea Borne Trade in Millions of Tons Loaded



	1980	1985	1990	1995	2000	2005	2006	2007	2008	2009	2010	2011	2012	2013
Container	102	152	234	371	598	969	1 076	1 193	1 249	1 127	1 275	1 421	1 480	1 578
Other dry cargo	1 123	819	1 031	1 125	1 928	2 009	2 112	2 141	2 173	2 004	2 027	2 084	2 184	2 300
Five major bulks	608	900	988	1 105	1 295	1 709	1 814	1 953	2 065	2 085	2 335	2 486	2 665	2 786
Oil and gas	1 871	1 459	1 755	2 050	2 163	2 422	2 698	2 747	2 742	2 642	2 772	2 794	2 836	2 904

Source: UNCTAD

Figure 1.9: Ship Earnings Super Cycle



Source: Clarksons Research Services

1.2: Deployment of Ships

The main participants in the freight market are the ship owners and the charterers. Ship owners are the parties who have the vessels for hire, while the charterers have the cargo to transport. It's a common practice that parties enter into a contractual agreement which is called a charter party. Most commonly used charter parties are voyage charter, time charter, bareboat charter and contract of Affreightment (COA). Costs and risks are distributed differently under each contract. If the ship owner and charterer enters into a:

- **Voyage charter,** the ship owner will agree to transport a specific cargo between two ports. Freight is paid to the ship owner at a fixed price per ton, e.g. 10$/MT for transporting of 150 000mt of coal from JNPT to Cochin Port.
- **Contract of Affreightment (COA)** is a Binding agreement which sets forth the obligations and rights of the owner of a vessel (aircraft or ship) and a merchant. The vessel owner undertakes to provide cargo-space (at a specified time, and for a specified freight) to the merchant who is liable for payment whether or not the cargo is

ready for shipment. This contract addresses issues associated specifically with a vessel, its crew, and the routes on which it will be plied. Also called contract of Affreightment.

- **Time Charter,** the charterer decides which ports to call, and which cargo the vessel shall carry. In return, he pays a fixed rate per day in addition to port and fuel costs. If the vessel is fixed on a voyage charter or COA the ship owner pays for port costs and bunkers.
- **Bareboat charter**, the charterer manages the vessel and pays for operating and voyage costs.

The ship owner (or charterer) can secure the revenue (cost) for a period of time equal to the length of the contract. Either the ship owner or the charterer loses money when the spot freight rate or hire deviates from the agreed price. The ship owners gain is the charters loss and vice versa

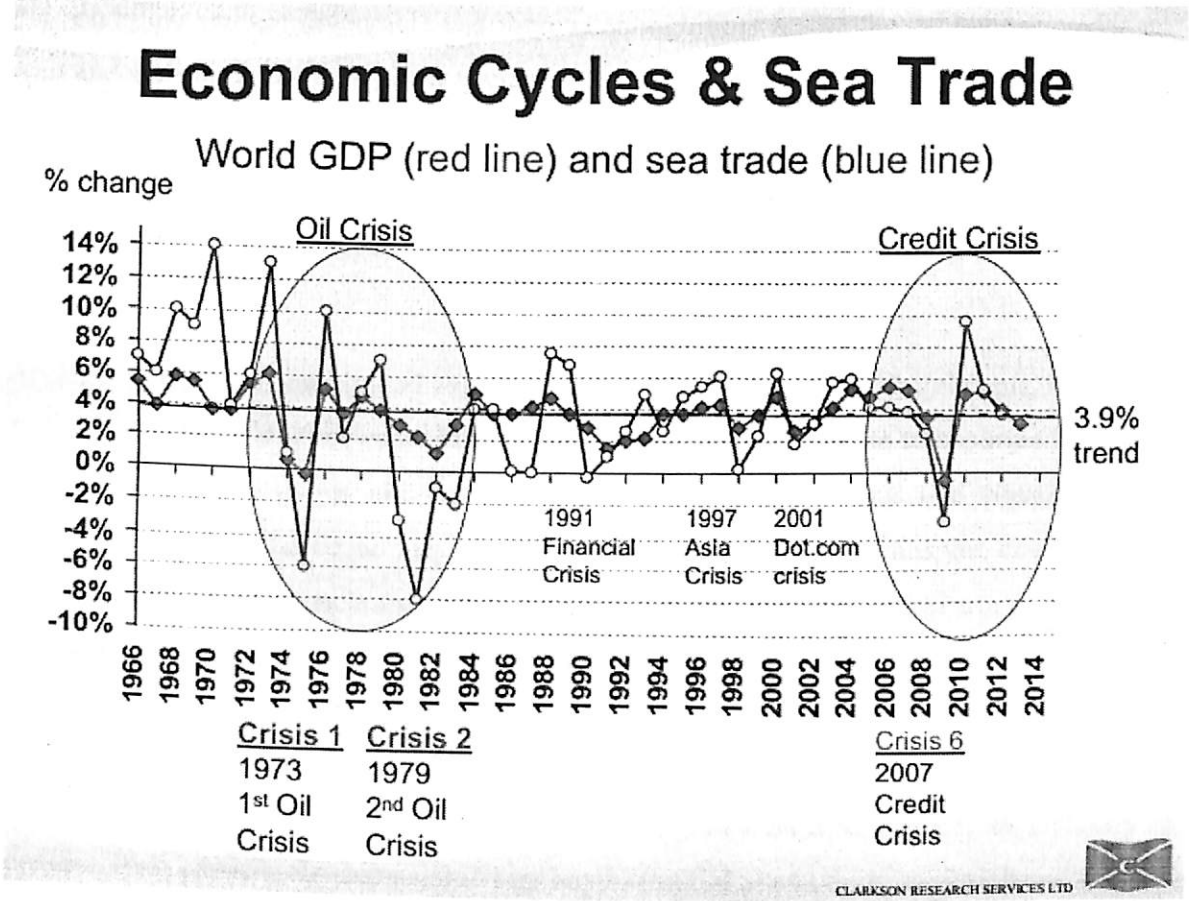
1.3: Global Economic Growth

The International Monetary Fund (IMF) estimated that global economy is expected to expand by 3.3% in 2014, which is half a percentage point less than the actual growth recorded in 2013. Europe has suffered the most, as the region's GDP is expected to have declined by a little more than half a percentage point in 2014. Leaded by China, most of the developing countries remained as a key contributor to global growth in 2013. Meanwhile, the emerging markets of Asia and Latin America countries also experienced weaker economic growth rather than the forecasted. China's economy grew 7.8% in 2012, which is the lowest level in 13 years, as the domestic and export markets cooled. By comparison, the Chinese economy grew by 10.4% in 2010 and 9.3% in 2011. In total, global seaborne trade volumes are estimated to have increased by a little less than 4% in 2012, whereas the world fleet is expected to have expanded by almost 9%.

During the year 2012-2013, volumes of crude oil and refined petroleum products have grown marginally at 1.5 per cent. It should be noted that, however, when the economic slowdown, increase in oil price levels and new technologies have reduced the demand for crude oil, petroleum-product trade fared better in comparison. As regards gas trade, minimal additions of liquefaction installations during the year have constrained volumes, which increased by a moderate 1.6 per cent. Reflecting to a large extent their increased participation in the world trading system, developing countries continued to contribute larger shares to international seaborne trade. In 2012, they accounted for 60 per cent of global goods loaded and 58 per cent

of goods unloaded in 2012 .However, while the group's share has been on the rise, contributions by individual countries have been uneven, reflecting their respective varying levels of integration into global trading networks and supply chains.

Figure 1.10: Economic Cycles & Sea Trade



Freight rates in the bulk shipping industry fluctuate drastically in the short run (Kavussanos, 1996). But such fluctuations affect the formation of the shipping policies, transactions and contracts and also ship owners' and charterers' cash flows and costs (Brown et al. 1987 and Laulajainen, 2007). The macroeconomics determinants of shipping bulk freight rates include the state of the general world economy, international seaborne trade, the tonnage available for trading, bunker prices, and the changes in fleet due to delivery of new vessels and also the sending of vessels for scrapping (Strandenes 1984, Beenstock and Vergottis, 1989). In addition to the above mentioned, freight rates are dependent on vessel characteristics such as size and age of vessels, the route in which the vessel is employed and the terms of charter contracts. The terms and conditions of the charter contract, e.g., the loading date in relation to the contract date and the cargo size in relation to vessel's capacity, are also determinants of freight rates.

Hence, assuming vessels are available in the market at all time and at a constant flow, the trader has the option to enter into the freight market and hire a vessel anytime until the very last minute (as long as it is practical) before the layday. Therefore, it is the trader's decision for all practical purposes as to when to enter the market and charter (or hire) a ship. For instance, if the conditions are not favourable and there is enough time before the layday, the trader may wait and not inform the shipbroker about the need for a ship. The charterer's decision of when to charter a ship i.e., the fixture date, is dependent on such market conditions as current and expected freight (charter) rates, the volatility of freight rates, and the cost to be incurred of not being able to find a ship to charter if the decision to hire a ship is delayed.

1.4: Vessel Types

Approximately 90% of all traded volume is transported by sea. Large instalments, like drilling rigs and long pipes have no other alternative of transportation and are transported by purpose built vessels. Other goods like coal, grain, ore, petroleum products and consumer goods (containers) utilize the economies of scale in shipping to reduce transport costs. Tankers, bulkers and container vessels are built to carry these goods. It can therefore be more economical to import goods from thousands of miles away by sea, than to obtain the goods from some domestic location.

Vessels that transport dry cargo in bulk are generally called bulk carriers. These vessels are the work horses of the fleet and transport coal, iron ore, grains, bauxite, paper rolls, fertilizer and cement. Bulk carriers are characterized by hatches raised above deck level to cover the large cargo holds. Vessels transporting crude oil, petroleum products and chemicals are called tankers. Tankers are similar to bulk carriers, but can be distinguished by the pipelines and vents on deck. This thesis investigates freight rates and Forward Freight Agreements (FFA) associated with only Bulk Carriers, which again can be divided into subcategories of vessel types and sizes:

- **Capesize** bulk carriers typically transports coal or iron ore and has a displacement of 100,000 to 180,000 dwt. In general it serves deep-water terminals and can access 19% of the world ports. This vessel is too big for the Suez- and Panama Canal, and have to go round the Cape of Good Hope and Cape Horn.
- **Panamax bulk** carriers are primarily used for transporting grain or iron ore. Typical displacement is between 60,000 to 70,000 dwt. These vessels can enter approximately 27% of the ports in the world. It is the largest that can pass thru the Panama Canal.

- **Supramax** & **Handymax** are bulk carriers with a capacity less than 60,000 dead weight tonnage (dwt). A Handymax vessel typically has a capacity between 35,000 and 50,000 DWT, while Supramax vessels are relatively bigger in size with 50,000 to 60,000 DWT. Modern Handymax designs are typically 52,000-58,000 DWT in size. These bulkers are well suited for small ports with length and draught restrictions, or ports lacking trans-shipment infrastructure. As a result, Handymax and Supramax bulkers represent the majority of bulk carriers over 10,000 DWT. Though these bulkers are primarily used for carrying dry cargo such as iron ore, coal, cement, finished steel, fertilizer, and grains, sometimes the category is also used to define small-sized oil tankers.
- **Handysize** most usually refers to a dry bulk vessel with deadweight of up to 50,000 tonnes. This allows the ships to enter smaller ports to pick up cargoes. Vessels of a deadweight of above 35,000 tonnes are referred to as Handymax bulkers (typically 35,000 - 50,000 tons deadweight); there is no well-defined or widely accepted size sector below 15,000 tons. Compared to larger bulk carriers, Handysizes carry a wider variety of cargo types. These include steel products, grain, metal ores, phosphate, cement, logs, woodchips and other types of so-called 'break bulk cargo'. Handysize bulkers are built mainly by shipyards in Japan, Korea, China, Vietnam, the Philippines and India, though a few other countries also have the capacity to build such vessels.

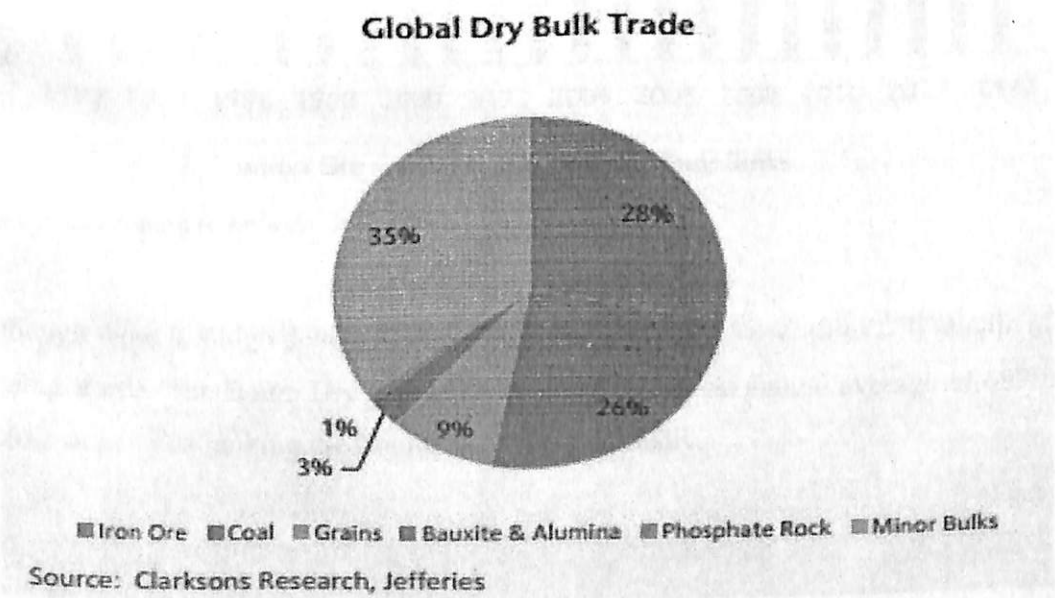
Chapter 2

2.1: The Global Dry Bulk Sector

Sea borne trade is classified into five major groups: (a) Dry Bulk (b) Oil Tankers (c) Gas Tankers (d) Container Vessels (e) Others. As our research focuses on the Dry Bulk market, the dry bulk market has a market share more than 38% of the total sea borne trade (ICMA 2010-04), hence having a lion's share of the total sea borne cargo shipped. The dry bulk sector is further classified into two segments i.e. Minor bulk and Major Bulk. These two types of cargoes are transported by different types of vessels known as bulkers. These bulkers are classified on the basis of their size namely Handysize, Handymax, Supramax, Panamax and Capesize vessels.

The major bulk cargoes comprises of two thirds of the dry bulk cargoes transported. The major dry bulk cargoes include Iron Ore, Coal, Bauxite, Phosphate Rock and Grains. The minor dry bulk cargoes include agribulks, metals, fertilizers, steel, minerals and forest products. It was indicated that much of the growth in the dry bulk sector was due to the expansion and increase in the trade of the five major dry bulk commodities at 7.2 per cent and to an extent by the minor bulk commodities by 4.6 percent. As in case of volumes, more than 500 million tonnes of was added to world sea borne trade within the years of 2002-2012 (Clarkson Research 2013). During the year 2013, the minor bulk volumes accounted to 1.4 billion tonnes and the major bulk volumes summed up to 2.7 billion tonnes making the dry bulk's share two thirds in the global shipping industry.

Figure 2.1: Global Dry Bulk Trade Components

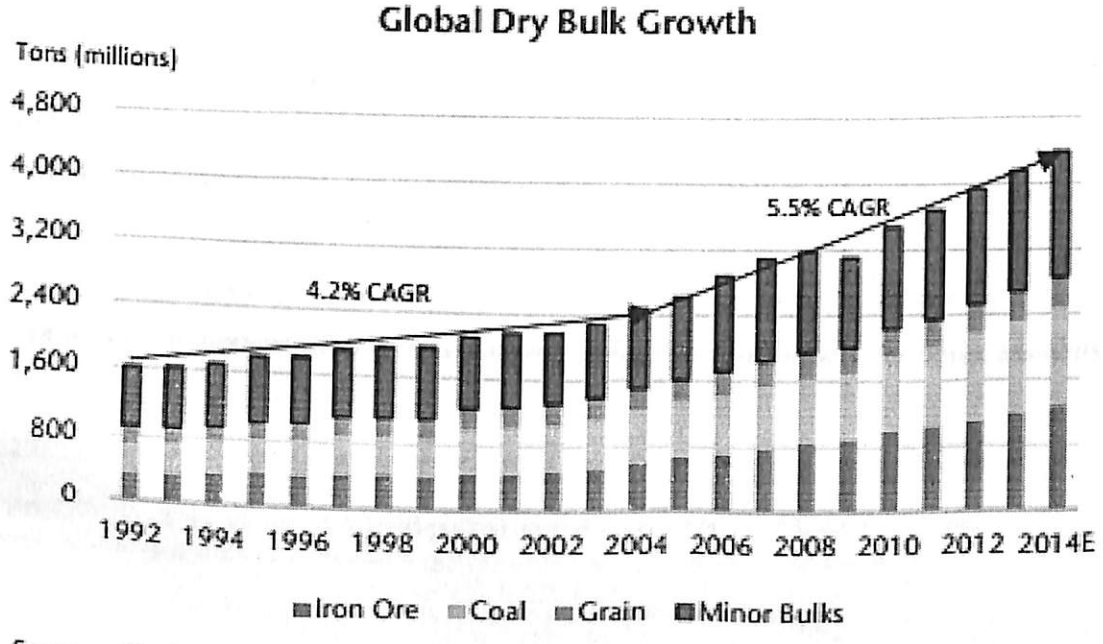


Even with the weakness in the global economy, dry cargo movements continued to grow steadily at a rate of 5.7% in 2012 (RMT 2013). Judging by historic standards and bearing in mind the global economic situation, this performance is rather impressive (Clarkson Research Services, 2013a).

From the year 2000, there has been a gradual increase in the shipping of coal and Iron Ore. Figure 5.2 clearly show that the percentage of coal and Iron Ore shipments have been increasing to significant level holding around a two third share in the total dry bulk shipments.

Developing Economies like china are the major drivers of Dry Bulk Shipping demand as they are heavily importing Iron Ore. (See **Figure 1.6**). As there are large scale investments made in developing countries in infrastructure, significant amount of raw materials such as cement and steel. Furthermore steel production in china has reached record limits in the year 2013 which has increased the share of the minor bulk commodities.

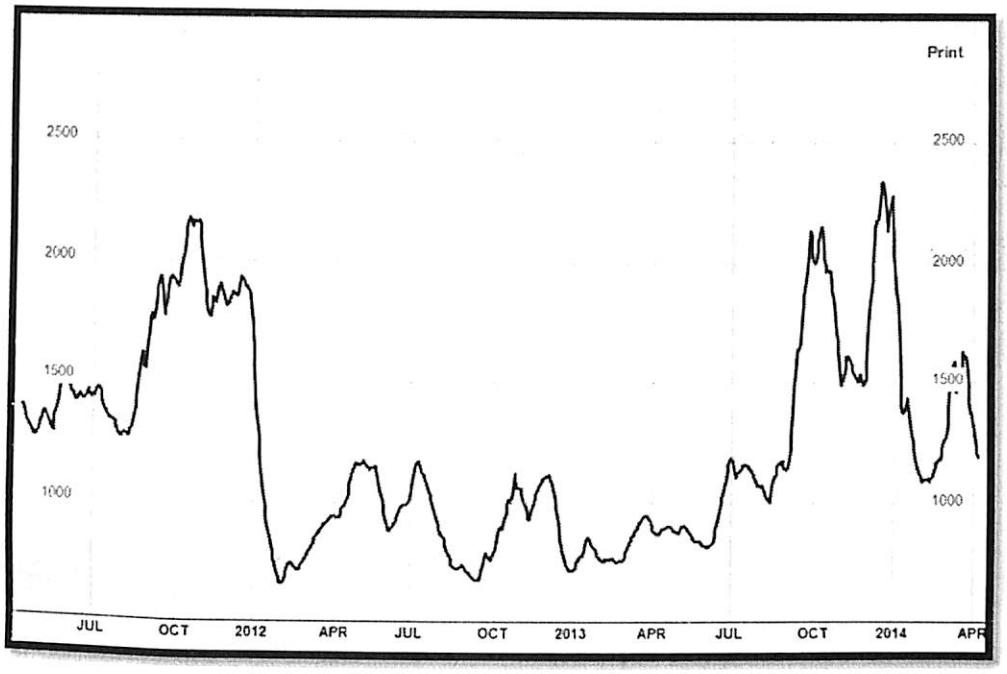
Figure 2.2: Global Dry Bulk Growth



Source: Clarksons Research, Jefferies

Even though there is a high demand for dry bulk shipping the charter rates still remain at very depressing levels. The Baltic Dry Index has reached its lowest annual average of 699 in the year 2012 since 1986 making the freight rates fall drastically.

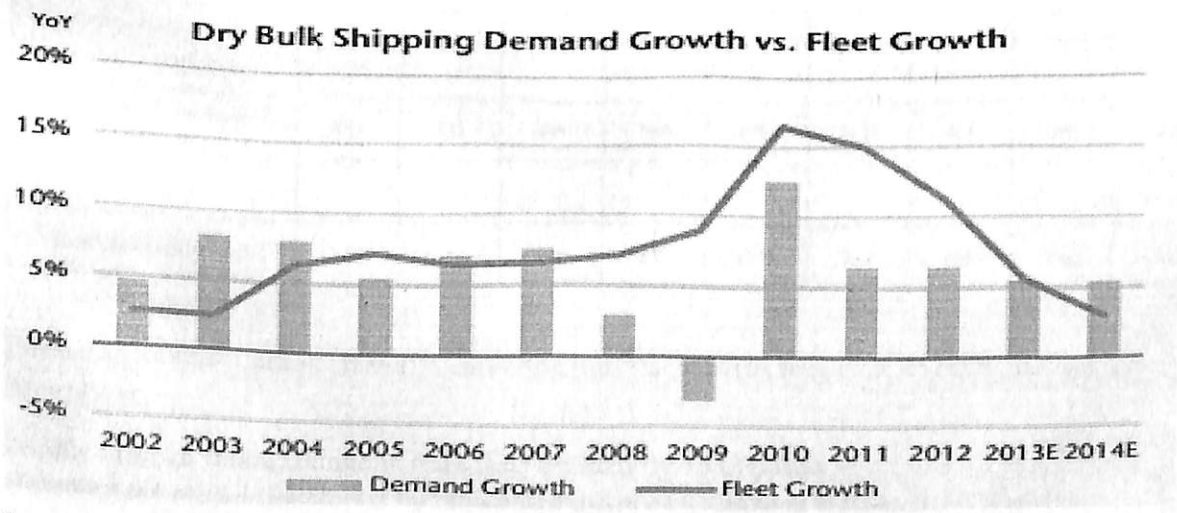
Figure 2.3: Baltic Dry Index 2012-2014



Source: Bloomberg

It was noted that the demand growth of the dry bulk has exceeded the supply growth for the dry bulk since the past years. During the year a significant hike was noticed in the demand growth for dry bulk shipping but the fleet size has not been able to cope up with that. In a study conducted by the Clarkson's research, it was found that the actual dry bulk vessel supply has overtook the actual demand for dry bulk shipping. This shortage of in the market can also be a factor for the continuous drop in the charter rates for dry bulk vessels. Dry bulk assessment is done on the basis of time charter contracts.

Figure 2.4: World Fleet Growth vs Demand Growth



Source: Clarksons Research Services

Table 2.1: Dry Bulk Supply and Demand Shortage/ Surplus

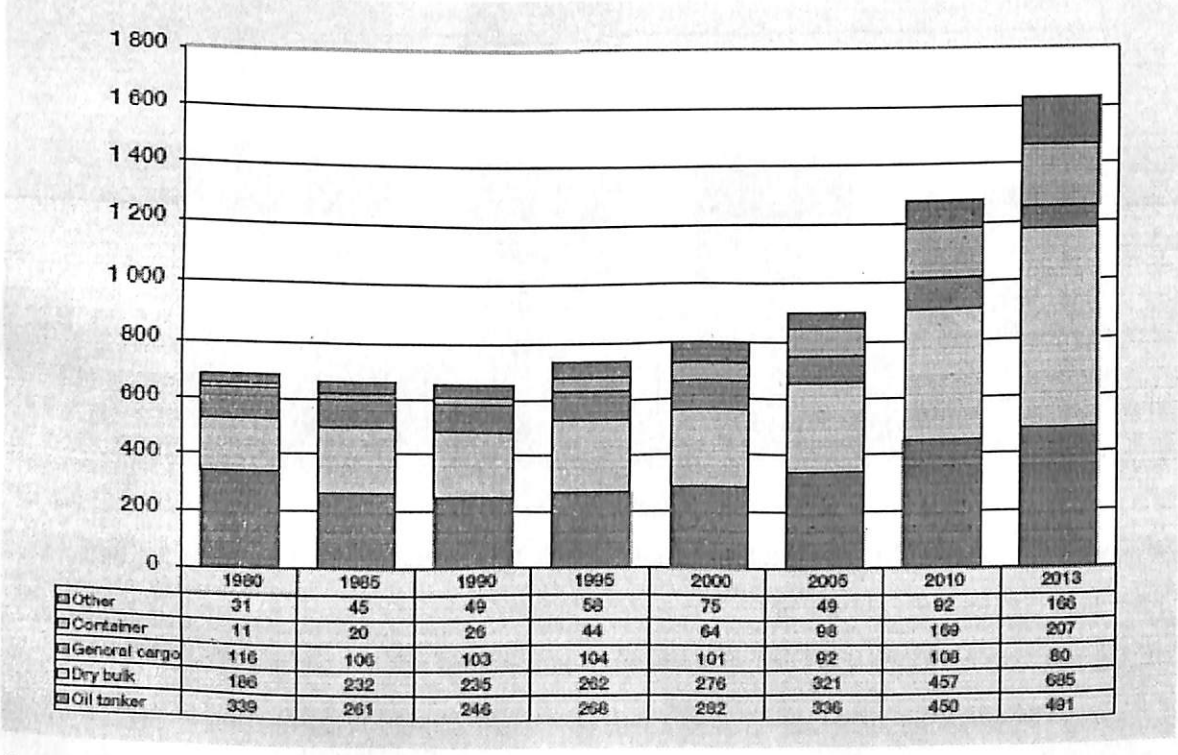
All Bulk Commodities									
(In Millions of Tons)	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014E**
Coal	704	753	777	777	900	946	1062	1126	1193
Iron Ore	713	777	841	898	991	1052	1109	1222	1357
Grain	292	306	319	321	343	345	370	394	419
Bauxite/Alumina	78	93	97	74	96	113	107	112	118
Phosphate	30	31	31	20	23	29	30	31	32
Other Minor Bulks	116	1244	1234	1103	1239	1340	1402	1467	1535
Total	2980	3204	3299	3193	3592	3825	4080	4352	4643
Seaborne Trade Growth	196	224	95	-106	399	233	255	272	292
Additional Panamaxes Required	**503**	**574**	**244**	**-272**	**1108**	**647**	**708**	**754**	**810**
(In Millions of Tons)	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014E**
Beginning Balance	345.3	368.6	392.6	418.5	459.4	535.9	615.2	679	716.7
Deliveries	26	24.7	29.3	51.7	82.8	103.7	98.6	62.7	31.4
Deletions, Repair, Congestion	-2.7	-0.6	-3.5	-10.7	-6.4	-24.4	-34.8	-25	-10
Ending Balance	368.6	392.6	418.5	459.4	535.9	615.2	679	716.7	738.1
Fleet Growth	23.3	24	25.9	41	76.4	79.3	63.8	37.7	21.4
Additional Panamaxes Delivered	**333**	**343**	**369**	**585**	**1092**	**1133**	**911**	**539**	**306**
Vessel (Shortage)/Surplus	**(169)**	**(231)**	**126**	**857**	**(17)**	**486**	**203**	**(216)**	**(505)**

Demand Growth = Trade Growth Converted into Panamaxes based on 65,000t cargoes x 6 trips a year.

Supply Growth = Net change in bulk fleet divided by 75,000 dwt.
Based on the model developed by Howe Robinson of Clarksons Research.

Table 2.1 reveals that there is a significant shortage of vessels in the dry bulk market. Currently there is a real shortage of 216 million metric tons in the year 2013 and by keeping the Business As Usual Scenario there is an expected shortage of 505 million metric tons. The main reason for shortage in the supply can be twofold. One is the demolition of the ships. Very old ships are very inefficient in terms of operation as their operating expenditure is very high as compared to the new builds. Old ships can burn mostly IFO 180 fuels which are very expensive as compared to the new builds which can churn IFO 380 and above which are less expensive than IFO 180. When ships are sold for demolition, that much supply from the market is taken away and if the new builds are not capable of coping up with the lost volumes of supply, then it results in the supply shortage. Secondly, heavy rise in demand is also another factor that can result in supply shortages. Developing countries like china has increased their share of iron ore imports significantly and that too suddenly for which the ship building industry cannot immediately cover up. Over a period of years, new builds can bridge the gap of the supply and demand in the dry bulk industry. Here, supply is in context with the fleet size and demand is the cargoes to be transported.

Figure 2.5: World Fleet by vessel types 1980-2013

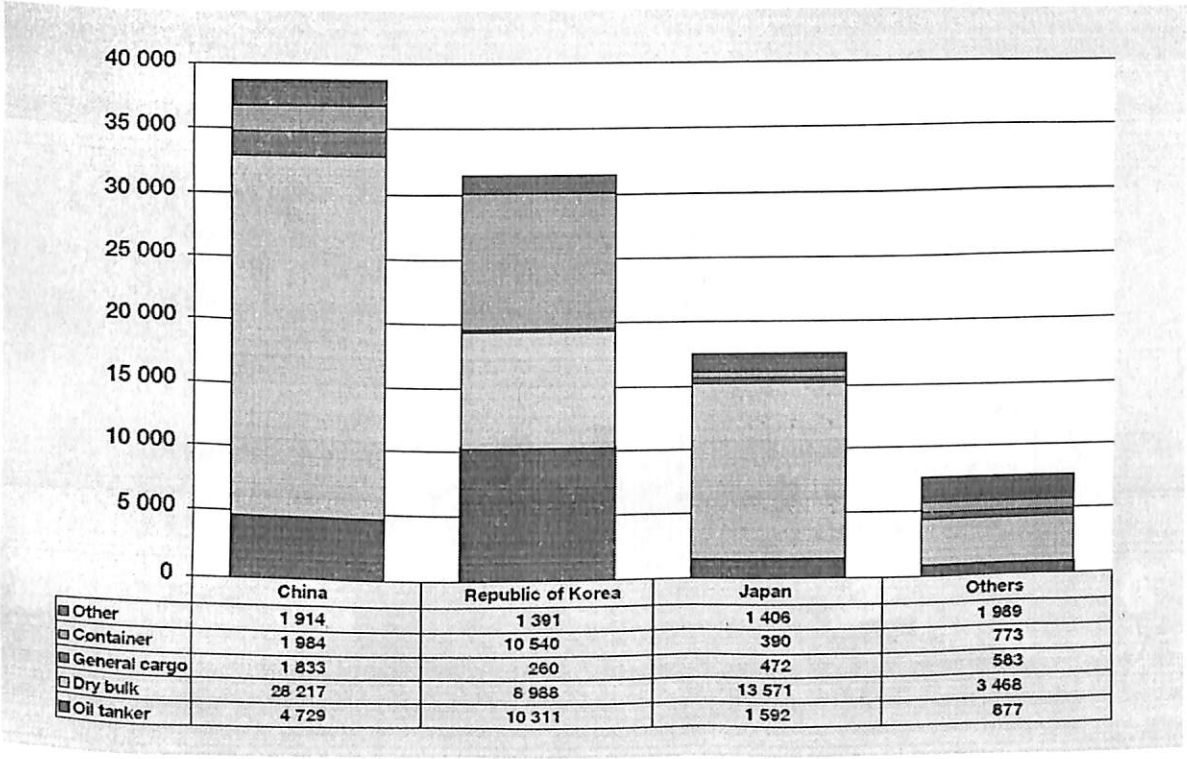


	1980	1985	1990	1995	2000	2005	2010	2013
Other	31	45	49	58	75	49	92	166
Container	11	20	26	44	64	98	169	207
General cargo	116	106	103	104	101	92	108	80
Dry bulk	186	232	235	262	276	321	457	685
Oil tanker	339	261	246	268	282	336	450	491

Source: Review of Maritime Transport, 2013.

Given below in **figure 2.6** is the graph showing the delivery of new build ships into the world fleet and the countries in which they are built. New builds are responsible for the increase in the world fleet supply. Republic of Korea, Japan and china are the three main countries that are responsible for building 92% of the world' new Gross Tonnage added. More than 40 per cent of the ships has been built by china and out of the total new building capacity, around 57% of the ships built are dry bulk vessels. Each of these three countries have their own specialization in building vessels. Japan and china have their core competency in building Dry bulk vessels while Republic of Korea is having their efficiency in building container vessels and oil tankers.

Figure 2.6: Addition of New Build ships into the market with vessel classification and manufacturing country in the year 2012



	China	Republic of Korea	Japan	Others
Other	1 914	1 391	1 406	1 989
Container	1 984	10 540	390	773
General cargo	1 833	260	472	583
Dry bulk	28 217	6 988	13 571	3 468
Oil tanker	4 729	10 311	1 592	877

Source: UNCTAD

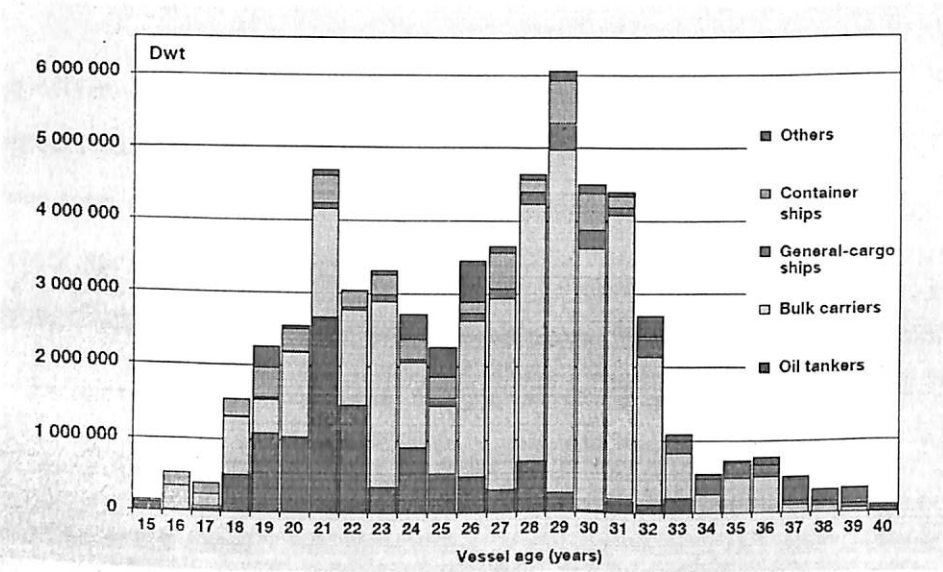
India and the sub-continent is known for its efficiency in scrapping of vessels. This area has the highest share of scrapping vessels. Around 70 percent of the worlds reported tonnage which was sold for scrapping was to the Indian Sun-Continent. It has been reported that Bangladesh is the largest ship breaking country which is further followed by India and Pakistan.

Table 2.2: Reported tonnage sold for demolition and the place of demolition. In thousands of GT

	China	India	Bangladesh	Pakistan	Unknown Indian Subcontinent	Turkey	Others/ unknown	World Total
Oil tankers	1 459	369	1 197	2 711	191	21	200	6 149
Bulk carriers	5 533	5 446	6 064	1 959	205	365	720	20 293
General cargo	316	393	1 166	28	–	291	471	2 665
Container ships	316	553	2 954	7	216	124	76	4 246
Gas carriers	4	89	30	–	–	77	38	238
Chemical tankers	7	11	333	–	21	–	27	399
Offshore	154	4	44	649	156	75	100	1 182
Ferries and passenger ships	12	4	82	–	–	139	66	303
Other	55	158	386	17	–	146	56	817
Total	**7 855**	**7 027**	**12 256**	**5 372**	**790**	**1 239**	**1 755**	**36 293**

Source: UNCTAD

Figure 2.7: Tonnage sold for demolition by 2012



Source: UNCTAD, RMT2013

Figure 2.7 reveals that, of the total ships which were sold for demolition by the end of the year 2012, majority of the ships are Dry Bulk vessels which are above 2 million dwt. Careful investigation of the graph reveals most of the dry bulk ships with a very large capacity has been in the world fleet for more than 25 years. The impact of the demolition of these vessels had given their shock in the dry bulk market with a supply shortage of 505 million metric tons in the market.

2.2: Major Cargo Shipping Routes

Iron Ore

- Export countries – Brazil, Australia, Canada, South Africa, and India
- Import countries – China, Japan, South Korea, and European Union
- Vessel types –Cape Size and Panamax
- Voyage transit times

Brazil to China, Japan and South Korea = approx. 55 days

Australia to China, Japan, South Korea = approx. 18 days

Brazil to Europe = approx. 22 days

Coal

- Export countries – Australia, Indonesia, South Africa, and Colombia
- Import countries – Globally, excluding those with domestic supply, even some of the countries with domestic supply import coal e.g. The US.
- Vessel types Cape, Panamax and Supramax
- Voyage Transit Time:

Indonesia to China = Approx. 15days to mid-China.

South Africa to Europe = Approx. 23 days

Data source: FIS global

The transit time calculated is based on the assumption of ideal ship steaming speed and ideal weather conditions.

Chapter 3: Shipping Freight Mechanism

In this chapter we will be discussing the mechanism of freight rates in the shipping industry. The shipping industry is all about demand and the demand arises as a result of the seaborne trade. This means that, for the shipping industry to work, there should be demand; demand is only derived through the seaborne shipments. The freight rate mechanism is twofold. One is the cost perspective and the second is the demand perspective. The cost perspective shows the real factors that determines the freight rate for a route, while the demand perspective is the factor that affect the demand for sea borne trade. The fundamental idea is that if the demand for seaborne trade increases then the freight rate tends to increase i.e. the basic rule of demand and supply.

3.1: Cost Perspective

The cost perspective include the basic elements that derives the cost of shipping a cargo. Cost is always looked from the operations point of view. The main factors that affect the cost of shipping a cargo are:

3.1.1: Destination

Destination is the first and foremost factor that affect the freight rates. The rates vary according to the destination. Freight rates tend to increase with increase in distance. On the whole, the farthest the location, greater the freight rate.

3.1.2: Exchange Rates

In today's business world, the common currency used for international transactions is the dollar. Hence, the freight rate is always open to foreign exchange fluctuations.

For example; on 10th April 2014, the freight rate of 1 MT of cargo in a bulker is 1000$ from JNPT to Fujairah. According to the current exchange rate in India 1$= 62 INR then for 1000$ the charterer has to pay 62000INR for 1MT of cargo transported. If on the chartering day the INR depreciates against USD and becomes 63INR for 1$, the charterer has to pay the extra 1000INR per MT of cargo transported. Hence hedging the risk against freight rates fluctuations is necessary.

3.1.3: Terminal Handling Charges

Certain ports charge terminal fees for berthing at their ports. Terminal charges in certain ports also affect the freight rates. If terminal charges are present, the freight rate tends to be more and vice versa.

3.1.4: Bunker Cost

Bunker is the term used for the fuel of the ships. More than 50% of the freight cost comprises of the bunker cost for the ships. If ships are to steam for long distances, the bunker cost tend to be more thereby increasing the freight rates. Ships which use expensive fuels such as the IFO 180, the freight cost will be more as compared to ships using cheaper fuels such as IFO 380, IFO 780 etc.

3.1.5: Season

Season is also a matter of great concern for freight rates. For example, grains and fruits which are transported in certain seasons have to pay more freight rates.

3.1.6: Penalties

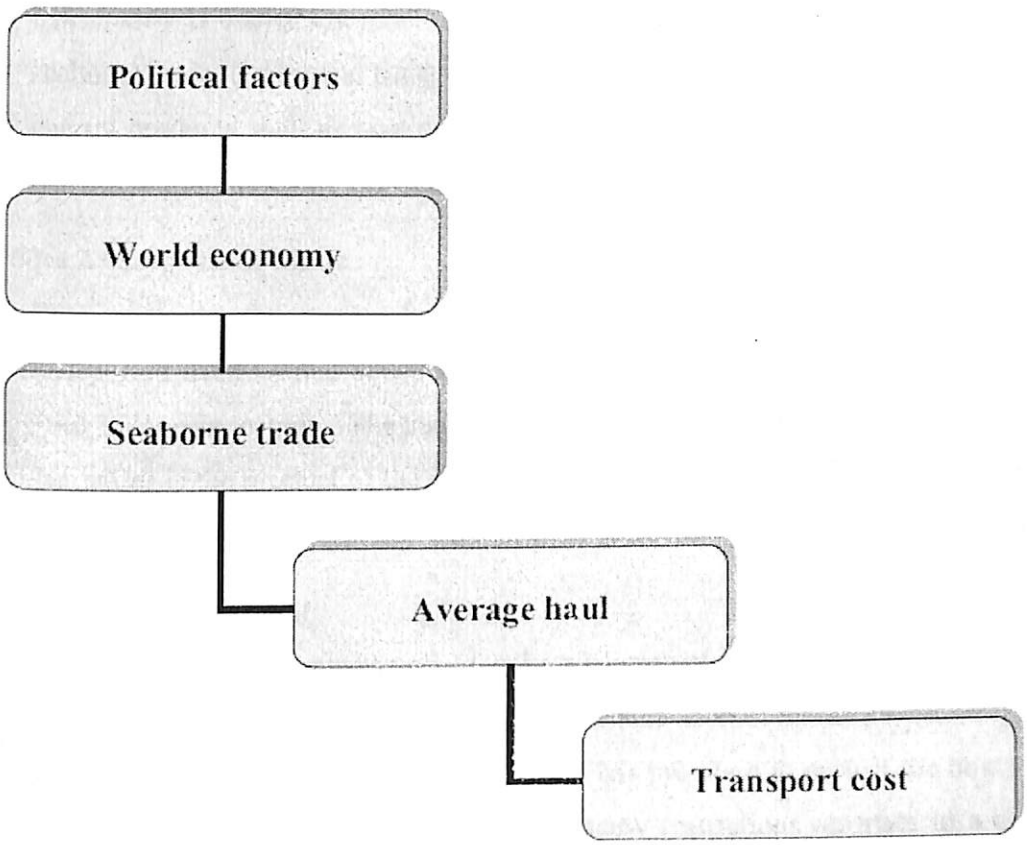
On delay of arrival to a port due to port congestion or other problems, then there can be fines related to this which increases the ocean shipping rates.

3.2: Demand Perspective

The demand for freight transport depends upon the demand for a particular physical commodity. Demand and supply are the two market mechanisms that the shipping industry work on. The shipping industry has shown different faces in past few years. There has been times of heavy growth, times when the whole shipping industry stood still or stagnated in a certain level and there has also been times when the whole market started crashing. The Baltic Dry Index touched its all-time low of 699 in the year 2012 since its inception in the 1980's.

The major factors that determine demand for sea transport are:

Figure 3.1: Demand Determinants of Sea Transport



3.2.1: World Economy

The world economy has a positive relationship with the Ocean Freight. When the world economy is doing well, the exports and imports between countries increase and this eventually takes place through sea transport. To summarise, if the world economy is showing growth, the demand for sea transport also increases and if the world economy is showing a decline, the demand for sea transport also decreases.

3.2.2: Cost of Transportation

There has been great developments in the shipping industry resulting in the addition of new vessels which can transport large volumes at a cheaper cost. When the cost of transportation decreases, the demand for transportation also increases. The manufacturers' decision on distribution of products is largely dependent upon the availability of cheap transport. In the year 2012, a large volume was added to the world fleet through new builds and out of which the major share is dry bulk vessels. Many

cape size vessels with extremely large capacity was added to the world fleet thereby reducing the freight costs.

3.2.3: World Seaborne Trade

Seasonality is one of the main factors responsible for the short term volatility in the seaborne trade. Grains and fruits are more expensive to ship during certain seasons and energy products such as heating oil show a high demand for seaborne trade during winters as there is a very big demand is there in the northern parts.

3.2.4: The Average Haul Made

We can discuss the average haul effect with the help of an example. A ton of coal transported from United States to India has more demand than a ton of coal shipped from Indonesia to India. The sea transport demand is measured in terms of ton miles. Ton miles is the product of the quantity of cargo shipped with the average distance of which the cargo is transported. This distance phenomena is known as Average Haul.

3.2.5: Political Environment

Political Environment always relate to the government. This includes the government's interference in the trade and shipping. It is the sum total of all the policies, regulations and other restrictions the home government has put upon to protect the home market against dumping etc. When there are too many restrictions on trade in a particular country, the demand for seaborne trade also decreases thereby making the freight rates unstable.

In the shipping industry lower shipping costs can be achieved through economies of scale wherein maximum utilization of the ship's space is done. As there are new ships in the market with such unprecedented size, during the long run lower freight rates can be achieved.

Chapter 4: Types of Risks Faced by Shipping Companies

Any uncertainty in the future that may give arise to a loss or damage can be called as a risk. In the shipping industry, the uncertainty that may arise causing a loss or decline in the value of a shipping company comes under the purview of shipping risk. The net cash from its operations is the main driving factor of any shipping company and any hindrance to that can put the company into staggering losses.

For a shipping company, the risk that may arise can be classified into three main categories.

1. Credit Risk
2. Price Risk
3. Real Risk

4.1: Credit Risk

A credit risk can also be termed as a counterparty default risk. It is the risk or uncertainty that may arise from the counter party to our contract default in his obligations i.e. his financial duties partially or wholly. A real life example of a credit risk is the default in payment by our debtors on time or bad debts that arise to a company. All these are examples of credit risk. In a credit risk, the main problem is the hindrance of the expected cash flow which in turn disrupt all the other activities which were dependant on that particular revenue. In the shipping industry, most of the credit risk happens as the trades, deals and other contractual terms are personally negotiated between each of the parties to the contract. The different types of contracts that are entered in the shipping industry are shipbuilding contracts between an investor and a ship builder, charter agreements, derivative contracts between two parties and in certain cases credit risk may arise from bunkering process. A wilful default from the ship-owner to the bunker supplier can even get the vessel arrested.

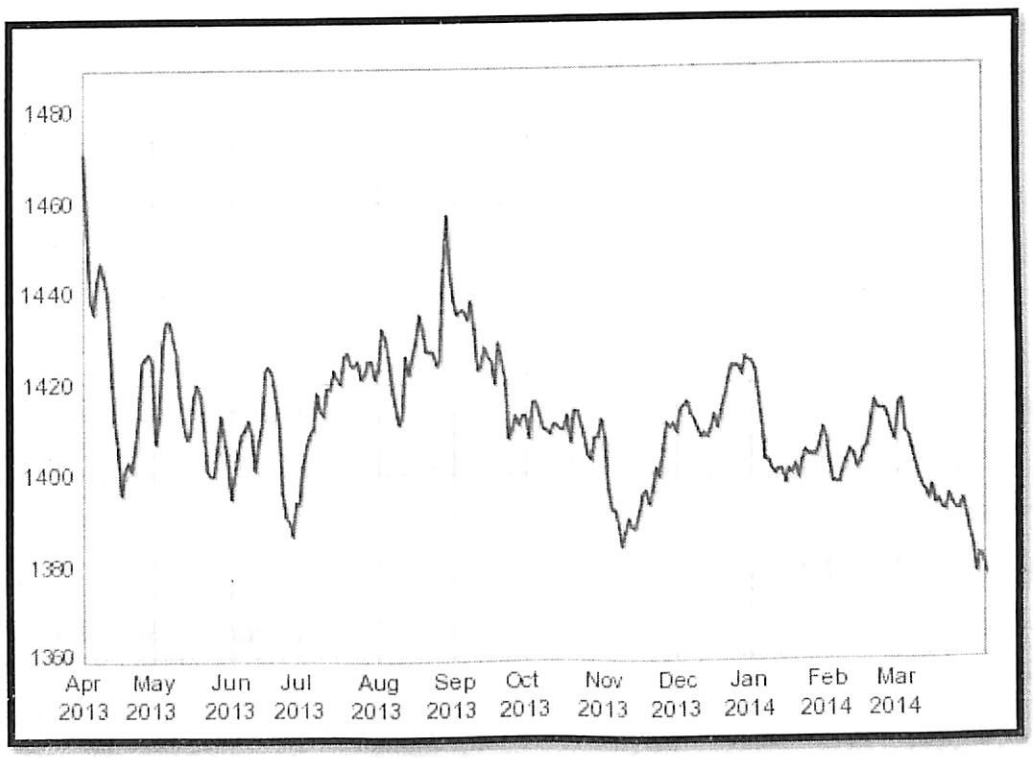
4.2: Price Risk

The uncertainty that arise over the amount of cash flows to the company due to the uncertain fluctuations in the Internal and External prices are known as a price risk. The risk that arise due to the changes in the price or the cost at which the firm can ask for its goods and services are known as External price risks. The uncertainty that arise due to the changes in the cost payable by a firm for its internal operations are known as internal price risk. There are different types of price risk that can be faced by a shipping company. They are:-

4.2.1: Opex Risk

The volatility that occurs on the operating expenditure or the operating cost of a ship is one of the major threat that can consume the profit margins of any shipping company. From a vessel's point of view, one of the major cost components of a ship is its fuel cost also known as it bunker cost. More than fifty percent of the total voyage cost components consist of the bunker cost and very large volatility in the bunker oil prices can drastically affect the profitability of shipping companies. There is a high risk of volatility because bunker oil prices are related to world oil prices. In the world oil trading market, the bunker prices are cross hedged using crude oil derivatives.

Figure 4.1: Bunker World Index



Source: Bunkerworld

Figure 4.1 shows the volatility of the bunker prices and such a volatile commodity if left un-hedged can end up the shipping company into very big losses.

4.2.2: Freight Rate Risk

The uncertainty that arise resulting in the varied earnings of a shipping company because of the changes in the freight rates are known as freight rate risks. The most important risk that has to be taken care by the shipping company is the freight rate risk because the profitability of the company totally depends upon the freight rates fluctuations.

4.2.3: Asset Pricing Risk

The risks that arise due to the fluctuations in the value of the assets of a company is known as asset pricing risk. In a shipping business, ships are the major assets and fluctuations in the ship prices are of a major concern as it very much affect the balance sheet of a shipping company as well as ship financing companies. If the value of the ship decreases then it can directly affect the credit rating of the ship owner and its debt finance obligations to ship finance banks.

4.2.4: Interest Rate Fluctuations

The risks that arise due to interest rate fluctuations are known as interest rate risk. As the shipping industry has a very heavy capital requirement, most of the vessels are financed by ship financing banks on a floating rate of interest. When the interest rate of these loans go up in the market, the ship owners are required to pay more interest than what they were paying before. This can significantly affect cash flows of shipping companies who are not in a position to service their debt further.

Shipping companies are also exposed to exchange rate fluctuations as in cases where they are required to convert the income from the freight from dollars to any other currency required.

4.3: Real Risk

The uncertainty that causes reduction in the total value of the business due to real and physical damage such as accidents, collisions and other losses. This risk also covers technical and human error that has resulted in losses for the company. The penalty payable by the shipping company in times of oil spill or chemical spill also come under the context of real risk.

Chapter 5

5.1: Baltic Exchange

Started in 1985, the Baltic Exchange is the world's only provider of maritime market information. They provide market data about the physical as well as the derivative trade of shipping derivatives. As reliable information is very much important to a very efficient market, the Baltic Exchange is the sole repository of Freight Market Information regarding trading. The calculations in the Baltic Exchange are done on a daily basis by a panel which is independent consisting of shipbrokers. The assessments made on the Baltic Exchange is on the basis of Current Negotiations made by brokers, the recent fixtures made and also based on the balance between the supply and demand for Sea Transport.

The Freight Rate assessment is made at 13:00hrs local London time based on the average of all the assessments received on that particular day. Daily assessments for over 50 major shipping routes are made by the Baltic exchange from Monday to Friday for all dry bulk indices and by 16:00hrs London Local time, the freight rate assessment for the dirty and clean tanker indices are published.

The panel that reports the freight are ship broking companies appointed by the Baltic Exchange. For appointment as a panel member, the companies must fulfil the following criteria:-

- The panellists should be the member of Baltic Exchange fulfilling all the membership criteria.
- The panellist's main business should be ship broking.
- The panellist company should be a competent business frim with the right amount of personnel actively engaged in the markets.
- A geographic spread of the panellist is kept.
- The Baltic Exchange refuses the appointments of companies who represents charterers having an influential position in the market.
- The reporting companies must nominate a representative member of the Baltic who will be responsible for the index they are reporting.

The most important trade routes are included in this index. The Capesize market is classified on the basis of four major trading routes known as C3, C4, C5 and C7. These represent routes on the basis of Voyage Charter for per metric ton of cargo to be transported. The C4 and C7 segments represent the major coal routes from Columbia and South Africa to the Netherlands.

Out of these, there are also two major routes used for transporting Iron Ore i.e. C4 consist of the route from Brazil to China and C5 represent the route from Australia to China.

The Panamax market is divided into two. The first route is named as P2A_03 and the second route is named as P3A_03. These contracts are based on trip charters valued in dollars per day. The P2A_03 route represents the delivery with Skaw – Gibraltar and a redelivery in between the voyage to Taiwan- Japan areas and this voyage usually range between 60-65 days.

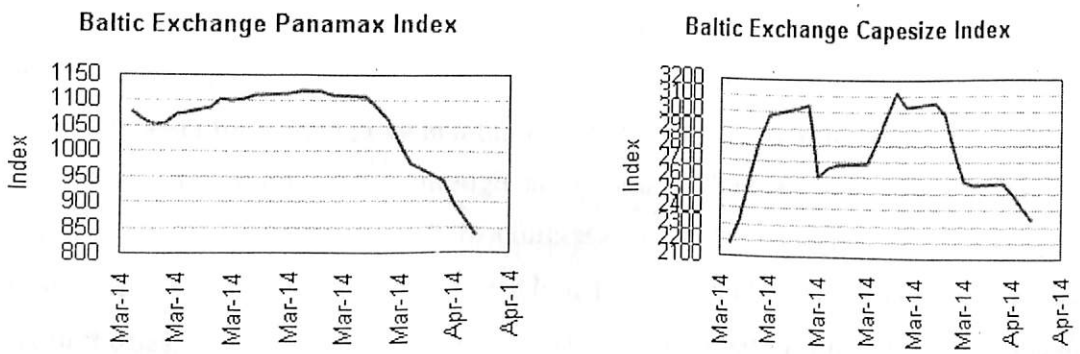
The P3A_03 represents the route for delivery in Japan-South Korea and with the redelivery in the same region while the voyage ranges between 30-50 days.

Table 5.1: Overview of Selected routes from The Baltic Exchange

Segment/Route	Vessel size	Cargo basis	Route description	Index
Capesize				
C3	150 000mt	Iron Ore	Tubarao/Qingdao	Baltic Ex. Capesize Index
C4	150 000mt	Coal	Richards Bay/Rotterdam	Baltic Ex. Capesize Index
C5	150 000mt	Iron Ore	W Australia/Qingdao	Baltic Ex. Capesize Index
C7	150 000mt	Coal	Bolivar/Rotterdam	Baltic Ex. Capesize Index
Panamax				
P2A_03	74 000mt dwt	Grain	Skaw/Gibraltar	Baltic Ex. Panamax Index
P3A_03	74 000mt dwt	Grain	Japan/South Korea	Baltic Ex. Panamax Index

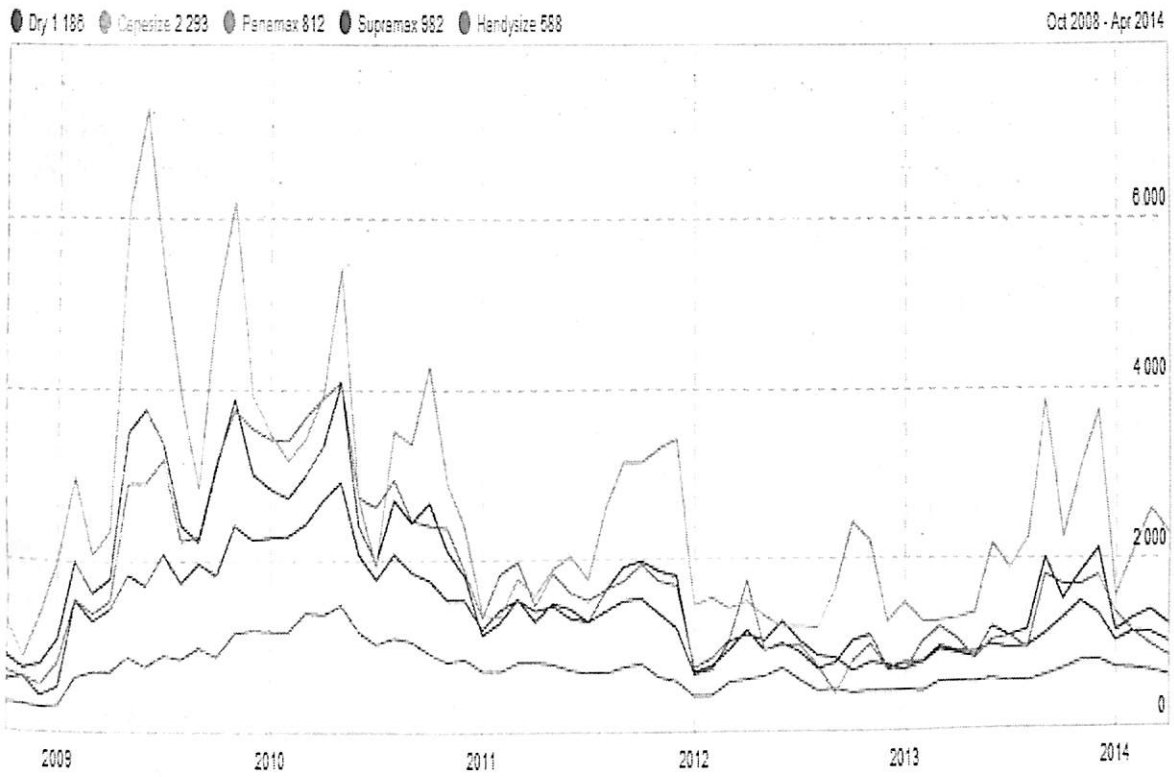
Source: Clarkson's Research.

Figure 5.1: Baltic Exchange Panamax & Capesize Index



Source: Clarksons Shipping Intelligence Networks

Figure 5.2: The Baltic Indexes 2008-2014



Source: Lloyd's Shipping Intelligence

Figure 5.2 shows the Baltic Indices for 2008 to 2014ytd. The index consist of the Baltic Dry Index, The Baltic Capesize Index, The Baltic Panamax Index, The Baltic Supramax Index and the Baltic Handysize Index.

5.2: The Freight Derivatives

A future contract is an agreement that has been entered between two parties for the purchase or sale of an asset for a fixed price in a future date. The main significance of a futures contract is that these contracts are entered through an exchange. The main importance of an exchange is to prevent the counter party default. In a futures contract there can be any of the two positions can be taken. First is the Long position, in a long position we buy an underlying contract of the asset in the beginning and try to sell it at a higher price to earn profits. In a long position, the trader always expects a bullish market. In a bullish market, the prices tend to move up. Second is the Short position. In a short position, the trader sells the underlying contract of the asset and tries to buy it cheap further in order to generate profit. The main advantage of a futures contract is that there is no counterparty default risk and secondly the physical delivery of the underlying asset may or may not happen.

Table 5.2: Difference b/w Forward and Future Contracts

	Futures	Forwards
Trading	Exchange-traded	OTC
Credit risk	Guaranteed by clearing house	Counter-party risk (OTC clearing also possible)
Deposit/Collateral	Initial margin deposit	Usually not required
P&L	P&L realised daily through marking-to-market	P&L realised at the settlement of the contract
Contract terms	Highly standardised	Tailor-made
Closing position	Usually by closing contracts on the exchange; offset or reversing trade	Negotiated between the counter-parties or via offsetting trades

The advent of Freight derivatives was during the year 1985 named as the Baltic International Freight Futures Exchange (BIFFEX) contract. This allowed the ship owners and the charterers to hedge their risk in the physical market. Even though there is no physical delivery happening, the freight market is a service market and the risk that may arise from such a market is the freight rate fluctuations. For a ship owner, higher freight rates are profitable and in case of a charterer low freight rates are beneficial. Hence, in a freight future market, the ship owner enters into a futures contract to protect him from the prices going down and the charterer enters into a freight derivative contract to hedge the risk of prices going up.

The first BIFFEX contract was traded in the London Commodity Exchange and was settled against the Baltic Freight Index on the basis of cash equivalent values. The Baltic Freight Index which was the underlying for the BIFFEX contracts, was derived on the basis of the freight rates for 11 dry bulk cargo routes. The market players considered the Baltic International Freight Futures Exchange contracts as an innovation when it was launched initially. Even though the BIFFEX contract was able to hedge the performance of the underlying Baltic Freight Index it failed in hedging the freight rate fluctuations that happened in the individual 11 trading routes that constituted the BFI but the performance of the BIFFEX contract only worked as a cross hedge. Cross hedging strategy only work efficiently if the underlying index and the freight rate movements in the calculated routes was moving together uniformly.

The BIFFEX contract is efficient only if the underlying index was constituted with a small number of routes. When the number of routes increase in the calculating index, the fluctuations

in the index tend to move without uniformity and even a cross hedging strategy won't work. In this context the BIFFEX contract proved futile for risk hedging in maritime freight movements.

By 2002, the BIFFEX contracts were de listed and was taken off from the London Commodity Exchange paving ways for the era of the Forward Freight Agreements.

5.3: Forward Freight Agreements (FFA)

An agreement in which two parties agree to pay a freight rate for a pre-specified quantity of cargo or a type of a vessel based on the charter contract for a certain or multiple shipping routes on a future date. In the dry bulk sector, the underlying assessment will be made only by the Baltic Exchange and the settlement is made through the difference in the settlement price and the contract price in the form of cash settlements.

The type of contract traded determines the settlement price of each contract. The rates which are used for settlement for the Forward Freight Agreements on each of the indivisula routes of the Baltic Capesize Index and the Baltic Panamax Index is by taking the average of the last seven trading days of that particular month.

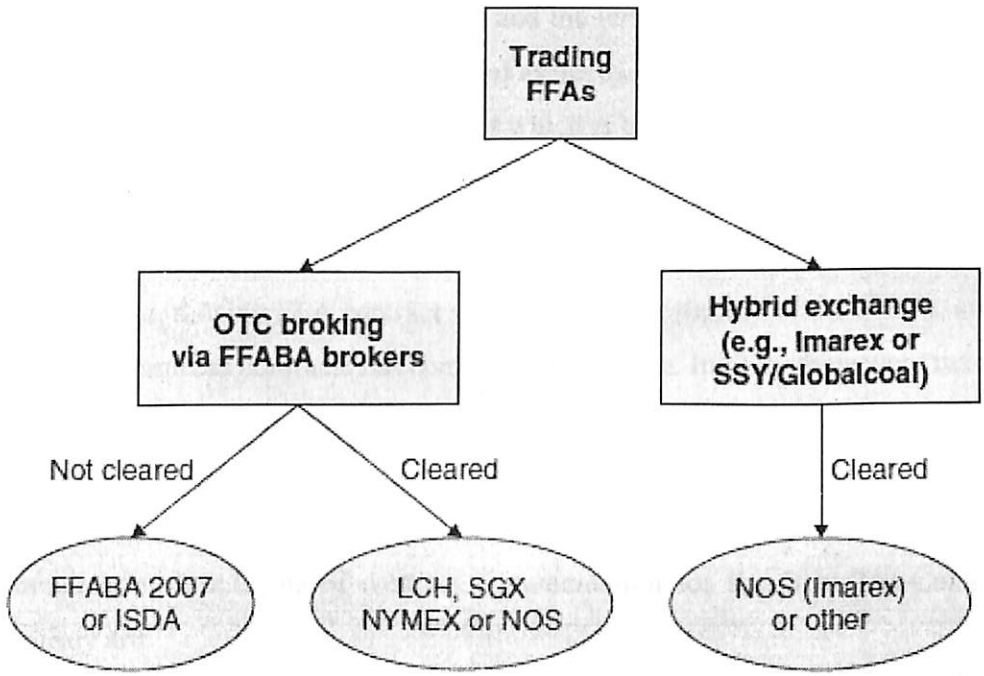
Even though the settlment rates are calulted on an average to make sure that the rates are not too much influenced by the large market shifts due to high volatility or errors on a particular trading day, the different averaging periods used to derive the settlement prices actually depict the market trend and make Forward Freight Agreement an effective risk hedging tool. On a typical example, for an individual route, Forward Freight agreements are used here to hedge particular and specific voyages hence deriving the average over a very small span of time and therby providing better correlation with the actual physical route that is underlying for settlement.

5.4: Trading of Forward Freight Agreements

There are two ways in which the Forward Freight Agreements are Traded. The first method is through Over The Counter (OTC) contracts and the second method is through a very hybrid from of exchange. The FFA OTC contracts are enterd via specialized Forward Freight Agreement brokers who enters the contract using traditional methods such a telephone. Two types of trade is possible for the FFA, the first one is the Principal-Principal contract which is being entered between two parties i.e. individuals while the second form of trading is done using ceratin satndardized contracts such as ISDA Master Agreement or the FFABA (Forward Freight Agreements Broker's Association). Trades also happen through various clearing

houses which clears the freight trades in the market. The various clearing houses that provide service to the freight market are : The Singapore Exchange (SGX), Norwegian Futures and options Clearing House (NOS), the London Clearing House (LCH. Clearnet) and the New York Mercantile Exchange (NYMEX). Hybrid exchange like the International Maritime Exchange (IMAREX) or the Simpson Spence Young Global (SSY) where in the trading is done in the IMAREX or t and cleared through Norwegian Futures and Options Clearing House.

Figure 5.3: Structure of FFA Trading



5.4.1: OTC Trading of Forward Freight Agreements

The Over The Counter trading of the FFA contracts are done in a much traditional way. The broker enters the contracts over the telephone. There will be two counter parties commonly known as pricipals to the contract the term used in the traditional physical trading market.

The brokers who enter the OTC contract are the members of the Forward Freigh Agreement Broker's Association (FFABA). In 1997,the members of the Baltic Exchange formed thid association to promote the trading of the FFA and other OTC instruments which are traded in the exchange for hedging the freight rate risk. The main objective also extends to create a standard contractual format for the trading of shipping Derivatives.

As an OTC contract is made between two counter-parties, the broker's role is only as an intermediary or a facilitator to the contract. The broker is not responsible for default from the side of either of the parties to the contract. Hence, utmost care should be observed while entering into FFA OTC contracts and should make sure that the counter-party to the contract is a realiable and competent company or and individual. In order to reduce the risk of counter party default, the parties to the contract also opt for trading in contracts which are already cleared by the clearing houses. Utmost care should be taken by the broker in order to play a neutral role so that he does not influence the decision of the parties to the contract.

Forward contracts are tailor made agreements and the terms and conditions of the contract is negotiated and fixed between the counter- parties as per their requiremnets.There is a brokerage charged form each of the parties in the contract which is basically 0.25% of the agreed freight rate.

5.4.1.1: Documentation of contract in the OTC Market

As discussed before, the first FFA contract started trading by the end of the 1990's, and so did the need of a standardized contracts has come into the picture. Initially there were two sources from which the contract documentation of the FFA was developed. These two were the Forward Freight Agreement broking community and the market participants who were actively involved in the derivative trading the financial and commodity instruments. This has resulted in the formation of two forms of contract documentation for the Over-The-Counter FFA contracts. They are:

1. **Forward Freight Agreement Broker's Association Contract**

   The broker's association of the FFA made this version of FFA contract and was named as FFABA contracts. This initial version of the FFA contract included the contract terms such as the agreed route, the duration and the date of settlement etc. and was called the FFABA 2000 contract. As the markets grew stronger and larger, the inefficiencies of the FFABA 2000 contracts started coming out especially in terms of Counter-Party default Risk. This contract did not contain provisions pertaining to cases when either of the counter-party becomes insolvent or bankrupt. The netting off contract was not possible in the FFABA 200o contract at the time of default from either of the party in the contract.

   This shortcomings in the FFABA 2000 contract made way for addition of certain provisions into it thereby developing the FFABA 2005 agreement which incorporates

the International Swaps & Derivatives Association (ISDA) which is the main agreement and the legal contract for transacting derivatives in the world today.

The revised version of the FFABA 2005 agreement came up in the year 2007 known as the FFABA 2007 agreement which also include the ISDA 1992 provisions and improvements in the settlement calculations.

The main components of the contract are:

I. 1st Clause: The Contract route agreed (e.g.: BCI C7)

II. 2nd Clause: The rate at which the differences in the contract will be settled (e.g. US$ 30/MT). This effectively is the Forward Freight Agreement rate.

III. 3rd Clause: The contract's total quantity and the contract quantity by month.

IV. 4th Clause: The time period of settlements.

V. 5th Clause : The dates of the settlements

VI. 6th Clause: The rate of settlements. This clause defines the calculation of the settlement rates

VII. 7th Clause: The Settlement amount. This is the actual difference between the rate of the contract and the settlement price.

VIII. 8th Clause: This includes the provisions of the ISDA master agreement.

2. The ISDA Schedule and the Master Agreement

The market participants also started using International Swaps and Derivatives Association's Master Agreement and the Schedule to do trading in the Forward Freight Agreements. Most of the market participants are energy and commodity companies who uses the same contract for derivatives trading in their respective vessels as they know how these contracts behave. Freight has been added to the definitions used by the International Swaps and Derivatives Association in the year 2004.

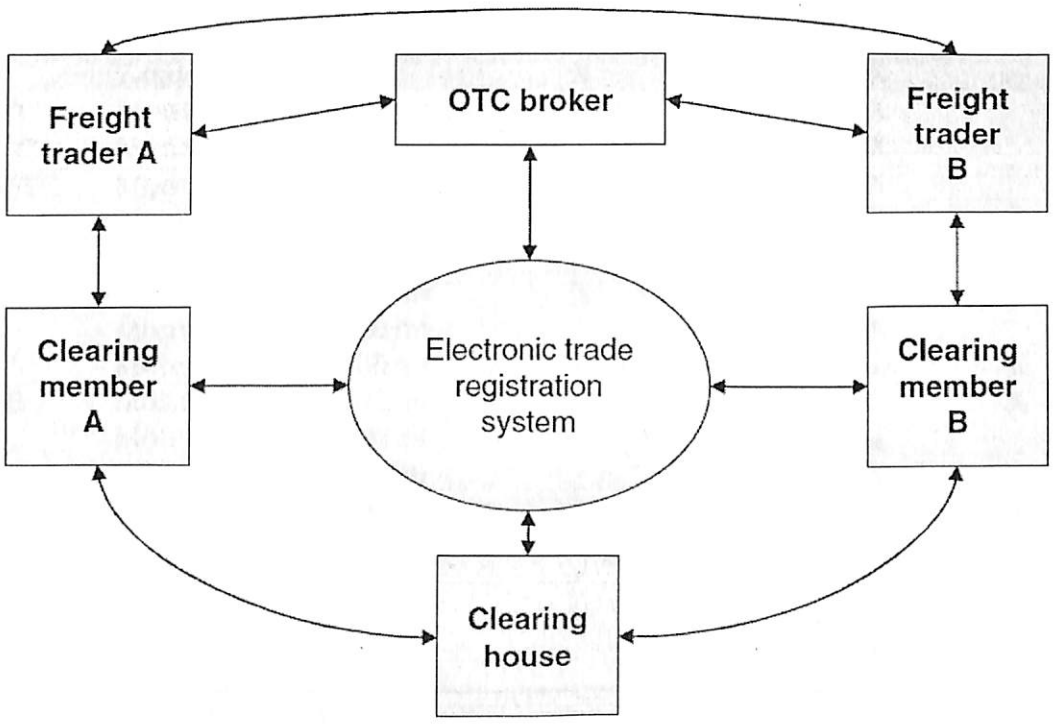
The ISDA agreement includes a master agreement which defines the standard credit and legal relationships of the counter-parties. Any changes made to the master agreement is mentioned in the schedule and is attached with the Master Agreement.

ISDA agreements has been found very much enforceable by jurisdictions worldwide and is therefore widely used.

5.4.1.2: Clearing of FFA Contracts

Clearing houses are specialized financial institution that specialise in guaranteeing the performance of the counter party in the contract. The most efficient way of reducing the counter party credit risk in a contract is through the process of clearing. Even though clearing was done only for contracts which were traded on the exchange, by the end of the 1990's clearing houses started providing clearing services for OTC contracts which are not traded in an exchange. Clearing services for OTC freight contracts are provided by various clearing houses such as NOS, NYMEX, SGX and LCH.Clearnet.

Figure 5.4: The FFA clearing Process



Source: Shipping Derivatives, Nomikos 2009

Figure 5.4 denotes the process flow the FFA clearing system. Both the parties in the contract will be having their own clearing member who holds an account with one of the recognized FFA clearing houses and the details of the trade entered by the OTC broker is saved in the electronic trade registration system wherein the clearing members can clear the appropriate contracts.

With the help of the clearing procedure, the two principals doesn't need to enter into a direct contract with each other, such as FFABA 2007 or ISDA. "The terms of the specific trade are governed by the rules and regulations of the clearing house." (Nomikos 2009)

Table 5.3: Clearing houses and the list of Contracts Cleared

Route	Settlement	Lot size	LCH.Clearnet	SGX	NOS	NYMEX
C3	7-day	1000 mt	X	X		
C4	7-day	1000 mt	X	X	X	
C5	7-day	1000 mt	X	X		
C7	7-day	1000 mt	X	X	X	
C4 M	Month	1000 mt	X		X	
C7 M	Month	1000 mt	X		X	
BCI 4TC	Month	1-day	X	X	X	
P2A	7-day	1-day	X	X	X	
P3A	7-day	1-day	X	X	X	
BPI 4TC	Month	1-day	X	X	X	
BSI 6TC	Month	1-day	X	X	X	
BHSI 6TC	Month	1-day	X		X	
TD3	Month	1000 mt	X	X	X	X
TD5	Month	1000 mt	X		X	X
TD7	Month	1000 mt	X		X	X
TD8	Month	1000 mt			X	
TD9	Month	1000 mt			X	X
TD10D	Month	1000 mt				X
TD11	Month	1000 mt			X	
TD17	Month	1000 mt			X	
TC1	Month	1000 mt				X
TC2	Month	1000 mt	X		X	X
TC4	Month	1000 mt	X	X	X	X
TC5	Month	1000 mt	X	X	X	X
TC6	Month	1000 mt			X	

Notes: Settlement denotes whether the settlement rate is calculated as the average of the last seven days or the average of the month of the underlying spot rate. Lot size is the minimum lot size that can be cleared. SGX also allows clearing half-days for the BCI 4TC, BPI 4TC and BSI 6TC routes.

For NOS, TC4 and TC5, routes are settled on the basis of price information provided by Platts. For NYMEX, all rates are quoted in US$/mt instead of Worldscale points. Also, routes TC1, TC4 and TC5 are assessed on the basis of Platts reports.

Source: LCH.Clearnet, SGX, NYMEX, NOS

5.4.1.3: Margins

All the clearing houses maintain a balance of portfolio for its net long and net short positions and the loss that can arise in time when a party default will be huge. In order to mitigate the risk of default, clearing houses maintain a certain set of margins. Margin is a certain sum of money or cash equivalents that the party to the contract has to put up to the clearing house at the time of entering into the contract. At the time of entering into a contract, the trader has to deposit a certain percentage of the total value of the contract entered by him to the clearing house in the form of bank guarantee, letter of credit etc. such a margin is known as the initial margin.

If the volatility in the market is too high, a margin is asked to put up by the trader to the clearing house over and above the initial margin, such a margin is called special margin. If the net balance of the trader becomes negative the trader is asked to put up extra money to reach the initial margin, such a margin is called maintenance margin. Any money over and above the initial margin can be withdrawn by the trader

Year-to-date, cleared volumes in the dry freight market have increased 61% overall, to 321,004 lots from 199,402 lots traded in the same period of 2013. Capesize volumes have increased 85% to 173,201 lots, Panamax by 29% to 109,883 lots, Supramax by 83% to 35,790 lots and Handysize by 89% to 2,130 lots.

Freight Investor Services MD John Banaszkiewicz in his words "Dry bulk freight has been an undervalued market for so long that it was overdue for a recovery in both sentiment and in terms of supply/demand balance. Paper has come back into its own as a means to hedge freight rate risk and for traders who are looking to take advantage of the increased volatility."

The physical Capesize market has recovered during 1Q14 as China imported more iron ore.

This has been reflected in the growth in trading of iron ore futures. Figures from the Dalian Exchange showed that a record of 230M tonnes, a quarter of China's total import volume, was traded on the Dalian Exchange in a single week.

Projections for 2014 are for an increase of 110M tonnes of additional volume, bringing the total seaborne volume to over 1.3Bn tonnes. As market players get more bullish, operators and traders are returning to the paper market to hedge their risks. (Source: IHS Global)

5.4.1.4 Mark to Market

By the end of each trading day, the net position of the trader is valued whether he is in profit or making loss. Such a valuation is called mark to market. This shows the net loss and profits made by a trader on a particular trading day. The process of mark to market enable the clearing members to limit the losses from the default from a trader or all losses incurred due to the daily fluctuations are well accounted and settled for.

Table 5.4: Example for Mark to Market

Date	Day	BFA rate (US$/mt)	Daily P&L (US$)	Margin account (US$)	Variation margin (US$)
12/11/2007	1	48.500		3,645	
13/11/2007	2	48.875	375	4,020	
14/11/2007	3	48.908	33	4,053	
15/11/2007	4	49.083	175	4,228	
16/11/2007	5	49.292	209	4,437	
19/11/2007	6	48.792	−500	3,937	
20/11/2007	7	48.750	−42	3,895	
21/11/2007	8	48.542	−208	3,687	
22/11/2007	9	47.500	−1,042	2,645	1,000
23/11/2007	10	46.450	−1,050	2,595	1,050
26/11/2007	11	45.930	−520	3,125	
27/11/2007	12	45.780	−150	2,975	
28/11/2007	13	45.922	142	3,117	
29/11/2007	14	46.400	478	3,595	
30/11/2007	14	46.330	−70	3,525	

Source: BFA rates are provided by the Baltic Exchange. The initial and maintenance margins are US$3650 and US$2700 per 1000 mt lot, respectively (SGX).

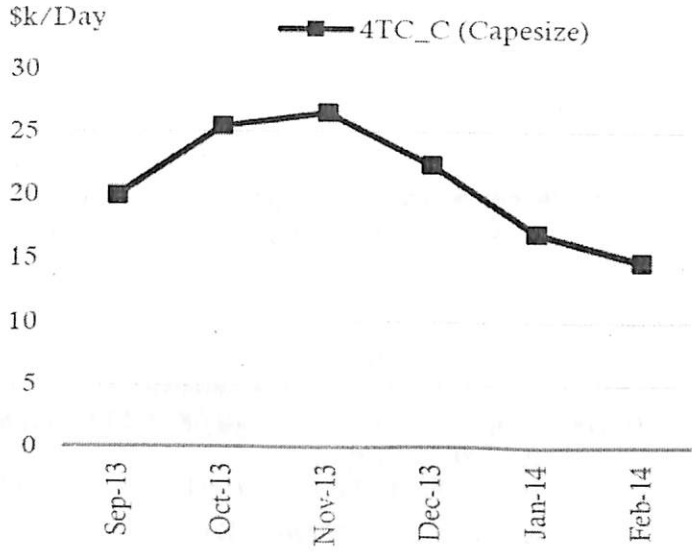
Marking to market helps to reduce a major portion of credit risk among the clearing houses. Trade in dry bulk forward freight agreements has been rejuvenated with rising freight rates, bolstering hopes that the sector has finally shaken off the worst of the downturn.

5.4.2: Trading of FFA through Hybrid Exchange

The electronic trading of Forward Freight Agreements in an exchange comes under this perspective. The most famous hybrid exchange is the International Maritime Exchange. IMAREX is a public listed company which is situated in Oslo, Norway which offers the market platform for the trading and clearing of freight derivatives. IMAREX offers real time trading screen wherein the market principals can buy or sell freight derivatives either directly or through brokers of the IMAREX.

The main advantage of trading through an exchange is the factor of anonymity. The buyer and seller cannot see each other nor know their details. In an exchange, various contracts are listed and there is a price ladder that moves up or down. The person that quotes the lowest price to sell gets the order executed fast and the person who quotes the highest price to buy get the contract executed first. All contracts are cleared through the NOS. The main advantage of screen based trading is that there is price transparency and the market moves through its fundamentals. The main benefit of trading through an exchange is that there is no risk of counter party default.

Figure 5.5: FFA Market Capesize 6 month average



Source: Baltic Exchange

It was noted that the Capesize spot rates had fallen at the beginning of August, to $10.5 k/Day by the first week's end. Without much delay, the market started rising in the second week, rising up to to $16.5 k/Day mid-month and the spot rates have continued to rise since, to almost $20 k/Day in early September. But towards the end of 2013, the markets started crashing falling well below 15k$/day mark.

Chapter 6: Hedging with Forward Freight Agreements

The derivative market provide us with the option of transferring the risks that may arise in the future to people who are ready to bear the risk. Basically there are two types of hedge. They are called as the long hedge or the short hedge. In the derivatives market, 'short' means 'sell' and 'long' means 'buy'. By using a short hedge, the ship owner who always expects high freight rates can take a short position in the market by selling the FFA contracts because the ship owner expects a decline in freight prices. If the freight rates fall below the contract price entered by the ship owner, he can compensate his losses by gaining in the forward market.

In a long hedge strategy, charterers who always favour a low freight rates condition, expects a rise in the freight rates and buys FFA contracts. If the freight rate actually go up, then at the time of shipment, the charterer can execute his contract thereby forwarding his goods at a much lower rate than the actual market conditions. The sole purpose of introduction of the FFA was to hedge the risk from the fluctuation of the freight rates but nowadays FFA's are mostly used for speculative transactions for finding out the trend of the future prices.

6.1: Hedging the Trip-Charter Freight-Rate Risk

Forward Freight Agreements are used for hedging freight rate risks for the Panamax Index on Trip-Charter basis. With the help of an example, the hedging carried out for this route can be explained

Table 6.1: Hedging example for Trip-Charter

Two-month hedge for the period 2 July 2001 to 31 August 2001	
Physical market	**FFA market**
2 July 2000	
Route 2A freight rate: US$11,158/day Freight cost: US$669,480 (= US$11,158 × 60 days)	Route 2A August 2001 FFA: US$10,050/day Expected freight: US$603,000 (= US$10,050 × 60 days)
Shipowner sells August 2001 FFA contract	
31 August 2001	
Route 2A freight rate: US$7483/day Actual freight cost: US$448,980	August 2001 FFA settlement: US$7545/day
Loss in the physical market US$448,980 – US$603,000 = US$154,020	Gain from FFA transaction (US$10,050 – US$7545) × 60 = US$150,300
Net result from hedging = – US$3720	

6.2: Hedging a Capesize freight using Voyage FFA's

In this scenario, we will be considering a hedge using voyage FFA's for 4 voyage routes. A ship owner who is operating a Capesize bulk carrier which is engaged in the coal trade b/w Continental Europe and South Africa. The contract price entered was at 14$/MT.

6.2.1: 1st case when the FFA is settled on Expiry

Table 8.2: Settlement on Maturity

	Settlement rate ($/mt)	Profit/loss from short Cal06 FFA at US$14/mt	Payoff from FFA (75,000 mt)
Q1 (January 06)	10.75	+US$3.25/mt	US$243,750
Q2 (April 06)	12.5	+US$1.5/mt	US$112,500
Q3 (July 06)	16.5	–US$2.5/mt	–US$187,500
Q4 (October 06)	22.5	–US$8.5/mt	–US$637,500

6.2.2: 2nd Case Ship owner executes his hedge for Q3 & Q4

Let's say that it is mid-June now. The Q1 and Q2 contracts have already been executed and the spot rate for C4 trades at US$13/MT.

Table 6.3: Settlement of Q3 & Q4

	Settlement rate	P&L from short Cal06 at US$14/mt	P&L from long Jul 06 at US$13.25/mt	P&L from long Oct 06 at US$13/mt	Total payoff in US$/mt	Payoff from FFA (75,000 mt)
Q1 (Jan 06)	10.75	+US$3.25/mt			+US$3.2/mt	US$243,750
Q2 (Apr 06)	12.5	+US$1.5/mt			+US$1.5/mt	US$112,500
Q3 (Jul 06)	16.5	–US$2.5/mt	+US$3.25/mt		+US$0.75/mt	US$56,250
Q4 (Oct 06)	22.5	–US$8.5/mt		+US$9.5/mt	+US$1.0/mt	US$75,000

Table 6.4: Panamax 4TC Quotes on 10th October 2005

Contract	FFA rate (US$/day)
Spot	22,762
Q4 05	23,825
Q1 06	21,750
Q2 06	20,750
Q3 and Q4 2006	17,775
Cal 06	19,550

Source: FIS

6.3: Scope of FFA trade in the Dry Bulk Sector

Table 8.5: Demand & Performance Indicators for Dry Bulk Routes

Capesize Freight Rates, Vessel Prices and Performance & Demand Indicators (80 k+ Dwt)

Year/ Month	Iron Ore 160 kT Tubarao-Rotterdam[a] $/T	Iron Ore 160 kT Tubarao-Qingdao[a] $/T	Iron Ore 160 kT W.Aust Qingdao[a] $/T	Coal 150 kT R.Bay-Rotterdam[a] $/T	Average Spot Rate Modern[a] $ k/Day	170 k Dwt Modern 1 Yr T/C $ k/Day	150 k Dwt 1990s 1 Yr T/C $ k/Day	170 k Dwt Newbuild $ Mn	150 k Dwt 10Yr $ Mn	1 Yr T/C as % of Reqd[aa]	World Steel Production MnT
Av 2009	15.2	28.5	11.5	13.4	42.5	33.6	27.4	65.9	40.8	134.0%	99.3
Av 2010	13.7	26.4	10.4	12.2	33.3	31.1	27.9	58.6	41.2	141.4%	116.0
Av 2011	11.0	22.3	8.9	10.7	15.7	15.0	13.1	52.8	31.1	70.9%	124.1
Av 2012	8.6	19.7	7.8	8.0	7.6	11.3	9.7	46.6	24.0	57.0%	126.0
Ytd 2013	8.4	18.6	7.6	7.3	8.0	11.4	9.0	46.4	21.6	59.6%	131.8
Mar-13	7.5	17.4	7.3	6.4	4.7	10.4	8.2	45.5	21.0	55.4%	135.3
Apr-13	7.1	17.4	7.1	6.3	4.5	10.6	8.2	46.0	21.5	56.2%	132.7
May-13	7.7	17.6	7.3	6.5	5.5	10.5	8.5	47.0	22.5	55.5%	136.2
Jun-13	8.8	18.6	7.7	7.5	8.8	11.0	8.8	47.0	22.0	57.9%	131.3
Jul-13	10.1	20.3	7.8	8.8	13.3	13.0	9.5	47.5	22.0	66.6%	132.7
Aug-13	9.2	21.2	8.9	9.3	13.6	14.9	11.5	48.5	22.0	75.8%	
Nov-13	11.7	23.9	8.9	10.3	19.4	17.3	13.3				
Feb-14	9.2	19.2	6.9	7.8	8.7	12.9	10.2				

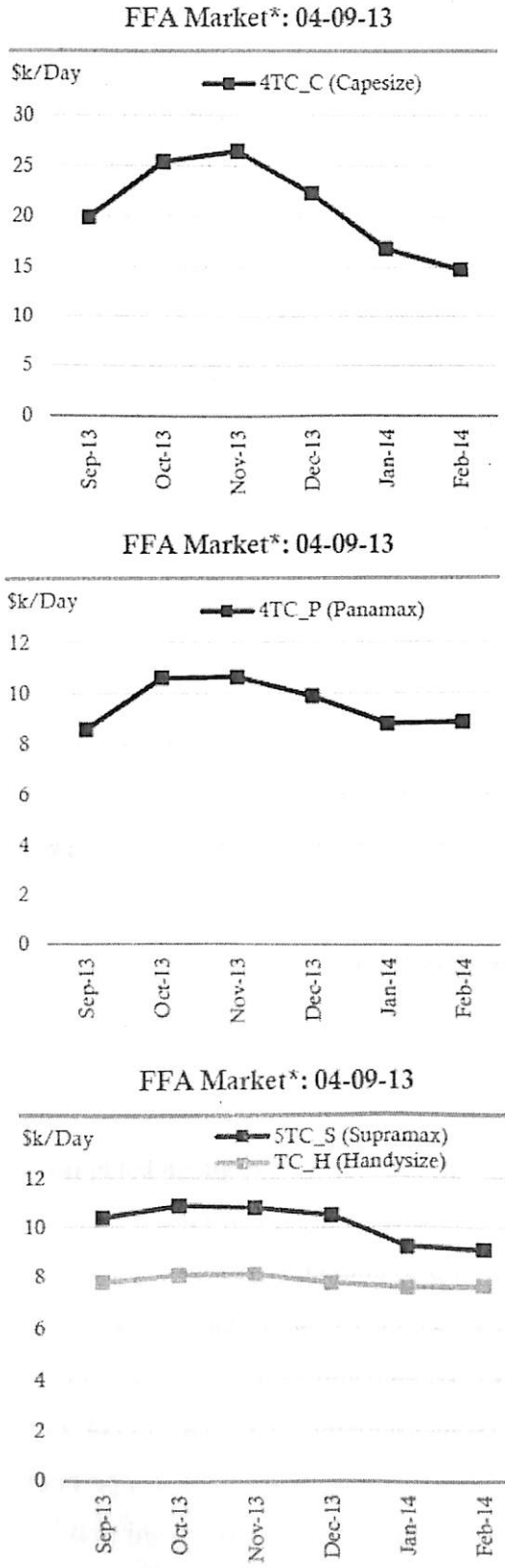
Panamax Freight Rates, Vessel Prices and Performance & Demand Indicators (50-80 k Dwt)

Year/ Month	Grain/Ore/Coal 74000 Tr Atl RV[a] $/Day	Grain/Ore/Coal 74000 Cont-Far East[a] $/Day	74000 Pacific RV[a] $/Day	Grain/Coal 74000 FE-Nopac/ Aus-Cont[a] $/Day	Average Spot Rate Modern[a] $ k/Day	70 k Dwt Modern 1 Yr T/C $ k/Day	65 k Dwt 1980s 1 Yr T/C $ k/Day	75 k Dwt Newbuild $ Mn	69 k Dwt 10Yr $ Mn	1 Yr T/C as % of Reqd[aa]	Coal Exports Aus, Ids, Saf US, Canada MnT
Av 2009	21.8	28.7	17.1	9.6	19.3	18.3	10.7	37.9	24.5	118.8%	56.5
Av 2010	26.6	35.6	23.2	14.7	25.0	24.3	14.7	35.2	31.6	161.0%	66.2
Av 2011	15.3	23.8	11.9	5.0	14.0	14.1	8.6	32.4	24.5	96.8%	70.6
Av 2012	7.6	16.2	7.1	-0.2	7.7	9.5	5.8	27.3	16.6	69.7%	77.7
Ytd 2013	8.5	15.2	7.0	-0.3	7.6	8.2	5.0	26.4	14.3	64.2%	62.0
Mar-13	9.1	17.2	10.1	0.3	9.2	9.2	5.6	25.8	13.5	72.3%	86.7
Apr-13	9.3	16.8	9.4	0.5	9.0	9.0	5.5	26.5	14.0	70.7%	83.2
May-13	8.1	14.9	6.8	0.2	7.4	8.6	5.2	26.5	14.5	67.5%	83.6
Jun-13	8.3	13.7	5.6	-0.1	6.9	7.8	4.7	26.5	15.0	60.3%	85.9
Jul-13	11.1	16.7	6.8	-0.1	8.6	7.9	4.8	26.5	15.0	61.2%	
Aug-13	8.5	15.1	6.6	-0.2	7.5	8.5	5.2	27.5	15.0	64.7%	
Nov-13	8.1	14.5	6.3	0.5	9.0	8.9	5.4				
Feb-14	6.5	11.6	5.1	0.4	8.0	8.5	5.2				

Handysize/max Freight Rates, Vessel Prices and Performance & Demand Indicators (10-50 k Dwt)

Year/ Month	Cont-Far East[a] $ k/Day	Supramax Trans Pacific[a] $ k/Day	USG-Cont[a] $ k/Day	Supramax WAF-FE via ECSA[a] $ k/Day	Average 52 k Dwt S'max[a] Spot $ k/Day	Average 28 k Dwt H'size[a] Spot $ k/Day	52 k Dwt Modern 1 Yr T/C $ k/Day	30 k Dwt Modern 1 Yr T/C $ k/Day	51 k Dwt Newbuild $ Mn	35 k Dwt 10Yr $ Mn	1 Yr T/C as % of Reqd[aa]
Av 2009	27.1	13.6	29.2	23.7	17.4	11.4	14.8	10.7	33.2	19.7	107.8%
Av 2010	31.4	19.5	36.7	30.7	22.5	16.4	20.6	16.3	32.8	24.8	153.5%
Av 2011	21.7	11.2	26.6	21.0	14.4	10.5	13.9	12.1	29.7	21.4	107.0%
Av 2012	15.9	7.9	15.6	14.8	9.4	7.6	9.9	8.7	25.0	16.2	83.7%
Ytd 2013	13.2	7.4	18.2	13.5	8.9	7.5	9.1	7.9	24.0	15.2	80.2%
Mar-13	13.3	8.4	20.2	14.4	9.5	7.5	9.2	7.5	23.0	14.5	82.2%
Apr-13	14.2	8.2	18.5	16.0	9.5	7.9	8.9	8.2	24.0	14.8	80.6%
May-13	13.9	7.3	18.2	13.9	9.0	8.1	8.8	8.2	24.0	15.0	79.7%
Jun-13	13.9	7.7	21.1	13.0	9.5	7.9	8.7	8.0	24.5	16.0	77.2%
Jul-13	14.1	7.9	19.9	13.3	9.6	8.1	9.6	8.0	25.0	16.0	83.0%
Aug-13	13.7	7.6	17.3	12.0	9.6	7.6	9.8	8.4	25.0	16.0	84.5%
Nov-13	15.1	8.4	19.0	13.2	10.5	8.4	10.3	8.3			
Feb-14	13.5	7.5	17.0	11.8	9.4	7.5	9.7	7.6			

Figure 6.1: Performance of the FFA Market for the Dry Bulk Vessels



Source: Baltic Exchange 2013 SAI report

Chapter 7: Literature Review

Only very little research has been done on the freight futures and forwards market, as compared to the futures and forwards on other commodities and financial assets. A major portion of the study is now on de-listed BIFFEX futures contract, and not on forward freight agreements (FFA). A major reason for this shift has been due to the very poor availability of data to support empirical work (Kavussanos & Visvikis, 2006). Most of the studies are focused on the dry bulk segment and are conducted on a low number of routes and their contracts in each of the papers. We will start here by presenting relevant hedging literature and then move over to potential and scope of FFA's performance on the dry bulk shipping routes.

We can say, one of the first hedge efficiency studies to be done on the BIFFEX contract was by Thuong and Visscher (1990). The study analysed the weekly data from 1986 to 1988, using the conventional hedging method of (OLS) to calculate the optimal hedge ratios. Their significant variance reductions range were from 33% to 9%, depending on route. An early survey performed by Collinane (1991) six years after the launch of freight futures, concluded that ship owners did not accept the BIFFEX as a proper hedging tool.

Kavussanos and Nomikos (2000) also investigated the weekly spot and futures prices from 1988 to 1997. They found that a variance reduction from 4.0% to 19.2%, depending on the underlying route when investigating the BIFFEX contract. They also found that that the alternation of the BIFFEX contracts to include time charter contracts in the BIFFEX had no significant effect on hedging performance. Variance reduction when using hedging was still well below other commodity and other financial markets.

Dinwoodie (2003) found that ship owners are very much worried and concerned that the use of FFA might expose their risk management policies to other market participants. Kavussanos and Visvikis (2010) investigated using an in and out-of-sample variance reduction using weekly data on route C4 and a basket of time-charter routes from 2004 to 2008. The hedge ratios were calculated using the conventional method (OLS), VECM and VECM-GARCH-X. Depending on the model used the in sample results showed a variance reduction from 56% to 60% on C4, and 55% to 64% on the basket of time charter routes. Variance reduction on the out-of-sample varied from 79% to 86% for route C4 and 63% to 66% for the basket. The VECM-GARCH-X method of calculating the optimal hedge ratios, and a low experienced hedge outperformed all models in- and out of sample, respectively.

Kavussanos and Nomikos (1999) also investigated the unbiasedness hypothesis of BIFFEX prices. By using the monthly observations from 1988 to 1997 they found that the acceptance

or rejection depends on the contracts time to maturity. They also found that futures prices provide forecasts of realized spot prices that are superior to forecasts generated from error correction-, ARIMA, exponential smoothing, and random walk models. Their findings are supported by Haigh (2000) who found that one month BIFFEX contracts are accurate for forecasting prices one month ahead, but are poorly suited for predicting two- and three months spot prices.

Kavussanos et al. (2004) investigated the unbiasedness hypothesis of four Panamax FFA contracts with one, two and three month maturity. Their findings suggest that FFA prices one and two months before maturity are unbiased predictors of subsequent spot prices. Moreover, they suggest that the validity of the unbiasedness hypothesis depends on the selected trading route and the time to maturity of the contract, similar to the results from the BIFFEX papers. Grober (2010) also investigates the unbiasedness hypothesis for Panamax FFAs. Using monthly data from 2005 to 2010 he finds that all investigated FFAs are unbiased predictors of prevailing spot rates. Grober also discovered that the FFA price leads the spot rate when volatility is low and vice versa when volatility is high. Recent literature by Kavaussanos and Nimonkos 2000, Haigh et al (2004) and Kavaussanos and Viskvis (2004) suggests that freight rates are non-stationary. On the other hand, Tvedt (2003) and Koekebakker (2006) suggest that freight rates are stationary. Tvedt uses an augmented Dickey fuller (ADF) test, while Koekebakker uses a non-linear version of the ADF test.

In a study conducted by Manolis G Kavusanos and Ilias d Visvikis (2006) found out that because of the risk management potential in the shipping industry, many non-market players who are only interested in the prices market are attracted towards this. They are not interested in the actual handling of the ships. When the shipping market becomes more familiar with risk management and hedging tools, ship owners and charterers find it needful to safeguard their profits and returns.

Furthermore, a research conducted by *Andrew Baird, Berwin Leighton Paisner LLP: The Forward Freight Agreement boom/bust – a cautionary tale.*by the third and fourth quarters of 2008, they noticed a sharp and violent decline in dry bulk freight rates. The Baltic Dry Index, set up in 1985, has reached a record high of 11,793 points on May 20, 2008 and had fallen down by 94% to 663 points by December 5, 2008 as its lowest point since 1986. Daily frieght rates for Capesize vessels declined during this period by around 98%.This massive 'correction' in market freight rates occurred over a period of two months and their article looked into how the market itself along with the Forward Freight Agreement Brokers Association ('FFABA')

and the industry standard form forward freight agreement ('FFA'), managed to resist or support these unprecedented and highly volatile market conditions and the wave of defaults that inevitably ensued, what lessons have been learned and whether there is any realistic future for FFAs traded on an 'over the counter' (or OTC) basis.

A study conducted by *Andreas Alnes "Can Shipping Freight Risks be reduced using Forward Freight Agreements "* investigated the hedge efficiency and forecasting performance of 50 Forward Freight Agreements (FFA) in bulk shipping from 2005 to 2012. The study found out that the hedge ratios estimated to be with the conventional method of hedging offer high hedge efficiency for majority of the Freight Forward Agreements in the in-sample period. Keeping and testing these hedge ratios through an out-of-sample period, the study found out that the hedge efficiency is not perfect for the majority of the contract as the time varying of covariance between freight rate returns and Freight Forward Agreements returns, even in addition to changing variance in FFA returns. The paper also moves on explaining that the findings suggest that the conventional or commonly practised method of calculating optimal hedge ratios does not outperform an imperfect hedge.

Furthermore, the author finds that Freight Forward Agreement prices are unbiased predictors of the subsequent spot freight rates in 42 of 50 contracts across the four segments valued. However, these are only stable predictors while we consider only current- and one-month contracts. The forecasting performance decreases when the forecasting horizon increases. The study noted that the basis provides unbiased forecasts of subsequent freight rate change in 42 of the 50 contracts. It does not provide stable forecasts in the Capesize and Panamax segments. The forecasting power of the basis in the Clean and Dirty tanker markets is medium, and increases with the forecasting horizon. The basis on five month contracts written on TC5 and TD5 is relatively high with $R2$ at 0.65 and 0.58, respectively.

In the year 2012 *Marcel Prokopczuk* studied on the *Pricing and hedging in the Freight Futures Market* considering the pricing and the hedging of a single route dry bulk freight future contracts which are traded on the International Maritime Exchange. The author noted that this market is very young and very less academic attention had been given to it. Hence by contrasting many other commodity markets, the freight service market is non storable and it is impossible to carry out the valuation of Cost-of-Carry. The study empirically compare the pricing and hedging accuracy of a variety of continuous-time-futures model of pricing. The results show that the inclusion of a second stochastic factor in the model had made significant

improvement in the pricing and hedging accuracy. Overall, the results also indicate that a non-stationary two-factor model provides the best performance.

A study conducted by *Dimitrios Lyridis, Panayotis Zacharioudakis,Stylianos Iordanis and Sophia Daleziou* of The National Technical University Athens, Greece did extensive research on the Time Series modelling of Forward Freight Agreement using Artificial Neural Network Model in the year 2013 noted that the quantitative findings of the models developed above have resulted that the applied Connectionist models in the study do fit well to the underlying dynamics of the time series data, thereby giving satisfactory accuracy which is capable of a high success rate when using the models within a trading strategy context.

The methodology can easily be expanded to multivariate models forecasting vector time series, i.e. it can be generalized to model multiple system variables of the shipping market and also be adapted to forecast the price and time of the market for other financial instruments.

There has been extensive research done on the Dry bulk industry and numerous literature has showed the revenue generation, the cargo movements and the composition of freight rates. It has been found that very little or no research has been done on the segment of risk management in shipping especially pertaining to the risk hedging tools such as freight futures and Forward Freight Agreements. The main reason poor such a poor literary reach is because of the non-availability of data.

The Baltic Exchange and the BIFFEX are the sole repository of the market trading data including the historical prices and the market volumes. This data is not easily available for literary purposes hence posing a major hurdle for research on the use of derivatives for hedging the freight risk in the shipping industry. In this study, I have taken the maximum effort to gather the market trading data and the price movements by relying on secondary data. This study is conducted to describe how the Forward Freight Agreements are used to hedge the price risk in the Dry Bulk Shipping Industry.

Kavusanos and Nomikos (1999, 2003) and Kavusanos and Visvikis (2004) in their study has found out that the future prices are a good projector of the underlying spot prices while examining the joint performance of the spot and the future prices in their model.

This dissertation will briefly discuss about the global dry bulk market in detail, its components and performance of the dry bulk market. The study goes further to discuss about the various risks in shipping industry and specifically the risks that arise from the freight rates. Furthermore, the significance of freight derivatives especially the use of Forward Freight Agreements in the dry bulk sector will be discussed in this dissertation.

Chapter 8

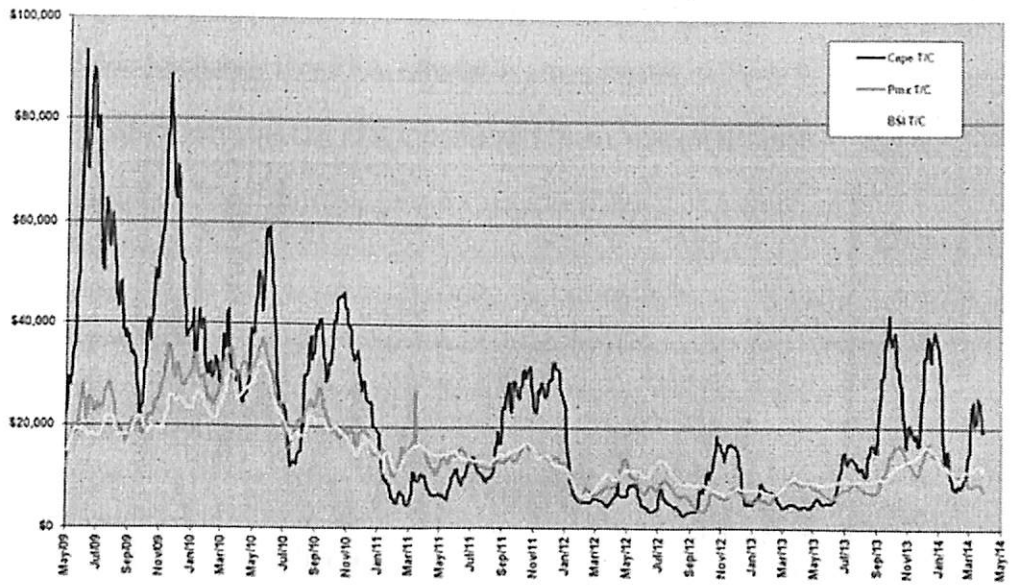
8.1: Objective of the Study

- The first objective of this study is to briefly understand the Global Dry Bulk Market. The study will explain the major cargoes that are handled in the dry bulk market and the different types of vessels that are used for transporting these Dry Bulk.
- The second objective of this study is to understand the major factors that affects the Global Freight Rates.
- Securing the cheapest freight rate is profitable for the charterer and charging the highest freight rate is beneficial for the ship owner. As the freight rates are the function of supply and demand it is necessary to hedge the price risk using derivatives. Hence, the third objective of this study is to understand the working of shipping derivatives.
- There are various hedging tools used for managing the risk in shipping. In this study, I will be focusing on the use of Forward Freight Agreements for risk management in the Dry Bulk Shipping Industry.

8.2: Need of the Study

- Shipping industry is known for its highly volatile prices, seasonality, strong business cycles, cyclicality and capital intensiveness. Therefore risk management in this sector is extremely important.
- Charterers and Ship-owners face enormous risks, which arise from the fluctuations in the freight rates, bunker prices (fuel), interest rates, foreign exchange rates and vessel values. These risks substantially affect the revenue and cost of the ship-owners and the charterers, hedging such a risk is way too important.
- The latest risk management techniques, involve the use of financial derivatives instruments, and some of which have been developed exclusively for protecting (hedging) against the adverse and volatile price fluctuations of the previously mentioned risk factors in shipping.
- Through the use of derivatives instruments, ship-owners and charterers can secure or stabilise the level or rate of their future income or costs and thus reduce uncertainty and volatility of their cash-flow which are unseen. **Figure 8.1** shows the volatility in freight rates for the dry bulk sector

Figure 3.1: Freight Rate Movements in the Dry Bulk Market



Source: Dryships Inc.

8.3: Limitation of the Study

- Non Availability of Primary Data i.e. the non-disclosure of daily trading prices and the historical data for analysis has limited my research only to secondary data.
- The IMAREX and Baltic Exchange are the sole repository of this data and is not available to anyone but its members.
- Very few research has been done on the FFA market further narrowing the availability of secondary data for reference.

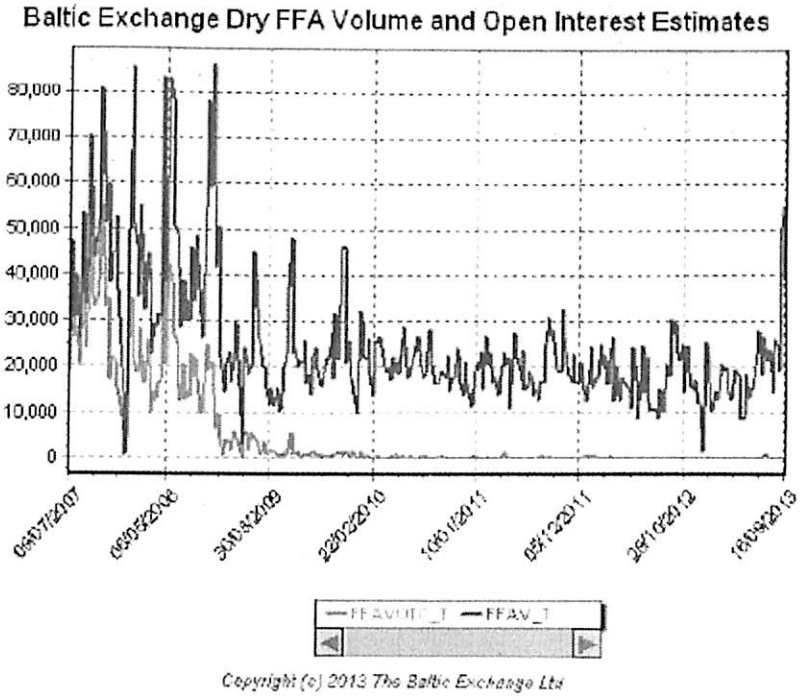
8.4: Research Methodology

The research methodology followed in this study is a descriptive research model. A descriptive research is used to describe the characteristics of a population or a given problem. It is neither a quantitative nor a qualitative research. In this research I will be describing the characteristics of the dry bulk market and the use of Forward Freight Agreements to hedge the risk in the freight rates. Furthermore, the research also pans over the various factors that influence the freight rates and the various risks that may arise if the risks are not mitigated properly.

This research is done by using the help of secondary data only as the primary data which can be used for analytical study was not available. The secondary data include various research papers, white papers and various research studies published by market professionals and other statistical data issued by price reporting agencies.

Chapter 9: Findings & Conclusions

Figure 9.1: Baltic Exchange Dry FFA volume & Open Interst



Source: Baltic Exchange

The Dry bulk freight market has dropped substantially after the global recession that happened in the year 2008. Figure 9.1 shows that the volumes traded in the Baltic Exchange for the Dry bulk FFA's has dropped to staggering 20,000 levels right from 85,000 levels. 2009-2012 was considered as a very bad returns period for the ship owners while a very profitable period for charterers. In 2012, the Baltic Dry Index touched 699 mark which was the lowest recorded since its inception in 1985. After 2012, the market moved in a confused manner showing heavy volatility in freight rates and FFA traded volumes. The year of 2013 had a rejuvenation for the world shipping industry. Demand for dry bulk cargo exceeded the total world tonnage available. Chinese iron ore imports rose to record limits by the end of 2013. As seen in the above figure, the open interest in the FFA dry bulk sector remained low indicating very less speculators in the market. Even though the market open interest remains stable throughout the years 2011-2013, the volumes traded in the Baltic Exchange started rising which is now above 50,000 levels from the previous 10,000 to 20,000 levels. This rise in the volume is a clear indicator that the actual market participant are using Dry Forward

Freight Agreements in a very large manner. In the year 2013, a large amount of tonnage was added to the world fleet through delivery of new builds out of which more than 70% was dry bulk. The increase in the dry FFA volumes show the high potential for Forward Freight Agreements for hedging the freight rate risks. As there is lot of trading activity happening in the FFA market, the dry bulk FFA rates has come down from the high levels it achieved during the end of 2013 and is projecting a stable movement. This is a clear indicator showing the potential for FFA in the Dry Bulk Sector.

References

1. Alizadeh & N. Nomikos (2009). *Shipping Derivatives and Risk Management*. Palgrave Macmillan, London.
2. Cullinane (1991). 'Who's using Biffex? Results from a survey of ship-owners'. *Maritime Policy & Management* **18**.
3. Dinwoodie, J. Morris (2003). 'Tanker forward freight agreements: the futures for freight futures.' *Maritime Pol* **30**:45–58.
4. Ederington (1979). 'The Hedging Performance of the New Futures Markets'. *The Journal of Finance* **34**(1):157–170.
5. Fama (1984). 'Forward and spot exchange rates'. *Journal of Monetary Economics* **14**(3):319 – 338.
6. Fama & K. R. French (1987). 'Commodity Futures Prices: Some Evidence on Forecast Power, Premiums, and the Theory of Storage'. *Journal of Business* **60**:55–73.
7. Geman (2005). *Commodities and Commodity Derivatives*. John Wilay & Sonds Ltd, Chichester.
8. Geman (2008). *Risk Management in Commodity Markets: From shipping to agricuturals and energy*. Wiley.
9. Gjolberg & T. Brattested (2011). 'The biased short term futures price at Nord Pool: can it really be a risk premium?'. *Journal of Energy Markets* **4**:1–20.
10. Gray (1990). *Shipping Futures*. Lloyd's of London Press LTD, London.
11. Grober (2010a). 'Forecasting Shipping Freight Rates'.
12. Grober (2010b). 'Is the forward freight market efficient?
13. Grober (2010c). 'The lead-lag relationship between spot prices and FFA's in international shipping markets'.
14. Haigh (2000). 'Co-integration, unbiased expectations and forecasting in the BIFFEX freight futures market'. *Journal of Futures Markets* **20**(6):545 – 571.
15. M. S. Haigh, et al. (2004). 'Integration and Causality in International Freight Markets: Modelling with Error Correction and Directed Acyclic Graphs'. *Southern Economic Journal* **71**(1):145–162.
16. S. Harrington & G. Niehaus (2003). *Risk management and insurance*. McGraw-Hill, London.

17. J. Hull (2012). *Options, Futures and other Derivatives*. Pearson Education Limited, Edinburgh.
18. L. L. Johnson (1960). 'The Theory of Hedging and Speculation in Commodity Futures'. *The Review of Economic Studies* **27**(3):139–151.
19. M. Kavussanos, et al. (2004). 'The Unbiasedness Hypothesis in the Freight Forward Market: Evidence from Co-integration Tests' **7**:241–266.
20. M. G. Kavussanos & N. K. Nomikos (1999). 'The forward pricing function of the shipping freight futures market'. *Journal of Futures Markets* **19**(3):353 – 376.
21. M. G. Kavussanos & N. K. Nomikos (2000). 'Futures hedging when the structure of the underlying asset changes: The case of the BIFFEX contract' **20**:775–801.
22. M. G. Kavussanos & I. D. Visvikis (2006). 'Shipping freight derivatives: a survey of recent evidence' **33**:233–255.
23. M. G. Kavussanos & I. D. Visvikis (2010). *International Handbook of Maritime Business*. Edwar Elgar Publishing Limited.
24. S. Koekebakker, et al. (2006). 'Are Spot Freight Rates Stationary?' *Journal of Transport Economics and Policy* **40**(3):449–472.
25. R. Kolb & J. Overdahl (2007). *Futures, Options and Swaps*. Blackwell Publishing, Oxford.
26. Review of Maritime Transport 2013.
27. The Baltic Exchange.
28. International Maritime Exchange.
29. Clarksons Research Services Ltd.
30. Lloyd's Shipping Intelligence.