Master Thesis

Speculation and Risk Management in the Shipping Industry:
Theory and Practice

By
Linda Korsfur

The master thesis is carried out as a part of the education at University of Agder and is therefore approved as such. However, this does not imply that the University answers for the methods that are used or the conclusions that are drawn.

Advisor: Steen Koekebakker

University of Agder, Kristiansand

02.06.2009

Abstract

This thesis investigates speculation and risk management in the shipping industry in general represented by the use of a case study consisting of two dry bulk shipping companies. In addition, it focuses on the impact of the financial crisis on the dry bulk shipping industry.

Shipping is one of the world's most international and capital intensive industries, and has since the very beginning been characterised by cyclicality, seasonality and volatility. Volatility in general and the recent dry bulk collapse suggest that shipping is a high-risk industry in which risk management is rather important in order to avoid instability and unpredictability.

There are five main risks that are of vital importance for shipowners and should thus be managed. These risks include freight rate risk, bunker price risk, exchange rate risk, interest rate risk and counterparty risk. There are several ways of managing these risks, and the most common is hedging through the use of derivative contracts such as futures, forwards, options and swaps. Market participants that actively manage risk with these instruments will experience reduced costs of financial distress and will be less exposed to short-term volatility than companies that stay un-hedged. In addition, by exploiting these tools, companies can obtain a competitive advantage by becoming more suited and prepared for unexpected ups and downs in the market.

The results of the case study show that the two companies operate rather differently when it comes to risk management. Where Camillo Eitzen & Co ASA actively implements hedges against freight rate risk, bunker price risk, interest rate and currency risk, Golden Ocean Group Ltd does not. The only feature they have in common is that they both operate in the dry bulk industry and that they both trade Forward Freight Agreements to a certain degree. Other than that they differ in terms of sub-segment, contract strategy and risk management strategy in general. What is particularly interesting is that both companies have recently experienced financial distress, suggesting that implementing an active hedging strategy in order to avoid financial distress may prove insufficient as long as a global financial crisis negatively affects all industries.

Acknowledgements

I would like to thank my advisor, Professor Steen Koekebakker, for his contribution and helpful remarks and comments. In addition I would like to thank The Baltic Exchange, Tradewinds and Lloyd's List for giving me access to their historical data. Christiana Chuan at Bunkerworld, I would like to thank for sending over bunker prices for the last two years. And finally, I would like to thank Elin Saugestad, Senior Accountant at Golden Ocean Management, for answering my questions regarding Golden Ocean's risk management strategy.

Table of contents

List of tables and figures

1. General Notes

1.1 Introduction

Shipping is a traditional industry with traces all the way back to the 'Westline' that started in Lebanon 3000 BC. The industry is truly international with around 100 trading countries and carries around 90 per cent of the global trade. During the last century, the industry has experienced remarkable development; the fleet has grown both in terms of number of ships and carrying capacity. The larger vessels have led to the construction of larger ports with more efficient handling gear, and the ability to take advantage of economies of scale. The size of the fleet has grown in accordance with the increasing growth of world trade, which is the main driver behind sea transport. The main characteristics of the industry have not changed much though; the industry is still embodied with volatility, cyclicality, seasonality and uncertainty in general concerning both income and expenses due to fluctuating price levels.

Through the operation of its vessels the shipowning company is exposed to several risks. The freight rates which constitute the main revenue are fluctuating and unpredictable, and so are operating costs in terms of bunker fuel. Bad weather may cause loss of the vessel and accidents may cause damages and unforeseen docking of the vessel and port congestion may cause delays, all of which will affect the owners' cash flows. Because of its capital intensiveness, a change in interest rate levels may cause severe changes in debt payments. In addition, because it is such an international industry, the participants are also subject to fluctuating exchange rates. And finally, the risk of the counterparty being unable to fulfil its agreements and pay when due is also crucial and has gained increasing attention due to the current financial turmoil. All these factors combined, make risk management very important for shipowners in achieving predictability and reduce cash flow fluctuations.

Over the years shipping participants have seen the rise and fall of the freight futures contract, and the introduction of Over the Counter (OTC) Forward contracts, options and

swaps. These contracts have made operational risk management cheaper, more flexible and readily available to parties exposed to adverse movements especially in the freight market.

1.2 Objective

As the shipping industry is risky and embodied with volatility, cyclicality, seasonality and uncertainty in general, this thesis will focus on how shipowners in fact can manage their risk exposures and make cash flows more predictable. The thesis will thus investigate risk exposure and determine which instruments are available for hedging risk. After the available hedging strategies are emphasised, the two dry bulk shipping companies Golden Ocean Group Ltd and Camillo Eitzen & Co ASA will be used as case studies. The main objectives are to see what risk management instruments are actually being employed in practice and to take a look at how the current global financial crisis have affected the shipping industry and its companies.

1.3 Outline

The rest of the thesis is organised as follows:

Chapter two contains a presentation of the shipping industry and its economics with the purpose of laying the foundation for the importance of risk management.

In **chapter three**, the current financial crisis and its repercussions on the dry bulk industry has been outlined. The focus of the chapter is the dry bulk crisis and why it happened as well as its consequences.

Chapter four includes an introduction to Modigliani and Miller's irrelevance theorem. In addition, it explains capital structure, hedging and financial distress and how these influence the risk exposure.

Chapter five includes risk management in shipping and starts with an explanation of why risk management is of such vital importance in the shipping industry. The chapter introduces the different risks and how these risks are commonly managed through a variety of hedging instruments.

In **chapter six**, a case study has been used in order to take a look at which instruments are being employed in practice. Two dry bulk shipping companies Golden Ocean Group Limited and Camillo Eitzen &Co ASA have been used as cases and have thus been analysed in order to state an example of how risk management works in the real world.

In **chapter seven**, the thesis is summarised and conclusions are drawn.

2. Economics of Shipping

Shipping is a captivating business. As one of the world's most international and capital intensive industries, shipping has since the very beginning been characterised by creativity, skills, cyclicality, remarkable profits and some devastating miscalculations.

Shipping, trade and economic development are closely linked together in the sense that trade promotes shipping, and shipping offers the transport needed to encourage economic development. Shipping is moreover an industry in constant change that has grown up with the world economy and is today a worldwide business community, built on transportation and free trade.

Ultimately, shipping consists of a group of people who work closely together on the mission of transporting cargo by sea. The participants are shipowners, charterers, brokers, shipbuilders and scrappers, financial institutions, insurance- and classification agencies, publishers, legal advisors and regulators. These players all interact in order to make the industry prosperous and more efficient.

The importance of sea transport is reflected in the size of the fleet, the volume of cargo transported, and the annual revenue. The industry carries, according to the International Maritime Organisation (2006), over 90 per cent of global trade. As of 1 January 2008 the world fleet consisting of 50,525 vessels with a combined tonnage of over 728 million gross tonnes transported over 7.7 billion tonnes of cargo. The 2006 revenue generated by operating the merchant fleet represented about 5 per cent of the global economy, approaching USD 500 billion in freight rates (Shipping Facts, 2009).

The commodities shipped by sea are commonly arranged into four groups; Energy Trades dominates the bulk shipping and accounts for 44 per cent of seaborne trade; Metal Industry Trades accounts for 18 per cent of total sea transportation; a total of seven commodities comprises the Agricultural and Forestry Trades accounts for 9 per cent; and finally, Other Cargoes accounts for 28 per cent of sea trade and consists mainly of high value, low volume commodities generally transported in specialised vessels and container ships (Stopford, 2009).

The shipping industry and its markets are characterised by exceptionally low barriers to trade and fairly free information resulting in almost free and perfect competition. All that is needed to enter the industry is a ship and a crew, both easily accessible in the liquid second-hand market and in low cost countries respectively. As long as the freight rates are high, funds for financing a vessel is easily obtained through different financial institutions and private investors. Correspondingly, due to the liquid second-hand market, exit barriers hardly exist. There may, however, exist a value gain or loss in the sense that second-hand prices fluctuate significantly along with freight rates.

2.1 Bulk Shipping

Bulk shipping goes all the way back to the 19th century and the coal trade between North England and London. Since then, the volume of seaborne trade has grown tremendously and there has been a consequent increase in the use of bulk shipping in order to exploit economies of scale and improved handling efficiency. Many different ship types are used for bulk transport, and the bulk fleet today consists mainly of tankers, dry bulk carriers, combined carriers, and various specialist vessels (Stopford, 2009).

Stopford (1997, p. 293) defines bulk cargo in two different ways, the first as “any cargo that is transported by sea in large consignments in order to reduce unit cost”, the second definition states that bulk is “anything whose physical characteristics allow it to be handled in bulk”. Both definitions reflect the main principle of bulk transport, notably the principle of ‘One ship, one cargo’ where the ultimate objective is to reduce costs.

When bulk vessels are carrying bulk commodities the cargo is referred to as ‘bulk cargo’, except when the cargo is transported by using the liner service, the cargo then turns into ‘general cargo’. Bulk cargo is divided into three main groups. The first group is *liquid bulks* consisting of crude oil, oil products, LPG (Liquefied Petroleum Gas), LNG (Liquefied Natural Gas), and chemicals. The second group is the *five major bulks* comprising iron ore, coal, grain, bauxite and alumina, and phosphate rock. Finally, the *minor bulks* cover steel

products, forest products, cement, fertilizers, manganese, sugar, soya meal, scrap, coke, pig iron, and rice (Stopford, 2009).

Four principles determine whether a load of cargo should be transported in a bulk carrier or by using the liner service, the first is the volume of the cargo; the second is its physical handling and stowage characteristics, followed by the value of the cargo, and finally the regularity of the material flow. If the commodity has high volume and low value it will probably be transported in a bulk vessel, hence crude oil and the five major bulks are almost entirely shipped in bulk vessels. Low volume cargo with irregular shipment and handling and stowage difficulties will most likely be shipped in a container vessel.

2.1.1 The Dry Bulk Market

The dry bulk shipping market is providing sea transport for the five major bulks and the minor bulks in different types of ships. The vessels are normally categorised into four segments depending on the volume and type of cargo transported.

Table 2.1 Dry bulk market segmentation by vessel size

Vessel type	# of vessels	Vessel size	Cargo type
Capesize	821	100,000+ dwt	Iron ore, coal
Panamax	1550	60,000 - 100,000 dwt	Coal, grain, bauxite and larger minor bulk cargo
Handymax/Supramax	1719	40,000 - 60,000 dwt	Minor bulks and smaller parcels of major bulks such as grain, bauxite and coal
Handysize	2869	10,000 - 40,000 dwt	Carries the same cargo as Handymax/Supramax

Sources: Clarkson RSL (2009); Kavussanos (2002)

It needs to be noted that the segmentation of the dry bulk fleet tend to vary slightly across different sources.

The total bulk carrier fleet currently (March 2009) consists of 6959 vessels constituting a total of 417.5 million dwt (Clarkson Research Services Ltd, 2009) According to Platou (2008) the dry bulk market represents approximately 40 per cent of aggregate volume transported by sea. Iron ore, coal and grain are the largest of the major bulk trades, and because of their

volume transported, these three are the driving force behind the dry bulk carrier market (Stopford, 2009). Hence the whole dry bulk market is subject to changes in the patterns of these commodities, which all has its own unique industrial characteristics and growth trends and thus impact on the dry bulk shipping industry.

2.2 Shipping Demand and Supply

In order to understand what is going on in the diverse shipping markets, it is vital to take a look at what causes the freight market cycles. This is done by using the supply and demand market model. The model has two main components, supply and demand, linked by freight rates which help bring supply and demand into balance in order to achieve an equilibrium price. Freight cycles are generally irregular as the demand for ships changes rapidly whereas the supply is slow and heavy because of the time-lag from the ordering of ships until delivery.

2.2.1 Demand for Sea Transport

There are numerous factors influencing the shipping market; and Stopford (2009) has identified five particularly important variables affecting shipping demand. The first and most vital is the world economy, the reason why this is such an important variable is that it is the world economy that drives shipping, with no world trade there would be no need for sea transport. The second variable is the structure of commodity trades, where short- and long-term trends play a vital part and can lead to alterations in ship demand. A third variable is the distance, also referred to as average haul. Political events are the fourth demand variable where random shocks such as weather changes, wars, new resources, or commodity price changes may affect the stability of the economic system. The final demand variable is transport costs, which is important for long-term demand.

2.2.2 Supply of Sea Transport

Stopford (2009) also indentified five variables influencing the supply of sea transport. The first variable is the merchant fleet and its expansion and contraction. Fleet productivity is also vital for the supply side of shipping and is therefore the second variable. The third supply variable is the long-cycle process of shipbuilding production, followed by the number of vessels lost at sea and sold for scrapping. The last variable influencing supply of sea transport is the freight rates, which is also the ultimate regulator motivating the decision-makers to adjust capacity, improve their service, and reduce costs.

According to Stopford (2009) there are four groups of decision-makers influencing the supply of ships, notably shipowners, charterers, the banks that finance shipping, and regulatory authorities. Of these decision-makers, the shipowners are the primary ones, making decisions on when to order new ships, when to sell old vessels for demolition, and when to lay up tonnage.

Table 2.2 The ten demand and supply variables

Demand	Supply
1. The world economy	1. World fleet
2. Seaborne commodity trades	2. Fleet productivity
3. Average haul	3. Shipbuilding production
4. Random shocks	4. Scrapping and losses
5. Transport costs	5. Freight revenue

Source: Stopford (2009, p. 136)

2.2.3 The Freight Rate Mechanism

The freight market is the adjustment mechanism linking supply and demand. It operates through the freight rate negotiations of shipowners and charterers. This rate reflects the balance of ships and cargoes available in the market. Hence if there is excess supply, rates are low, and if the demand exceeds the supply, the rates will soar.

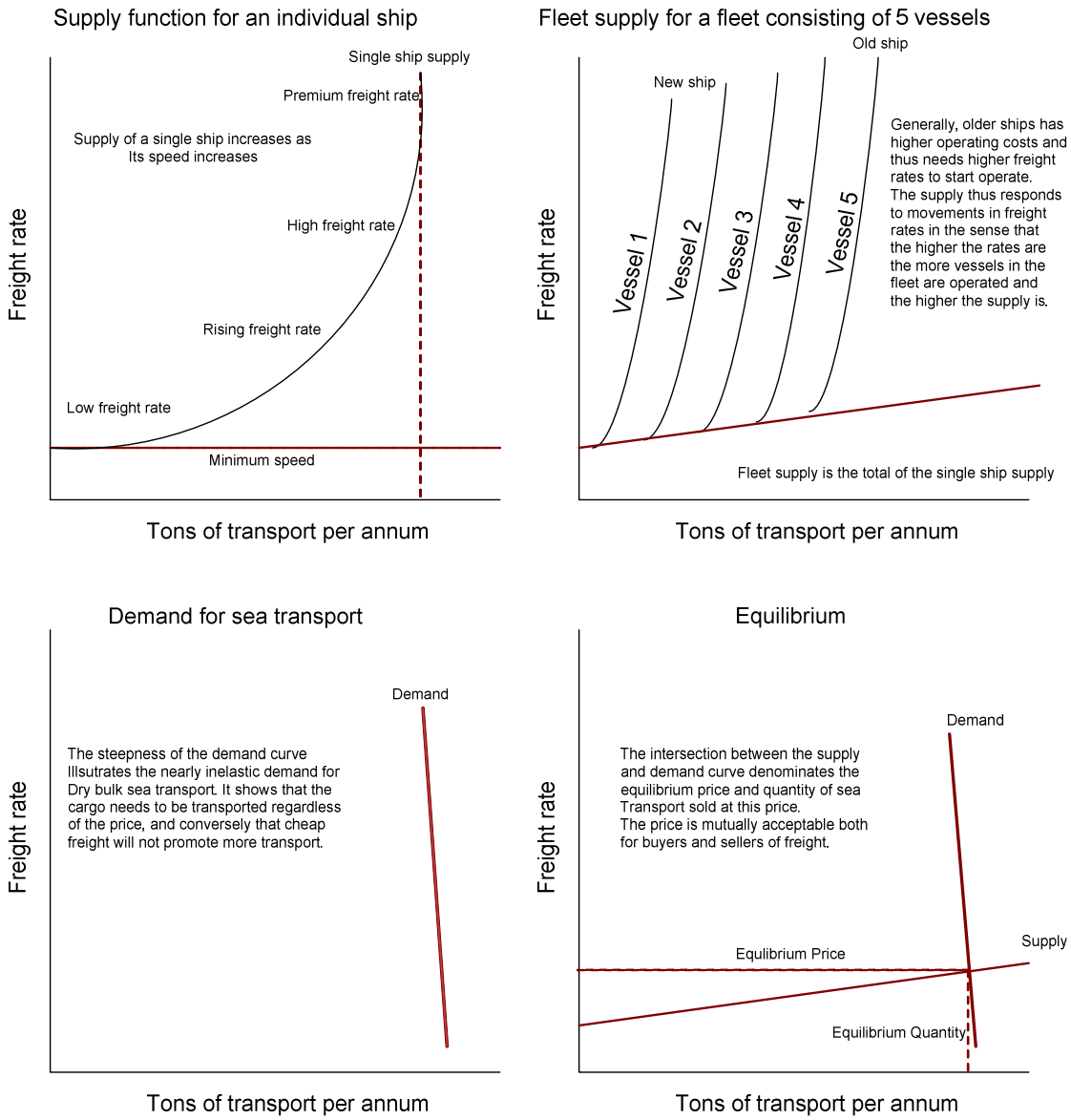
The supply function for one single vessel is a J-shaped curve illuminating the amount of transport the owner makes available at each level of freight rates. In a weak market when the rates are low, the supply curve is almost flat. The least efficient vessels are laid up, and the speed of the operating fleet is slow. As soon as the freight rates are starting to rise, more

vessels are added to the active fleet and the vessels are speeding up. When the market finally is in tight equilibrium and rates are high, there will be no laid up tonnage and the fleet will operate at full speed.

The demand function shows how charterers respond to changes in freight rates. The demand curve is almost vertical due to the lack of a competing form of transport which can move large volumes of cargo at the same relatively low rates; the cargo needs to be shipped regardless of price. Moreover, the low value of freight cost compared to the final price of the goods transported is also contributing to the demand function being nearly inelastic.

The intersection between the supply and demand curves indicates the equilibrium price; this price specifies a mutually acceptable price. Both the demand and the supply function are illustrated in figure 2.1 which is based on Stopford's figure 4.12 (2009).

Figure 2.1 Shipping supply and demand functions



Source: Stopford (2009, p. 161)

2.3 The Four Shipping Markets

Stopford (2009) divides the shipping industry into four core markets, each trading in a different commodity. The freight market trades in sea transport, the sale and purchase market trades second-hand ships, the newbuilding market deals in new ships, and the demolition market trades scrap ships.

2.3.1 The Freight Market

The participants of the freight market are shipowners who sell sea transport, charterers who buy the freight, and ship brokers who put the deal together.

The most frequently used contracts are the voyage charter, the contract of affreightment, time charter and the bare boat charter, all of which are thoroughly explained in section 5.2.1. When the deal is fixed the parties sign the charter-party which is the written contract stating the terms and conditions and anticipating the problems that may possibly arise. The freight rates are determined by demand and supply, which in turn is influenced by several variables, see section 2.3.

2.3.2 The Sale and Purchase Market

The sale and purchase market is where the shipowners meet to buy and sell existing ships, assisted by a broker. This market and its liquidity is the reason why barriers to trade in the shipping industry are so limited. The price volatility of the sale and purchase market leaves room for “Asset Play”, meaning that a vessel is bought cheap and sold for an escalated price, which is an important source of income for shipping investors.

Second-hand ship prices are generally determined by supply and demand, but are also affected by four main factors; freight rates, the age of the ship, inflation, and market expectations. The reason why second-hand prices and freight rates are closely linked is that when freight rates are high, estimated future earnings of the vessel is high, and when the rates are low, future earnings will be low.

2.3.3 The Newbuilding Market

The participants of the newbuilding market are shipowners or shipping investors ordering a new vessel and the ship yards that will build the ship, the deal is also here negotiated through a broker. The market is quite long term as it normally takes 2-3 years from the ship is ordered until delivery, expectations and predictions are therefore very important. Shipbuilding prices are determined by supply and demand where the demand is influenced by freight rates, second-hand prices, liquidity of the buyers, credit availability, and expectations. The key issues affecting the supply side on the other hand, are production costs, number of available berths, and the size of the order book.

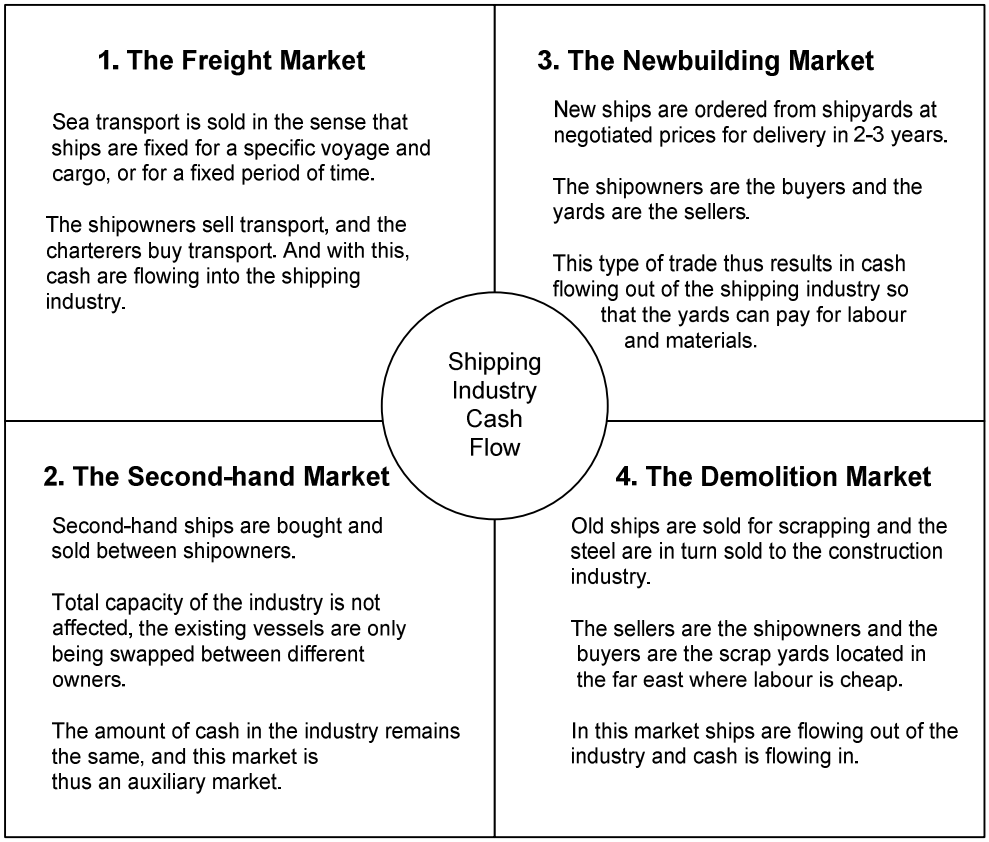
2.3.4 The Demolition Market

The fourth market is the demolition market where old ships are being scrapped and the scrap steel is being sold to the steel construction industry. The customers in this market are the scrap yards buying ships from the owners, generally handled by a broker. Today most of the scrap yards are located on a beach in the Far East (India, Pakistan, Bangladesh, and China) where labour costs are low. Prices can be very volatile, varying from ship to ship, and are settled through negotiation depending on the availability of ships for scrapping and the demand for scrap metal.

2.3.5 The Link between the Four Shipping Markets

As the same participants are essentially involved in all the markets, their activities are closely interrelated. Stopford (2009) explains how waves of cash flowing between the four markets are the phenomenon linking them together, this is illustrated in figure 2.2

Figure 2.2 The four shipping markets and how they correlate



These waves of cash flowing between the four shipping markets are what ultimately drive the shipping market cycle. All the markets will affect the others in a certain way. For instance if supply and demand for freight are in tight balance, and if demand is increased the rates will rise and second-hand prices and the size of the order books will increase. A few years later when the new ships are delivered there may be a situation of excess supply and the whole process goes into reverse with falling rates squeezing cash flows as the money goes out of the market to pay for the newbuildings. Financially weak owners who cannot meet their obligations are forced to sell in the second-hand market, resulting in reduced prices in this market; if the ships are too old they may have to be sold for demolition instead. As more ships are scrapped, supply of freight falls and the rates are bid back up and the entire process starts again.

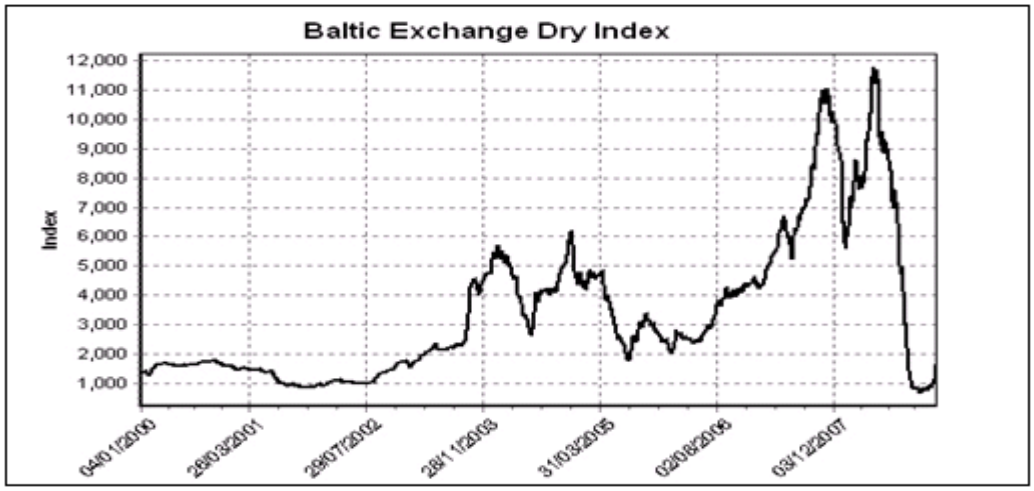
2.4 Freight Rate Volatility

Freight rates of sea transport are extremely volatile and make up the greatest risk of the shipping business as the freight income is the primary revenue for shipowners. A stable and predictable income is what all shipowners desire, hence the severe volatility of freight rates have been a major concern since the very beginning. The rates are generally determined by demand and supply, but in addition to the variables outlined in table 2.2 there are a few other factors affecting the volatility of freight rates.

The Baltic Exchange (2009) has found that freight rates fluctuate because the freight market is subject to a variety of external variables, but there are six fundamental factors driving the freight rates. The first factor is *fleet supply* which relates to the number of available ships, new deliveries and ships sold for scrapping. The second is *commodity demand* which is affected by industrial production, the levels of imports, and the performance of different industries. The third factor is *seasonal pressures* on which the weather has a large impact in terms of the size of the harvests and for instance the amount of ice in ports. *Bunker prices* is the fourth factor resulting in fluctuating freight rates, since bunker fuel account for approximately 25-35 per cent of voyage costs, oil price movements will consequently affect shipowners directly unless they trade in the time charter market.
The fifth factor, *choke points*, includes narrow canals such as the Panama and the Suez canals causing congestions. The last factor identified by the Baltic Exchange is *market sentiment* because market opinions affect the freight markets just as much as actual demand and supply.

Figure 2.3 demonstrates how the prices for dry freight have fluctuated from January 2000 until February 2009.

Figure 2.3 The development of the Baltic Dry Index during the last eight years



Source: The Baltic Exchange

Kavussanos and Visvikis (2006a) suggest that under a tight freight market when rates are high, changes in demand produce large variations in freight rates. This means that volatility and freight risks are higher in a tight and strong market. And conversely, rates are less volatile and freight risks are lower under weak market conditions.

2.5 Market Cycles

Market cyclicality is a well known phenomenon in various industries worldwide, and in the shipping industry they play a large role since as long as there are fluctuations in supply and demand, cycles will occur. Shipping cycles are irregular with no firm rules about the length or timing, consequently the cycles are unique and hard to predict.

Stopford (2009) makes a distinction between the long-term trend and the short-term cycle, by doing this it is possible to identify three types of cycles.
The long-term cycle is influenced by developments in the world economy and the level of shipbuilding capacity, which ultimately affect the growth rate of seaborne trade.
The short-term cycle fluctuates and may last for 3 to 12 years from peak to peak. The function of the short shipping market cycle is to coordinate supply and demand and is mainly driven by economic business cycles. Stopford (2009) identifies four distinct stages in the short cycle. The first stage is a market *trough* featured by surplus shipping capacity and

falling rates, the next stage is *recovery* where supply and demand move towards balance and rates are slowly rising, stage 3 is the *peak* where freight rates are high and demand and supply are in tight balance, finally there is the *collapse* when supply exceeds demand and rates are once again falling.
Lastly, freight rates fluctuating within a year is rather common and is referred to as *seasonal cycles*. This is particularly an issue for the dry bulk agricultural trades when rates are differing depending on the timing of the harvests.

Although the shipping market cycles are irregular and hard to predict they have a purpose. The cycles create an environment in which financially weak shipping companies are forced to bankruptcy in troughs, leaving the strong to survive and prosper. This will eventually produce a lean and efficient shipping business.

3. The Dry Bulk Collapse

2007 was a really good year for dry bulk shipping with high rates, full utilization of the fleet, and correspondingly high profits for the shipowners. Rates doubled from the previous year and rose from January to November, followed by a moderate decline in December. The dry bulk fleet reported a growth rate of 7 per cent, increased sailing distances, more port congestion, longer waiting time for repair and maintenance and a long order book at the shipyards. This trend resulted in a 13 per cent increase in demand for sea transport. As a response, a total of 162 million of new tonnage was ordered, which is more than three times the orders of 2006 (Platou, 2008).

The Baltic Dry Index reported in 2008 a record high of 11,793 points implying record high rates as the index is an indicator for the dry bulk shipping freight rates. The Baltic Dry Index has existed since 1998 and is managed by the Baltic Exchange, which is further explained in section 5.2.3.1.

Since the peak 20 May 2008, the rates have reached rock bottom. During the peak weighted average earnings for bulk carriers reached USD 68,848 a day (Clarkson Research Services Ltd, 2008) followed by a collapse in which freight rates for all segments dropped to only USD 4-5000 a day. By October 2008 at least four dry-bulk shipping companies, including Armada (Singapore) Pte and Britannia Bulk Holdings Plc, sought protection from creditors worldwide and have later gone bankrupt. China's planned crisis stimulus of USD 585 billion also failed to encourage demand in the world's biggest market for dry bulk ships (Leung, 2009).

3.1 Why Did the Rates Fall?

The Baltic Dry Index fell over 90 per cent last year, from 11,793 point to 663 points reported 5 December 2008 (The Baltic Exchange). One reason for this is that demand for raw materials plunged as Europe, Japan, and the United States simultaneously entered their first recessions since the Second World War (Nightingale, 2009). This recession was triggered by the financial turmoil in the US during the summer of 2007, which worsened in September

2008 and was spread to the rest of the world in just a few weeks. But In order to explain why the rates plunged, one needs to consider the demand and supply variables outlined in 2.2, which ultimately determines the freight rate level.

The dry bulk fleet reported a growth of 6.5 per cent during 2008. This was mainly due to the 24 million dwt of deliveries that year, whereas only 4.3 million dwt was deleted. In addition, 5 million dwt of converted tankers entered the bulk market due to the record high rates. Utilization of the fleet was in 2007 and during the first half of 2008 at full capacity (Platou, 2009).

The world economy has had a strong growth the last five years with an average growth of 5 per cent annually. At the same time the tonnage demand has increased surprisingly 8 per cent. 2008 on the other hand, despite the flying start, only ended up with a tonnage demand growth of 4 per cent.

Basically what caused the dramatic fall in freight rates and ultimately resulting in a collapse for the dry bulk industry was that supply of sea transport exceeded demand for the same transport. The sudden deterioration in economic activity towards the end of 2008 resulted in a sharp drop in the need for sea transport and explains the collapse in freight rates. The supply for sea transport increased rapidly due to extensive new orders encouraged by the record high rates, and at the same time the tonnage removed from the market was only minor.

In order to restore the balance between demand and supply in the dry bulk industry, the fleet needs to be reduced and the demand needs to increase. The industry cannot influence demand but it has some control over supply in terms of the level of newbuildings and vessels sold for scrapping. The shipowners are thus the main decision makers who can affect the supply by reducing the number of ships in the fleet by cancelling new orders and by selling more vessels for scrapping.

3.2 Consequences of the Crisis

Dry bulk shipowners have seen their profits diminish and share values plunge along with the falling freight rates when the market collapsed. When the rates slumped as a result of a 20 to 30 per cent cut in steel output reducing demand for transportation of iron ore, and after a freeze on credit made it harder to fund cargoes, things started to go wrong. Several vessels became idle and were waiting for employment as the need for transportation weakened. The Danish company Atlas Shipping A/S for instance, had to file for bankruptcy as it faced losses of USD 3 million a day due to the present freight rates and the charter parties they entered before the crisis (Shipping Times, 2008).

The fall of the rates can be exemplified by looking at the Capesize segment. During 2008 Capesize spot rates varied between USD 234,000 per day at the peak and USD 2,300 per day at the lowest. For one year time charter, however, the rates from peak to bottom are not as extreme, ranging from USD 170,000 to USD 18,000 (DNV, 2009). When looking at these deteriorating freight rate levels it is not hard to understand that vessel values also had to be affected as expected future earnings also was drastically reduced. By the 4th quarter 2008, market values for five year old Capesize and Panamax vessels had dropped approximately 60 per cent. Values dropped from USD 155 million to USD 49 million, and USD 90 million to USD 30 million respectively only in five months (Platou, 2009). Since the vessel values for virtually all the segments more than halved in 2008, several shipowners are now breaching covenants and face the threat of financial distress and eventually bankruptcy.

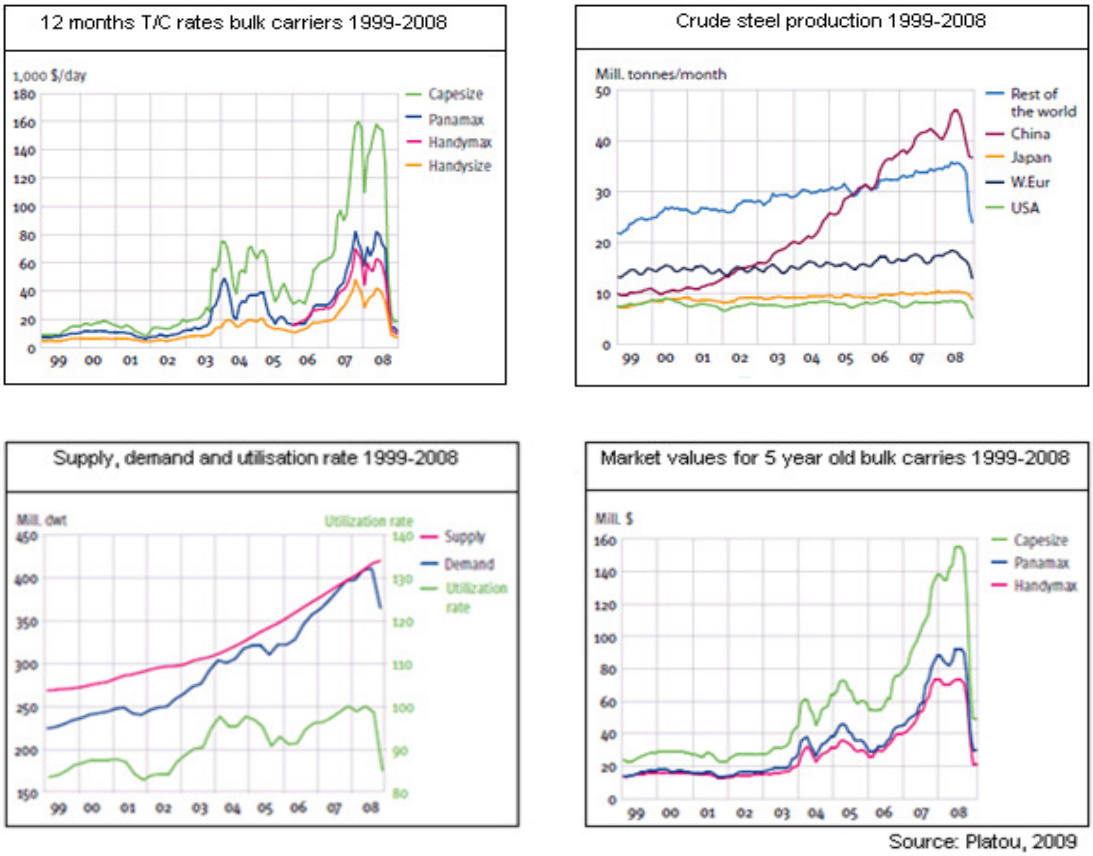
The credit crunch has made banks become reluctant or actually even unable to grant loans, and as a consequence only half of all the newbuildings in the dry bulk industry are fully financed. This will eventually lead to cancellations of new orders, which in turn will have consequences for the yards facing the threat of bankruptcy. However, it turns out that the yards have been too optimistic and have accepted more orders than they can possibly deliver when due, and this has opened up for owners being able to cancel the vessels as the yards have already broken the terms of the contract (Bjørndal, 2009). Ultimately, these cancellations will help to ease the pressure of continued overcapacity.

Several high profile shipping companies has been hit by counterparties not being able to pay the full rate or only being able to give parts of the payment of charter hires agreed upon in the charterparty. Other companies has experienced early redelivery of vessels on long term time charter or cancelled contracts of affreightment. Hence, another consequence is that many time charters fixed before the market collapse have been cancelled or renegotiated and resettled at much lower rate levels.

Scrapping volumes are surging every week, and several shipowning companies are now trying to cancel or delay future deliveries. The cancellation of vessels has its cost, however, because the yards have to be compensated, but still, this is cheaper than taking delivery of a new vessel that will only become idle. Platou (2009) reports that numbers of ships sold for scrapping has actually increased, with only 3 vessels sold in 2007, the numbers from 2008 increased to 36 vessels. So far in 2009, 39 vessels have been scrapped, and at the same time only 16 vessels were delivered, and thus there are signs of fleet contraction. However, there are still 3,387 vessels distributed among the four segments to be delivered within the next few years (Clarkson Research Services Ltd, 2009).

Figure 3.1 shows how the freight rates plunged, how the steel production has declined, how the demand dropped, and how market values for the diverse bulk sub-sectors have slumped during the second half of 2008.

Figure 3.1 The consequences of the global financial crisis



Source: Platou, 2009

To sum up, the consequences of the global financial crisis is that commodity demand has been reduced, which in turn has reduced demand for sea transport and freight rates have plunged. Lower freight rates have resulted in reduced earnings to shipowners. The overcapacity has led to tonnage being laid up or idle, and owners have experienced further reduced revenue. The reduced rates have also eventually resulted in reduced vessel value as estimated future earnings of the vessels are reduced. This has led to heavy write-downs, covenants violations and default on bank loans because the vessels are generally used as collateral for bank loans. Moreover, as counterparties are getting into financial distress and are unable to make payments when due, the situation only gets worse and has major effects on shipowners. In the second-hand market, shipowners exit purchase deals and as a consequence they have to pay penalty clauses. In addition, the companies face reduced liquidity because of the reduced revenue which ultimately affects the shareholders.

3.3 Was the Crisis Inevitable?

After a five year peak in the dry bulk industry driven by the record high world GNP growth and the increasing Chinese trade, which together put even more pressure on an already tight market, a market collapse was expected. Especially given that over the last 40 years, the growth in the world economy has been interrupted by major recessions every 7-8 years. There is as mentioned in chapter 2. a direct link between the world economy and the shipping industry, hence when the world economy slows down, so does seaborne trade. The current economic slump is driven by the credit crisis and 'bubbles' in certain industries, principally steel and real estate. The collapse in these two markets combined caused severe repercussions on the dry bulk industry because they were the main drivers behind the dry bulk shipping boom, particularly the Chinese steel production. In early 2008 when the demand for real estate declined combined with increased construction, the prices stopped rising and buyers pulled out, ultimately causing a market decline and consequently the demand for iron ore and steel was reduced as well (Stopford, 2008). Hence, historically and according to normal business cycle theory, after a boom there will always be a collapse because the tight market in equilibrium cannot go on forever. Normally the collapse in shipping occurs when supply overtakes demand and freight rates starts falling, all as a consequence of the business cycle downturn, see section 2.5.

As early as 4 February 2008, RS Platou predicted that the dry bulk rates had already reached the all time high, and that they would subsequently fall during the next two years due to the fleet growth (DN, 2008). They were wrong in the sense that the peak was already reached, as this did not happen until May the same year. However, they were right concerning the fleet expansion, but they could hardly have predicted the fall in world commodity demand.

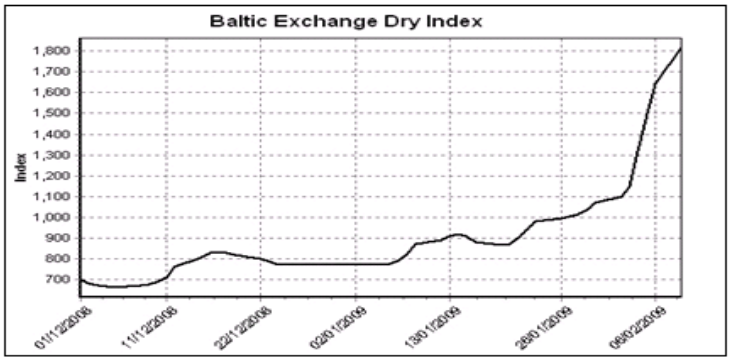
All in all it seems that most analytics and market agents could see the bubble burst and that a collapse was inevitable, but no one knew the timing, the length, the depth and the severity of the crisis. Still it is impossible to know the total outcome of this downward spiral.

3.4 The Rise of the Rates

After the dip in December 2008 the rates have risen slowly. During January the rates continued to fluctuate at a low level. February, however, was a better month for the dry bulk market where the level finally passed 1,000 points. As a consequence of the rising freight rates the chances of more companies going bankrupt were now limited and the value of their shares were increasing as well.

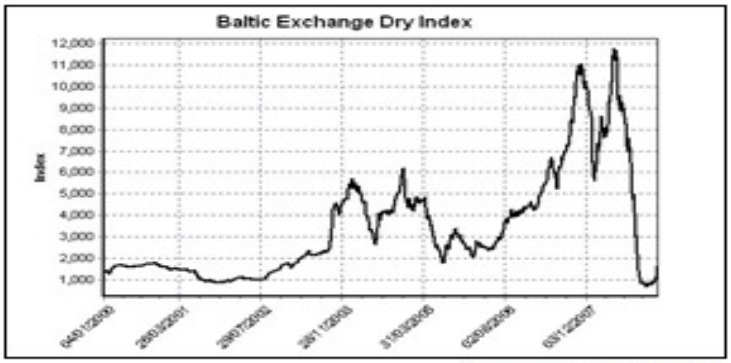
One of the reasons why the rates finally started to rise is that the Chinese steelmakers again started to buy iron ore from Brazil and Australia creating a demand for sea transport on these distances, and China's crisis stimulus finally started to pay off (Byberg, 2009). The upswing was thus driven by speculative traders taking advantage of the low freight rates and cheap iron ore, as well as a bet on the Chinese crisis package.

Figure 3.2 The rise of the rates from dip until mid February 2009



Source: The Baltic Exchange

Figure 3.3 The rise of the rates in a larger context



Source: The Baltic Exchange

The most critical issue at the moment is the massive delivery of new vessels that are due from the present and until 2013. The orderbook today (March 2009) consist of 47 per cent of the consisting fleet Platou, 2009), and since there is already an overcapacity situation in addition to the reduced demand, a larger fleet will just worsen the situation and postpone the recovery of the currently low market. The main problems with the massive delivery schedule are whether there will be finance available to fund these vessels and whether the yards are actually able to deliver all the ships contracted. According to Platou's calculations, a minimum of 35 to 40 per cent of the bulk newbuildings need to be deleted from the order book and some 20 per cent needs to be delayed in order to avoid a structural overcapacity in the future (Platou, 2009). Even though the volume of tonnage sold for scrapping and the numbers of cancellation have increased, the fleet size will still increase considerably.

What is important right now is that the rates are slowly rising and by April 2009 at least the rates covered the break-even for five year old vessels illustrated in table 3.1.

Table 3.1 The present dry bulk market (April 2009)

	Spot	1 year T/C	Break-even for a 5 year old ship
Capesize	USD 28,400	USD 28,500	USD 20,900
Panamax	USD 16,800	USD 15,500	USD 14,400
Supramax	USD 17,300	USD 13,000	USD 12,900

Source: DNV (2009)

From mid April to Mid May the Baltic Exchange reported that the Index was up 73 per cent ending up at 2,544 points. Since then the rates have continued to rise and 28 May the Index landed at 3,298 points. Hence, the rates from April in figure 3.1 have probably increased as well.

Although there are some positive factors such as limited yard subsidises and increasing numbers of tonnage demolished, there are according to DNV (2009) three significant challenges shipowners currently face. These are loss of revenue due to low rates and reduced activity, lack of financing and a too high cost structure as bunker prices have started to rise.

The current situation is being compared to the situation in the tanker industry in the 1970s when things developed badly and from which it took over 17 years to clear up the aftermath.

However, it is still uncertain how long, deep and severe this current downturn will be; one just has to wait and see.

4. Risk Management – A Miller & Modigliani Analysis

A central point in finance is that risk is undesirable, and a risk averse company would want to eliminate or at least manage its risks. Risk exposure may be affected by the capital structure and the hedging strategy of the firm. The two economists Modigliani and Miller (MM) have developed an irrelevance theorem that can be applied to both capital structure and hedging.

4.1 The Irrelevance of Capital Structure

Modigliani and Miller (MM) are famous for their propositions developed in the late 1950s. Their irrelevance theorem states that the value of the company will not be affected by its capital structure. The theorem is, however, based on the assumptions that the sum of all future cash flows distributed to the firm's debt and equity holders is unaffected by the capital structure; there exist no personal or corporate taxes; no transaction costs; and no arbitrage opportunities are available in the economy (Grinblatt & Titman, 2002). In addition, the possibility of bankruptcy and financial distress costs are being ignored.

Another interpretation of MM's theorem is that, in the absence of the market frictions mentioned above, shareholders are indifferent to a change in the firm's capital structure. Modigliani and Miller argue that "what the firm can do, so can the investor" (Buckley, 2004, p .183). MM thus suggest that a shareholder can obtain homemade leverage, and by borrowing on his own account he can offset high or low corporate gearing by homemade leverage.

4.2 The Relevance of Capital Structure

In the real world where market frictions do exist, the irrelevance of capital structure becomes more relevant. This can be explained by introducing dividend policy, taxes and costs of financial distress.

4.2.1 Dividend

The irrelevancy theorem can also be applied to dividends. MM argue that in a perfect capital market, with no transaction costs and no taxes, the dividend policy of the firm is irrelevant for the shareholders. They argue this the same way as for homemade leverage; that a shareholder can offset dividend by adjusting his own portfolio. In other words, if a shareholder receives more dividend than desired, he can just reinvest the excess amount. On the contrary, if he receives less than wanted, he can just sell shares and thus receive the amount of money desired.

But as soon as the unrealistic assumptions are being altered, it seems that, depending on its investment opportunities, the firm should avoid dividend payouts as the shareholders will have to pay tax for these payments, and rather reinvest the earnings. A company with a high cash flow and few positive NPV opportunities will be paying dividend. In addition, the stock market reacts positively to increases in dividends and negatively to decreases (Ross, et al. 2006). What is more is that the lower debt-to-equity ratio, the more earnings are available for shareholder dividends. This further suggests that the dividend policy actually matters after all.

4.2.2 Taxes

In a world without taxes the capital structure is irrelevant for the shareholders because high or low corporate gearing can be offset by homemade leverage. In the real world, however, this is not true as interest on debt is tax deductible. Because of this, the after-tax cash flows of a levered firm are larger than those of an all equity firm, which in turn leads firms to favour debt over equity financing.

The shipping industry is renowned for registering vessels in a particular country in order to reduce costs. Flags of convenience offer shipowners an alternative to being registered under their national flag. The advantages obtained from these open registries are associated with taxes, maritime safety conventions, crewing and terms of employment, and naval protection and political acceptability (Stopford, 2009). Taxes are therefore generally not an issue in the shipping industry.

4.2.3 Financial Distress

Distress or bankruptcy costs include expenses arising from conflicts between debt holders and equity holders and those arising from the firm's stakeholders such as customers and suppliers being reluctant to do business with a company with financial difficulties.

Financial distress occurs when a firm does not have sufficient cash flow to meet its obligations to pay when due and thus needs to take counteractive actions. Ross, et al. (2006) identifies several financial distress examples; these include dividend reductions, losses, plant closings, layoffs, falling stock prices and CEO resignation. In addition they identify numerous ways to deal with financial distress. The first three actions concern the firm's assets and include selling major assets, merging with another firm or cutting costs. The next four actions are related to financial restructuring and consist of issuing new securities, negotiating with banks and creditors, exchange debt for equity or, finally, filing for bankruptcy.

Bankruptcy costs are generally divided into two types of costs; direct and indirect costs. The former include administrative costs, accounting fees and legal expenses, whereas the latter consist of different losses such as loss of market share due to customers and other firms being unwilling to do business with a company in financial distress. Surveys show that together direct and indirect costs make up between 10 and 20 per cent of total firm value (Ross, et al., 2006). Other surveys show that the net present value of distress is normally 4-5 per cent of the firm's pre-distress value (Almeida & Philippon, 2007), and Korteweg (2007) found that the market usually expects costs of financial distress of 5 per cent of the firm's value, and in addition the costs may vary between 0 and 16 per cent across different industries.

Bankruptcy costs, particularly the direct costs, are borne by the firm's debt holders because if the firm files for bankruptcy, most of the firm's values are transferred to the debt holders which are the first priority claimants. Since the lenders bear the costs of bankruptcy they will in addition to the interest payments require a default premium reflecting the probability of bankruptcy. This premium may therefore offset the advantages of debt financing if the probability of bankruptcy is large. It is consequently the shareholders who indirectly bear the expected costs of bankruptcy as they have to pay the extra premium, and when choosing the firm's capital structure they need to consider these costs.

Since bankruptcy costs are associated with debt, a firm's capital structure is similar to a trade-off between the tax benefits of debt and the costs of financial distress and bankruptcy. This in turn suggests that there is in fact an optimal amount of debt after all, and that financial distress costs tend to offset the advantages to debt (Ross, et al., 2006).

The conflicts which are the source of financial distress can be eliminated if the firm is financed entirely by equity. Distress and bankruptcy costs are therefore nonexistent if debt is not included in the capital structure. By adjusting the firm's capital structure, the firm can therefore manage its risk of facing bankruptcy in the future. Accordingly, when opening up for risky debt and bankruptcy costs and ignoring MM's rather unrealistic assumptions, one can clearly see that the capital structure does matter.

4.3 The (Ir)relevance of Hedging

Hedging is a way of protecting the firm against changes in the market conditions. Ross, et al. (2006) explains that hedging is when a firm reduces its risk exposure with the use of derivatives instruments.

There are generally two sources of risk. The first type is systematic risk which constitutes movements in currencies, interest rates, commodity prices, and other changes in the aggregate economy. These exposures are generally non-diversifiable, but can often be hedged by taking opposite positions in the financial derivatives market. The other risk is normally diversifiable and is referred to as firm-specific risk. This risk cannot be explained by

market movements, but relates to the firm's capital expenditure and operation decisions as well as its financial decisions. These exposures cannot be hedged through derivatives contracts, but some of them, such as the risk of accidents happening, can be managed by using insurance contracts (Grinblatt & Titman, 2002).

Modigliani and Miller's irrelevance theorem is rather general and can also be applied to hedging. MM thus argue that if the company can hedge, so can the investors. Consequently, in the absence of market frictions, corporate hedging is irrelevant to shareholders as they can hedge on their own accounts either by adjusting their portfolio to mitigate firm-specific risk, or by using derivative contracts to directly modify the portfolio's exposure to systematic risk.

Grinblatt and Titman (2002) argue that by hedging its risks, a firm can increase its value by reducing the probability of facing financial distress in the future. This suggests that through the absence of hedging, the chance of financial distress is increased. And subsequently, a firm that stays un-hedged might experience its debt holders demanding higher returns to compensate for higher expected bankruptcy costs and/or they might negotiate stricter debt covenants. This further implies that firms that are subject to high costs associated with financial distress will have greater incentives to implement hedges.

In theory, individuals can hedge as effectively as large companies. Nevertheless, in reality large companies are often in better positions to hedge certain risks. This is because it is costly for individuals to learn how to hedge, and because the company itself has more knowledge on what exposures it faces and will need to hedge (Grinblatt & Titman, 2002). Consequently, if individuals are not able to hedge as effectively as the company, then it will obviously be in the shareholders interest to let the firm manage these risks and perform corporate hedging.

Subsequently, one could say that, in the real world where markets are imperfect; if the hedge reduces the probability of financial distress, the firm can gain from hedging. This is especially true for companies operating in industries where financial distress costs are high. Moreover, rather than the risk of bankruptcy itself, it is the costs related to bankruptcy that reduces firm value. Each of the costs related to financial distress is not significant, but the sum of these costs is rather substantial and may thus affect the capital structure of the firm.

This gives managers the right incentive to reduce these costs by hedging. This further suggests that in the real world, shareholders are not indifferent to corporate hedging.

Grinblatt and Titman (2002) have investigated which firms are most likely to trade in the derivatives market. The results show that larger firms as well as firms with more growth opportunities and firms with a high gearing ratio are more likely to use derivatives. In addition, they found that firms that are subject to high financial distress costs have greater incentives to hedge. And since it is actually rather common that 80 – 90 per cent of a vessel's value is financed through debt (Kavussanos & Visvikis, 2006a, p. 339), distress costs are high and shipowners should have the right incentive to implement hedges.

As the fundamental aim of any company is to obtain stable and predictable values of its cash flows, debt and assets, virtually any risk can be managed in one way or another. Risks may be mitigated through capital structure adjustments, by using physical contracts or through exploiting the derivatives market; this is thoroughly explained in section 5.1. In the shipping industry the most common exposures to hedge through the derivatives market are freight rates, bunker prices, interest rates and exchange rates. Credit risk and liquidity risk can be hedged by implementing specific policies in terms of intentionally choosing counterparties or keeping a certain amount of assets in cash respectively. Other risks may be managed by insurance contracts.

5. Hedging in Shipping Using Derivatives

In an industry characterised by irregular market cycles, freight rate volatility and uncertainty in general, risk management is extremely important. Grinblatt and Titman (2002, p. 739) defines risk management as "assessing and managing the company's exposure to various sources of risk through the use of financial derivatives, insurance, and other activities". Through their daily operations the shipowners are faced with a substantial business risk. Fluctuating freight rates and bunker prices affect the revenue. The value of the vessel also swings violently together with the freight rates, influencing both the ability to repay debt and the gain from a possible asset play. The former may also be affected by a change in the interest rates as shipping is one of the most capital intensive industries in the world. Bad weather and storms may cause accidents and damages or loss of the entire vessel, or changes in demand due to harvests gone badly. Being such an international industry, the participants are also subject to fluctuations in the exchange rates. Basically it all boils down to the fact that shipping is a high-risk industry. Consequently, finding ways to minimise these risks are vital in order to achieve predictable and stable cash flows and debt. Some of these risks vary according to what market segment the company operates in, a few may be easily managed, whereas others are more complicated and require costs and skills.

Kavussanos and Visvikis (2006a) classify the different risks faced by shipowners into eight different informal categories. The first category is *business risk* which is caused by fluctuations in earnings. Sources that affect the earnings are freight rates, voyage costs, operating costs and foreign exchange rates. The second category is *liquidity risk*, which refers to the inability of selling company assets at short notice in order to raise money quickly in order to meet its short term obligations. The inability to pay principal and interest to the bank is referred to as *default risk* and is the third category. *Financial risk* is the next risk category and depends on how the company's assets are financed. The relationship between equity and debt is vital here because a high gearing ratio increases the company's debt obligations. The fifth category, *credit risk,* refers to the possibility of a counterparty not being able to fulfil its contractual agreements. *Market risk* is yet another category and is influenced by stock price, and other fluctuating prices such as freight rates, interest rates,

and exchange rates. *Political risk* is subject to political decisions such as wars, political unrest, and canal closures. The last category of risk faced by shipowners is *technical and physical risk*, which refers to the risk of loss, breakdown or damage on the vessel. It should, however, be noted that some of these risks are overlapping, and some composite other risks.

Risk management has become increasingly important over the years and large international companies having their own risk management divisions have become more and more common. The main drivers behind this tendency are the increased volatility of interest rates, exchange rates, and commodity prices, as well as the importance of large multinational companies. Risk management is according to Grinblatt and Titman (2002) motivated by a variety of sources such as taxes, financial distress costs, executive incentives and other important issues.

There are several ways for a company to perform risk management in order to stabilise their income and expenses in order to secure predictability. A main distinction is made between the traditional and the modern types of risk management. The traditional type includes the use of physical contracts such as long term time charters. This traditional method is not very flexible and rather expensive in terms of changing segments and entering new contracts. As an alternative, modern risk management have been established through exploiting the financial derivatives market. However, both methods are subject to credit risk, except for some certain derivatives contracts where this risk is eliminated by a clearing house, outlined in section 5.1.1.

5.1 The Derivatives Market

Operational risk management is a big issue for shipowners in the sense that long term charters may be difficult to find in a declining market, and agreements may be abandoned if the conditions turn too much against either the owner or the charterer, which has particularly been an issue in the current market collapse. As a solution to this problem, exchange traded derivatives contracts have been introduced also in the shipping industry.

Derivatives instruments are contractually created rights and obligations whose purpose is to transfer risk to some other party willing to bear it (Kavussanos & Visvikis, 2006a). These contracts are referred to as derivatives because the price of the contract is derived from underlying assets such as physical commodities, financial instruments, indices, or spreads between the values of such assets. Derivatives are thus instruments that have no intrinsic value but derive their value from something else, and they help investors manage risk, particularly in markets where price volatility is high. By using derivatives, shipowners are able to stabilise their future inflow and they can thus reduce uncertainty and unexpected volatility of their cash flows.

Kavussanos and Visvikis (2006a) have identified three different groups of participants acting in the derivatives markets. The first group is the hedgers. The members of this group are primarily risk averse and their aim is to stabilise their income, costs or debt. The second group consists of the less risk averse speculators. These are profit seeking individuals and firms who take a bet on the price movements. Speculators are essential to the liquidity of the market in the sense that they provide capital and they are willing to take risk. Without the speculators, the values of the market would be more extreme and irregular as there would be no counterparties willing to take opposite positions. The last group of participants dealing in the derivatives market is the arbitrageurs, whose aim is to achieve a risk free profit. Their actions are based on different prices of the same good in different markets. Their profit comes from buying cheap and selling expensive. This price difference is caused by time-lags or temporary imbalances in supply and demand.

Derivatives markets, and especially forwards and futures markets provides two main economic benefits. The first benefit is price discovery, meaning that the markets have the ability to reveal information about current and expected spot prices. The second benefit is that it provides risk management through hedging in order to reduce spot price risk (Kavussanos, 2002; Kavussanos & Visvikis, 2006b). If the derivatives markets fail to provide these benefits, market agents have no interest or reason to trade and the market become illiquid and trade will eventually stop.

5.1.1 Futures

When an asset is traded at immediate delivery a spot contract is entered. A futures contract, on the other hand, is a contract in which the buyer and the seller agrees on a price and quantity today, but delivery of the commodity occurs at a specified future date. A futures contract is standardised in terms of quantity, quality and duration, and it is traded only on organised exchanges. In addition, the futures are marked-to-market daily, meaning that the price of the instrument is re-valued daily in order to reflect current values of the relevant underlying variable. Counterparty risk for participants in the futures market is literally non-existent as the futures exchange's clearing house guarantees the transaction. This guarantee is the main task of a clearing house, and they do this by enforcing rules that lower counterparty risk by fulfilling a contract in the case of default (Bernrud, et al., 2005).

5.1.2 Forwards

A forward contract is rather similar to a futures contract except it is more flexible in the sense that it is traded Over the Counter (OTC) and not on organised exchanges. When a contract is traded OTC the counterparties negotiate terms and conditions of the contract and both parties agree to take the counterparty risk in case of default. A forward contract is thus not standardised in terms of size and expiry date, and details will be negotiated between the two parties at initiation.

5.1.3 Options

There are two basic types of option contracts. The buyer of a call option has the right but not the obligation to buy the underlying asset or security, whereas the buyer of a put option has the right but not the obligation to sell the underlying asset. An option contract is flexible in the sense that the buyer has the right to decide not to exercise the contract depending on whether the current situation or price is in his favour. Investors use option contracts to speculate on price moves, to hedge the value of other positions, to reduce transaction costs, to avoid tax exposure, and to avoid market restrictions that may prohibit other forms of trading (Bernrud, et al., 2005). Option trading is a zero-sum game in the sense that the gains of one party is at the expense of another.

There are two main types of options offered with the only difference being the settlement date. The European option gives its holder the right to exercise it only on the maturity date, whereas the American option gives its holder the opportunity to exercise the contract at any time from initiation until the settlement date.
An option contract can be in the money (ITM), out of the money (OTM) or at the money (ATM) referring to the value of the contract. If the call option is ITM, the strike price, which is the agreed price in which to trade the currency, is below the spot rate. When the strike price and the spot rate are equal the option is at the money and when the strike price is above the spot rate the option is OTM and will not be exercised because it will then be cheaper to buy at the current spot rate. Hence a call option will only be exercised if the spot rate is higher than the strike price and the opposite is true for the put option.

5.1.4 Swaps

A swap contract involves the simultaneous buying and selling of a comparable underlying asset. There are many types of swaps, and they are used to hedge a variety of exposures such as interest rates, exchange rates, equity, and commodity prices. The swaps have become increasingly popular due to more favourable conditions as they are generally cheaper and less time-consuming than futures and forwards (Kavussanos & Visvikis, 2006a). The swaps are traded OTC and make, like futures and forwards, both parties obligated to fulfil the agreement and they normally have no market value at initiation.

5.2 Freight Rate Risk

Fluctuating freight rates are the most substantial source of risk faced by shipowners, the reason for this is simply that the freight is their primary earnings. Freight rate risk can be reduced by securing long-term contracts for the vessels; this is a traditional way of managing this type of risk. A more modern way of managing freight rate risk is to purchase financial derivatives contracts such as futures, forwards or options.

5.2.1 Traditional Risk Management

As pointed out in 2.3.1 there are four main contracts in which freight can be sold in the freight market, and these contracts have different consequences concerning risk for the shipowner.

When the shipowner trades *voyage charters* in the spot market he provides transport for a specific cargo from port A to port B for a fixed price per ton. The owner will then be subject to most of the risk because he will be operating the ship and voyage costs will be on his account. And since the fluctuating bunker prices accounts for a large part of voyage costs, this will cause a significant risk element.

The *Contract of Affreightment* (COA) builds on the same principles as the voyage charter but is slightly more complex. The shipowner agrees to carry a series of cargo from port A to port B at within a given time period. The shipowner will take on most of the risk because he is still operating the vessel and pays for voyage costs. Although the agreed price paid by the charterer is supposed to cover these costs, the fluctuating bunker prices might still cause a significant risk element. A problem that may arise regarding COAs is that the exact volume and timing of the shipments are not usually known in advance. COA is very common in the dry bulk cargoes of iron ore and coal, where the major customers are the steel mills of Europe and the Far East (Stopford, 2009).

A *time charter* may last from one voyage to several years where the agreed rate is fixed and paid on a daily or monthly basis. The time charter is often used by the shipowner as security for bank loans because then the bank will know that the company will receive a constant inflow. The charterer rents the vessel complete with a crew, and he is also responsible for the fluctuating voyage costs. The risk is thus mainly on the charterers account, whereas the shipowner's risk is limited to the less volatile operating costs. However, the shipowner will still face a credit risk where the counterparty is unable to pay the settled charter rate.

A Bare Boat Charter is arranged when a company wishes to have full operational control of a vessel without owning it. Under this arrangement an investor, normally a financial institution looking for a new profitable investment, purchases a ship and rents it out to a charterer for a

specific time period, typically 10-20 years. The charterer will then manage the vessel and pay both operational and voyage expenses.
Advantages generated by a bare boat charter are that the charterer does not tie up its capital through buying a ship, and the shipowner may achieve a tax benefit. Hence, under a bare boat contract the charterer is exposed to most of the risks. And the shipowner will not be subject to any substantial risk, except for credit risk and default risk.

A weakness in the spot market is that generally the rates here are more volatile and uncertain than time charter rates. This may however vary with market cycles. Kavussanos (2002) argues that when the market is low, time charters are more volatile than spot rates. The reason for this is that time charter rates reflect expectations of future events which makes them more responsive to changing perceptions of the future market. When for instance the market is at the bottom and the market is believed to climb, charterers rush to fix vessels on time charters to exploit the low rates before they increase.

Operating in the spot market will be riskier as the owners are exposed to the fluctuating voyage costs. In addition, the owner faces the risk of not finding employment for the ship and there may thus be periods of it being idle, causing productivity loss for the owner. Relocation costs are also a risk element when operating in the spot market. These costs occur when the vessel is unable to find employment in the same port as where the current cargo is being discharged. On top of all this, administration costs are also higher in the spot market as it is more costly to administer for instance 12 voyages instead of just one.

What kind of contract the vessel is operating on depends on the owner's personal skills and interests. A risk averse shipowner would prefer to trade in the time charter market instead of the more volatile spot market as a type of risk management strategy.

5.2.2 Vessel Size

Even though vessel size is not classified as a way of managing risk, this will still be of some importance. Kavussanos (2002) found that ship size also has a certain impact on risk exposure, and he argues that volatilities, and thus risks, vary over time and across vessel sizes. Smaller vessels are more flexible than larger vessels simply because they can approach more ports and they can more easily switch between different trades and routes. Operating

unit costs are, however, higher for smaller vessels because they cannot exploit the economies of scale that larger vessels facilitate. Since smaller vessels are more flexible and have a lower risk of unemployment they are less risky than larger vessels and the volatility of their freight rates are consequently lower. So, by investing in smaller vessels the shipowner can reduce the freight rate risk.

Kavussanos' (2002) results thus suggest that operational risks in shipping may be diversified away by investing in smaller vessels. However, Kavussanos and Visvikis (2006a) argue that as the duration of the contracts are increased, it seems that the freight rate volatilities by different ship sizes are eliminated. Investing in smaller vessels for pure diversification effects is therefore not applicable when the owner is planning to operate in the long-term time charter market. A risk averse shipowner planning on operating in the spot market would thus invest in Handysize and Handymax vessels as opposed to the more volatile and less flexible Capesize and Panamax.

Figures 5.1 and 5.2 show how volatile the spot and time charter freight rates are over a given period of time for the segments Handysize, Panamax and Capesize. It is clear from the charts that the spot rates in general have a higher variability than the time charter rates, and that the larger vessel sizes have a higher variability than the smaller.

Figure 5.1 The volatility of spot freight rates by vessel size

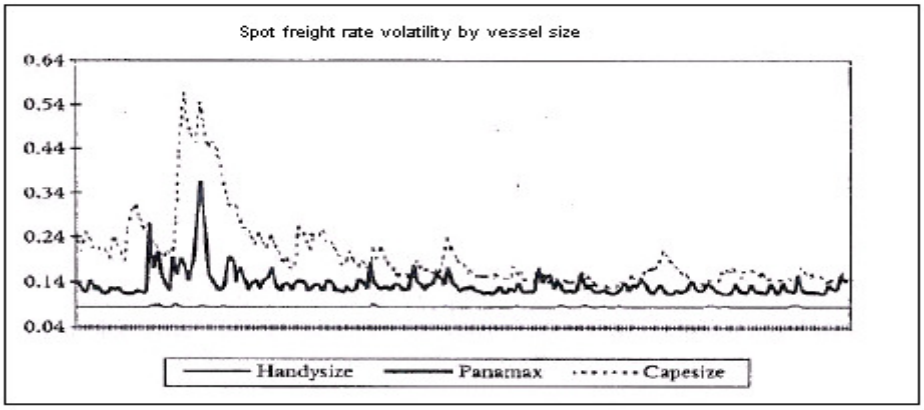
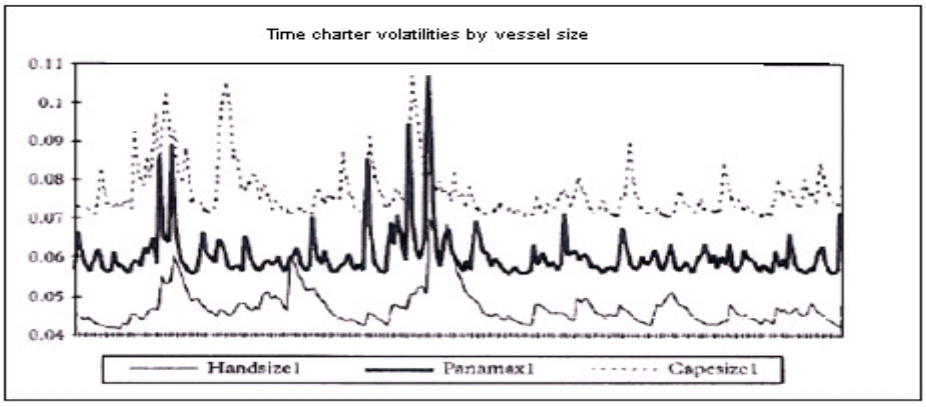


Figure 5.2 The volatility of time charter rates by vessel size



Source: Kavussanos (2002, p. 673)

5.2.3 Freight Rate Derivatives

A freight rate derivative is a financial contract between two parties to deliver sea transport at an agreed future price and date. The contract does not involve any physical exchange of freight and no actual ship is involved. The contract is simply settled in cash on the difference between the actual spot rate and the agreed rate. The underlying asset for a freight derivative is a service and not a storable commodity that can be physically delivered. The underlying asset is therefore an index provided by the Baltic Exchange. This index is more or less an accurate reflection of the real global spot market and is based on the average of daily fixtures for different types of ships.

For the shipowner seeking employment for his vessel, lower levels of freight rate is equivalent to reduced income. Freight rate derivatives can be used to hedge the risk of lower freight rates and thus reduce income volatility. Because the shipowner takes the opposite position when he hedges in the derivatives market than he has in the physical market, the flows from the derivatives contracts will balance the gains or losses of the physical contracts (Kavussanos & Visvikis, 2006b).

5.2.3.1 Parties Involved in the Freight Derivatives Market

Several parties are involved in the freight derivatives market in order to make the trade happen and to make transactions efficient. IMAREX, NOS and the Baltic Exchange are the most important parties for the dry bulk derivatives industry.

IMAREX

The International Maritime Exchange is a Norwegian company founded in 2000 with the purpose of being a freight derivatives market. Since then the company has grown to become a large diversified group acting as intermediary and clearer for physical and derivative commodity transactions worth over USD 200 billion annually. In addition to offering a market place and clearing, IMAREX provides market analysis, information services and training to existing and new customers. As the world's only regulated market for maritime derivatives, IMAREX offers tanker, dry bulk and bunker fuel oil derivatives through Freight Forward Agreements, Futures and options (IMAREX, 2009).

NOS

NOS Clearing (The Norwegian Futures and Options Clearing House) is a fully owned subsidiary of IMAREX ASA. NOS offers clearing services for the derivatives traded via IMAREX with the purpose of reducing counterparty risk for the market agents and intermediaries trading the derivatives. NOS operates under license of the Ministry of Finance and is also approved by the American Commodity Futures Trading Commission (CFTC) to carry out clearing of trades on IMAREX. In the clearing process, NOS acts as the counterparty between the buyer and the seller of a derivative contract, and thereby guarantees fulfilment

of the contract. The revenue from these actions is collected through a margin paid by the buyer and the seller (IMAREX, 2009).

The Baltic Exchange

The Baltic Exchange is a privately owned company offering independent daily shipping market information, in addition the company maintains professional shipbroking standards and resolve disputes. The Baltic Exchange plays a vital role in shipping market assessment; by using a panel of international shipbrokers employed worldwide the company is able to facilitate indices used as underlying values for shipping derivatives. The company thus provides daily assessments on more than 50 dry and wet routes, weekly sale & purchase and demolition assessments in addition to daily forward rates. For the dry bulk market, The Baltic Exchange provides indices for the Capesize (BCI), Panamax (BPI), Handysize (BHI) and Supramax (BSI) segments, in addition it offers assessments through the Baltic Dry Index (BDI) which is an average of all the four sub-segments (The Baltic Exchange, 2009).

5.2.3.2 Futures

The Baltic International Freight Futures Exchange (BIFFEX) contract was introduced by London International Financial Futures and Options Exchange (LIFFE) in 1985, and the London Clearing-House provided clearing of the contracts by guaranteeing fulfilment of the contracts and thus eliminating counterparty risk (Nomikos & Alizadeh, 2002). The underlying value of the BIFFEX was the Baltic Freight Index (BFI) provided by the Baltic Exchange. The BIFFEX disappeared from the market in 2002 partly because of the more popular and more flexible forward contract, and partly because of the unsatisfactory hedging effectiveness and lack of liquidity (Kavussanos & Visvikis, 2006a).

The freight futures contract is, however, available today as it was re-launched by IMAREX in June 2006. The contract is marked-to-market daily and it is cash settled with no physical delivery. The underlying indices are provided by The Baltic Exchange and fulfilment of the contract is guaranteed by NOS Clearing ASA. The contracts are sold as index products with BDI as underlying index, and as single route products with 6 individual routes being the underlying indices. In addition, the futures contracts can be based on time charter baskets

for Capesize, Panamax, Handysize and Supramax (IMAREX, 2009). The BDIFutures contracts are used for trading on directions, for trading as a hedge against dry bulk equities and for trading as a spread against FFAs.

5.2.3.3 Forwards (FFA)

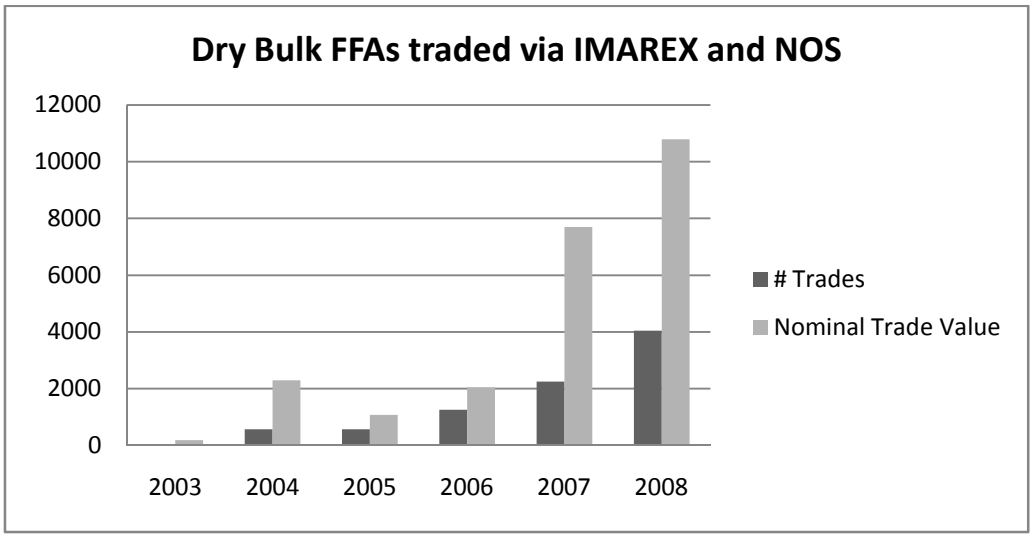
The Forward Freight Agreement (FFA) became available to market agents in 1992 as an alternative to BIFFEX, it was according to Kavussanos and Visvikis (2006a) introduced by Clarksons in association with the Baltic Exchange with the purpose of accomplishing better hedges. The FFA is essentially a more flexible futures contract, only it is OTC traded and settled through the principle of "contracts for differences" (CDF). This means that the price of the contracts is agreed at initiation and upon settlement only the difference between the settlement price and the agreed price is being transferred between the counterparties.

Normally, shipowners are sellers of FFAs and they engage in the FFA market simply because if freight rates drop, the reduction in the freight income for the owner will be compensated through a gain in the forward position. The general aim of FFAs is to hedge exposures, but they can also be used for speculating purposes by taking a bet on the future direction of the freight markets. Owners and charterers are the natural players in the freight derivatives market and make up 85 per cent of dry bulk FFA trades; the last 15 per cent consist of financials who enter the market for speculating purposes (The Baltic Exchange, 2009).

Unlike BIFFEX, whose underlying asset was the BFI, FFA contracts are written on individual route indices of the Baltic Dry Index. FFAs are traded both for trip time charter routes and for longer term time charter and there are one index provided for each sub-segment of the dry bulk market (The Baltic Exchange, 2009).

Figure 5.3 shows number of dry bulk FFAs traded via IMAREX and cleared by NOS. In addition, it illustrates nominal trade value denominated in USD. It is evident that the contract has become increasingly popular as both volume traded and the nominal value have had a massive growth since IMAREX started trading FFAs. So far in 2009 IMAREX has registered 900 trades with a nominal value of USD 669 million which is a remarkable increase from 2003 with 26 trades and a nominal value of USD 177 million.

Figure 5.3 Number of dry bulk FFAs traded at IMAREX from 2003



Source: IMAREX

5.2.3.4. Hybrid FFAs

The hybrid FFA was developed in September 2005 as a reaction to the demands of market participants to deal with the issue of credit risk in forward contracts. The hybrid FFA is similar to the standard FFAs, however, they are cleared through LCH.Clearnet. The contracts have the benefits of being flexible in terms of size and delivery and in addition the credit risk is eliminated, although participants need to pay a fee in order to do this. Currently, for the dry bulk industry, LCH.Clearnet offers clearing for four dry voyage FFAs and two dry trip time charter FFAs (Kavussanos & Visvikis, 2006b).

5.2.3.5 Options

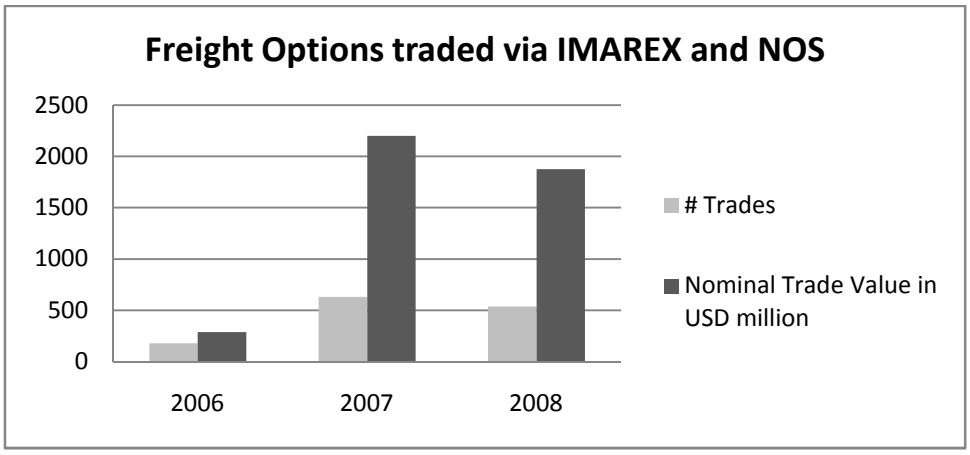
A freight option is a financially settled derivative contract which gives the holder the right but not the obligation to buy (call) or sell (put) an FFA at a negotiated price.

Option contracts were introduced to the shipping industry in 1990 when trading on options on BIFFEX available from LIFFE started. However, regardless of their flexibility, the options were only regarded as insurance rather than a derivative because maximum loss was the premium paid for the contract; the contract thus ceased trading in April 2002 (Nomikos & Alizadeh, 2002).

The dry bulk option contract was, however, reintroduced by IMAREX in April 2006 and is available today as call and put Asian style options whose expiration value depends on the average value of the index over a specific period. The options offered today by IMAREX are either completed OTC or they are cleared through NOS. The options available are index options based on BDI or on 6 individual routes provided by the Baltic Exchange (IMAREX, 2009).

A shipowner will buy a put option which gives him the right but not the obligation to sell his freight service in the future at an agreed price today. He will exercise the option only if the freight market falls below the agreed price, the option is then ITM. The shipowner will have to pay a premium to purchase the option and maximum cost is therefore the premium, the gain on the other hand is unlimited, just as for FFAs and futures.

Figure 5.4 Number of freight options and the nominal value traded at IMAREX



Source: IMAREX

5.3 Bunker Price Risk

In general, vessels use bunker fuel for propulsion and diesel oil for manoeuvring in ports and for electricity generators (Nomikos & Alizadeh, 2002). Bunker fuel is the final product of a simple distillation of crude oil, and will therefore generally tend to move in line with crude oil prices which have historically been volatile. Bunker fuel costs account for a substantial

part of total voyage costs and the owner or the charterer, depending on the contract, is therefore exposed to the large bunker price fluctuations.

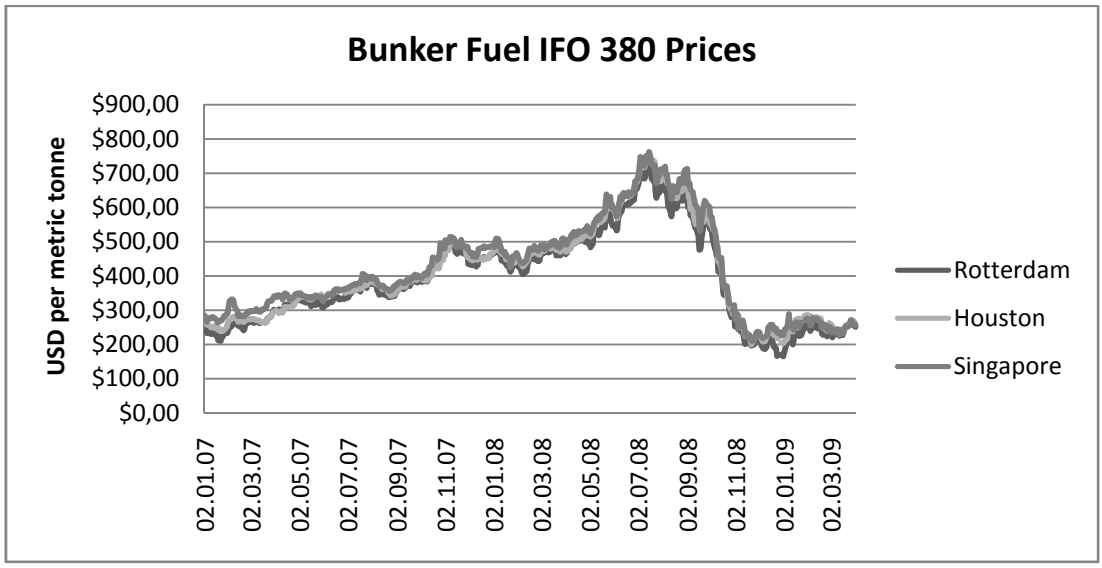
The price of bunker fuel is generally determined by demand and supply which is influenced by the number of vessels in the need of fuel and the number of oil companies and refineries respectively. In addition, Kavussanos and Visvikis (2006a) have identified several other economic factors influencing the bunker market. *The oil market* will affect the bunker price in terms of fluctuating oil prices, if the price of crude oil increases for instance, so will the products derived from it. The second factor is *changes in the bunker stock levels*. A potential reduction in stock of bunker will make the prices rise. A shortage of bunker may be intentionally created in order to force prices up; a sudden increase in price however, will result in an equally dramatic fall. This will ultimately contribute to increase the market volatility even further. *The practices of the diverse refineries* may as well affect the bunker market. Bunker fuel is often the least important market for refineries because it only represents less than 5 per cent of the value of all petroleum products traded worldwide. A fall in bunker prices in one port may affect the prices in another port; this is why *changes in overseas competition* also will influence the bunker market. *Changes in local market*s in terms of new market entries will affect the market share of the existing participants and especially since new entrants often offer low prices in order to attract customers. The next factor is *the delivery methods*, referring to the way the bunkering is done; this could be by using barges or directly from storage tanks.
The final variable is the *unpredictable factors* including weather incidents, port delays, OPEC decisions, political events, field shut downs and storage availability.

Even though most ports have bunkering facilities, the world bunker market is divided into three main regional markets. The largest is Singapore, followed by Rotterdam and Houston. The prices of bunker in these three markets differ slightly because they are all subject to local supply and demand. However, the prices also move together indicating that they are driven by a common variable, notably the world oil price.

Figure 5.5 demonstrates the fluctuating prices of IFO 380 over the last two years in the three major ports. Singapore bunker prices ranged in this period from USD 210.50 to USD 761.50, and in the same period both Houston and Rotterdam bunker prices had similar fluctuating

prices with the ranges USD 200.00 – 763.00, and USD 165.00 – 729.50 respectively. This in turn illustrates the severe volatility and thus the need for hedging.

Figure 5.5 Bunker fuel prices in the three major ports



Source: BunkerWorld

5.3.1 Bunker Derivatives

Different instruments and techniques have evolved over the last twenty years in order to reduce bunker price risk. Available tools for shipowners, operators and charterers are energy futures, forward bunker agreements, bunker options and bunker swaps. Market agents engage in bunker hedges in order to insulate themselves from sudden changes in the price of bunker fuel. Despite the benefits of hedging bunker price risk, Kavussanos and Visvikis (2006a) found that only a limited number of market agents actually hedge this risk. The reason for this is that the companies involved wants to benefit from price movements if the market moves in their favour.

5.3.1.1 Futures

The futures contract gives the buyer the right to buy a certain amount of bunker fuel in the future. Futures contracts for hedging bunker prices did not exist until IMAREX launched an electronic screen market for trading bunker fuel contracts in December 2005. These contracts are, as all other IMAREX traded contracts, cleared through NOS. The futures

contracts involve cross-hedging bunker fuels with futures contracts that have energy products as the underlying commodities, and are offered on five different types of bunker (Kavussanos & Visvikis, 2006a).

5.3.1.2 Forwards

A forward bunker agreement is generally a futures contract, only it is customised in terms of delivery, amount and price. Although physical delivery is possible, the main settlement is made on the difference between the forward price and the spot price of bunker at delivery. The contracts are offered by investment banks and companies trading bunkers, which receive a commission on the total amount payable for their services.

5.3.1.3 Options

No exchanges are currently trading bunker option agreements, they are only available OTC. If exchange traded options are highly desired, they are available as cross-hedges by using energy options as proxies. The incentive behind this cross-hedge is that when the futures are traded on an organised exchange the counterparty risk is eliminated because a clearing house will then guarantee fulfilment (Kavussanos & Visvikis, 2006a).

5.3.1.4 Swaps

A simple bunker swap agreement is a contract that gives the holder the right to exchange a floating price for bunker for a fixed price over a certain time period for a specified volume of bunker fuel. Because the time period is divided into several sub-periods, the swap can be seen as a portfolio of forward contracts. The contracts are traded OTC and there is no physical exchange of fuel, the agreement is only settled in cash. Because it is OTC traded credit risk is an important issue and the counterparties both have to agree to trade with one another and thus they both accept the risk of counterparty failure.

5.4 Exchange Rate Risk

Changes in the value of currencies influencing the value of an asset or liability are a source of risk which ultimately will affect the shipowner's cash flow. Most international business ends with a payment where one currency is exchanged for another. And as exchange rates fluctuate on a daily basis, the cash outflows and inflows will change accordingly. Exchange rates can hardly be accurately forecasted, the company can however measure its exposure and categorise it in order to decide whether to hedge this exposure or not.

Madura and Fox (2007); Buckley (2004); and Kavussanos and Visvikis (2006a) emphasise that there are three different types of foreign exchange exposure. The first is the *transaction exposure* which refers to how exchange rate fluctuations affect the value of the future cash transactions. *Economic exposure* is a general term for the financial effects of exchange rate fluctuations; it includes transaction exposure and indirect effects on revenues and expenditures. Economic exposure thus refers to how a change in the exchange rates will influence the present value of future cash flows. *Translation exposure* is a term related to the consolidated financial statements of a multinational company (MNC). This exposure is mainly an issue for large companies with affiliates abroad whose earnings are denominated in different currencies than the parent company. The exposures most commonly hedged are transaction and translation exposure.

Because shipowners operate in such an international industry, they may be subject to fluctuations in several currencies. Most shipping companies operate in US dollars because the rates are predominantly in this currency, whereas the expenses are mainly in Japanese Yen paid to the yards building the vessels. For a company based in Norway, different expenditures such as administration costs, wages, and repair and maintenance may be in NOK. In addition, principal and interest payments on a bank loan may be in a different currency than the shipowner's reserves. Hence a company based in Norway may be subject to more than four different exchange rates.

The price of a currency is determined by demand and supply. However, there are different factors affecting supply and demand causing movements in the price of the currency. Madura and Fox (2004, p. 127) illustrates how the price of a currency is a function of the

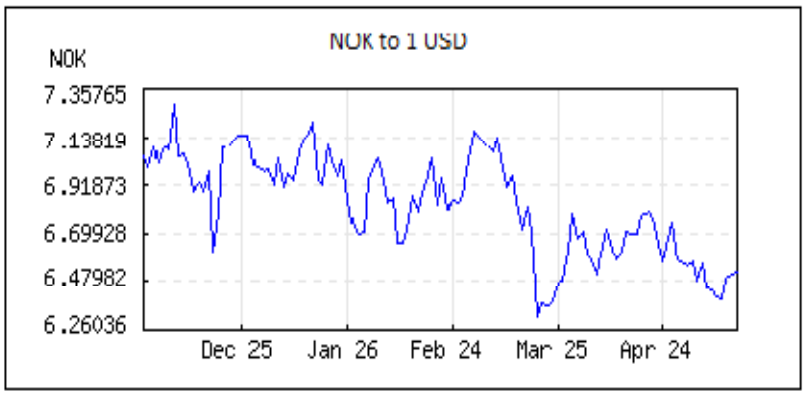
inflation differential (INF), the interest rates differential (INT), the income differential (INC), differences in government control (GC) and expected future exchange rates (EXP) of the respective currencies. △ denotes the percentage change, or the differential between the two countries.

E= f (△ INF, △INT, △INC, △GC, △EXP)

Kavussanos and Visvikis (2006a) support this, but add a few more factors; monetary policies, trade surplus or deficit, economic growth levels, intervention tactics by central banks, the level of political, social, business security and stability in each of the economies in question. All these factors will influence the exchange rates and make the currencies fluctuate causing a great risk for companies trading in these currencies.

Figure 5.6 shows the historical exchange rate between NOK and USD the last 120 days from the end of November 2008 until mid May 2009. It is from this chart apparent that exchange rates are rather volatile and how this volatility can affect the cash flows of any company trading in these currencies. For instance, a payment due in March 2009 would have been much higher than if it were due during the end of the same month. This volatility facilitates an incentive to hedge and to speculate on currency movements.

Figure 5.6 The volatile exchange rate between NOK and USD



5.4.1 Natural Hedge

A natural hedge is implemented through funding the operations and assets in the same currencies as the income. Since the income in the shipping industry is mainly denominated in USD, financing the vessels in USD will be a natural hedge because the adverse impact of the exchange rate variations on cash inflows will be offset by the effect on cash outflows.

5.4.2 Money Market Hedge

A money market hedge involves taking a money market position to cover a future payable or receivable position. A money market hedge on a receivable amount in USD involves borrowing the present value of the receivable amount in USD, followed by an exchange to NOK. The NOK amount will be deposited in a bank account in Norway, and when the USD is received after six months, it is used to pay off the loan granted in USD six months earlier. When taking interest rates on the bank deposit into consideration, a very small gain can be achieved by doing this, but the main intention is to eliminate uncertainty regarding exchange rate movements (Madura & Fox, 2007). A money market hedge on a payable amount involves roughly the same actions, only vice versa.

5.4.3 Foreign Currency Derivatives

A currency derivative is a contract whose price is derived from the value and price behaviour of the underlying currency that it represents. The underlying value is thus the actual exchange rate of the two currencies concerned. To hedge a foreign exchange exposure, the market agent takes a position in the derivative market which is opposite of his exposure in the spot market.

5.4.3.1 Currency Futures

Currency futures are obligations to buy or sell one currency for another in the future. Currency futures are standardised and traded only on organised exchanges and guaranteed by a clearinghouse with the purpose of eliminating credit risk. Currency futures are commonly used by large multinational companies to hedge foreign currency exposures and

they are also traded by speculators who aim at capitalising on their expectations of exchange rate movements. In order to speculate in futures contracts the participants purchase a futures contract and lock in the price of say USD, on the settlement date in the future they buy the dollars at the rate specified in the contract, and then they will sell the USD at the spot rate if the USD has appreciated and will thus profit (Madura & Fox, 2007).

5.4.3.2 Currency Forwards

A currency forward contract is essentially a futures contract, except it is more flexible in terms of quantity, quality, maturity and the way it is traded. The forward rate is determined by market expectations of the future spot rate, which in turn depends on the variables influencing the exchange rate. Firms use currency forwards in the same way as they use futures, and the aim is to insulate itself against an expected increase in the value of a currency regarding an outflow, and decrease in the value regarding an inflow (Kavussanos & Visvikis, 2006a).

5.4.3.3 Currency Options

Currency option contracts gives the buyer the right but not the obligation to buy (call) or sell (put) a currency at a specified date in the future. Currency options are traded both as OTC and on organised exchanges with clearing services provided by clearing houses.

5.4.3.4 Currency Swaps

Currency swaps are according to Kavussanos and Visvikis (2006a) derivative contracts that give two counterparties the right to exchange an agreed amount of a currency for another currency at a certain future date. Basically it concerns the swap of a principal amount of debt for another. For example if a Norwegian company with a good reputation domestically needs to raise funds in USD, but is not very well known in the U.S. and cannot as easily be granted a loan, then it could raise the money in NOK just to swap it into USD. The counterparty could either be a bank or another company in the need of an equivalent amount of NOK. If the counterparty is another company a financial institution will commonly

put the deal together by acting as an intermediary and eliminate counterparty risk. The most frequently used currency swaps have floating rates on both sides, but swaps are also available for fixed rates. A currency swap usually involves three basic steps. First there is an initial exchange of principal, followed by ongoing exchange of interest rates, and finally the re-exchange of principal amounts at maturity.

Reasons for entering into a currency swap are plentiful and involve hedging a currency exposure as well as for pure speculating purposes, it could also be to obtain funds at lower costs, obtaining access to restricted markets or altering the currency of a payment stream or investment income (Buckley, 2004).

5.5 Interest Rate Risk

As one of the main characteristics of the shipping industry is its capital intensiveness, payment of debt and interests plays a key role for shipowners. Vessel prices vary over time along with the volatile freight rates and the market cycle, and among the different types of vessels. A new vessel may cost up to USD 150 million (International Maritime Organisation, 2006) and a high gearing ratio among shipowners is therefore rather common. Sometimes debt is raised in order to cover as much as 80-90 per cent of the vessel's value, although a normal debt to equity ratio is around 70 per cent (Kavussanos & Visvikis, 2006a). To facilitate funds for the purchase of a vessel, the companies may use shareholder equity, or they may borrow from commercial banks with specialised shipping branches, or directly from the public through bond issues. The value of the vessel will be used as security for the loan, which can be rather worrying in times when vessel values are depreciating.

The cost of the borrowed capital changes as interest rates in the world change. These movements in interest rates cause unstable cash flows for the shipping companies. And the greater the financial leverage of the company is, the larger is its exposure to interest rate risk. The shipowners should be concerned with interest rate levels both with respect to their borrowed funds and their bank deposits. And one of the main decisions to make is the choice between a fixed and a floating interest rate.

In order to understand why interest rates move, it is vital to understand the factors determining the interest rates. Bodie, et al. (2008, p. 124) have identified three fundamental factors. Firstly, the supply of funds from savers, primarily households, will affect the interest rate level. The second factor is the demand for funds from businesses to be used to finance investments in factories, equipment, and inventories. Finally, the government's net supply of or demand for funds as modified by actions of the Federal Reserve Bank will influence the level of interest rates.

5.5.1 Interest Rate Derivatives

The underlying assets of interest rate derivatives differ according to the type of derivative contract. Generally the underlying assets of interest derivatives are cash instruments such as T-bonds, T-notes, T-bills and Eurodollars as well as LIBOR (London Interbank Offered Rate). As a response to volatile interest rates, the large amounts of government debt and the desire to reduce exposure, exchange traded interest futures were introduced in 1975 and the first OTC interest swap agreements was entered in 1981 (Kavussanos & Visvikis, 2006a). Since then several instruments for hedging interest rate risk have been introduced to market agents for the purpose of either protecting the value of the firm's financial assets or to lock in favourable interest rates for the finance of their investments. The instruments include forward rate agreements, caps and floors, and hybrid instruments such as forward swaps, options on swaps (swaptions), and options on options (captions) (Kavussanos & Visvikis, 2006a).

5.5.1.1 Futures

Interest rate futures are agreements giving the holder the right to buy or sell interest rate payments on a hypothetical principal amount at a given future date. Interest rate futures are exchange traded standardised agreements, and the nature of these contracts is the same as for all futures contracts; standardised, exchange traded, liquid and simple to use.

5.5.1.2 Forwards

A forward rate agreement (FRA) is a customised OTC traded contract and have been traded among major international banks since 1983. The banks will use FRAs to fix interest costs on expected future deposits or interest revenues on floating rate loans indexed to LIBOR (Kavussanos & Visvikis, 2006a). A bank that sells FRAs consents to pay the purchaser of the contract the increased interest cost on a principal amount if this exceeds the forward rate on the maturity date. Correspondingly, the buyer agrees to pay the seller any decrease in interest cost if market interest rates fall below the forward rate. No actual principal is exchanged, only the present value of the net interest owed is being transferred from one party to the other.

5.5.1.3 Options

Option contracts may be applied to the interest rate markets through the use of caps, floors and collars.

A cap is similar to an insurance policy for a company aiming at protecting itself against a rise in interest rates above a certain level. At the same time, however, the firm is hoping to take advantage of any future drop in the rates (Buckley, 2004). These contracts are OTC traded and can be customised to match the payment schedule of any floating-rate loan and to match nearly any interest rate maturity up to one year. The financial institutions writing the cap agree to compensate the company if the market index, for instance LIBOR, exceeds the cap rate. The holder of the cap thus continues to pay LIBOR plus a margin on its underlying loan; however he expects to be compensated if LIBOR exceed the interest rate level agreed upon in the contract.

An interest rate floor is essentially the same concept as a cap, only it has the reverse effect. The lender is now compensated of changing levels of interest rate. The investor or lender is thus protected from a fall in interest rates that falls below the floor rate, at the same time it allows the investor to benefit from any rise in the rates.

A third type of option contract is the collar, which is a combination of a floor and a cap. It gives the holder protection against rates rising above a certain level, the cap, and the ability

to take advantage of a fall in rates as long as this does not go below the limit represented by the floor rate. If the interest rate rises above the cap rate, the holder is compensated by the counterparty, whereas the holder has to compensate the counterparty if rates fall below the floor (Buckley, 2004).

5.5.1.4 Swaps

An interest rate swap is an agreement between two counterparties to exchange a series of interest payments or investment income in the same currency on an agreed amount of principal for an agreed time period. Normally, an interest rate swap involves the exchange of a series of fixed interest payments for a series of floating rate payments or vice versa (Buckley, 2004). If a company expects the interest rates to rise, it could enter a swap agreement to pay fixed and receive floating payments with the purpose of insulating itself from increased levels of interests, and thus increased payments on debt. Conversely, if a company believes that the rates will fall, it could enter a swap contract and at the same time consenting to pay floating and receive fixed payments, the company will thus experience reduced debt payments. Only the net differential between the floating and fixed payments are being exchanged on the settlement date, the principal amount is not being swapped.

The most frequently used interest rate swap is the fixed-for-floating rate swap, also referred to as a plain vanilla swap. In this type of contract fixed-rate payers make payments on a long-term interest rate to a floating-rate payer, the floating-rate payer will then make payments indexed to a short-term money market rate to the fixed-rate payer. The company is thus protected against increases in interest rates as well as the future interest payments are now stable and predictable (Kavussanos & Visvikis, 2006a).

An interest rate swap agreement can be entered for several reasons; the focal objectives include achieving funding at rates below those otherwise available in the market, obtaining fixed rate financing when bond markets are unfeasible to access directly, restructuring a debt profile without raising new finance or simply restructuring the profile of interest payments or receipts. The final objectives and the most common are to hedge against or speculate upon the movements in interest rates (Buckley, 2004).

5.6 Credit Risk

A shipowner may be exposed to credit risk in two different situations. The first situation relates to a counterparty being unable to perform under the time or voyage charter and is unable to pay its obligations when due. The second type of credit risk is related to the default of the counterparty of a derivatives contract.

Credit risk has especially been a problem the last few months due to the global economic downturn. Several companies have gone bankrupt or defaulted on their obligations due to the credit crunch.

The difficulties in assessing credit risk are to calculate the probability of default as well as estimating the recovery rate and the potential loss given default. Kavussanos and Visvikis (2006a) have identified the following complicating issues embedded in the calculation of credit risk. Credit exposure is an increasing function of time; this is because the value of the contract may increase over time. Hence, the longer the duration of a contract, the greater is the credit risk involved. And as time passes, the credit risk of the contract is usually reduced if the counterparty has already made cash flow payments on a contract with a positive value. Moreover, measuring default probabilities are difficult in general, and current positions may not represent future credit risk.

Different ways to manage credit risk is to assess the counterparties and rate them according to their creditworthiness. One can for instance place bank deposits and enter derivative financial instruments only with highly rated financial institutions and banks. Other ways to manage credit risk is to monitor this risk on a daily basis and only deal with major and financially strong shipping companies with a good reputation.

6. Case Study

In order to see what sort of risk management instruments are being employed in practice, this paper will perform a case study and thus analyse two ship owning companies operating within the dry bulk industry. The first company is Golden Ocean Group Limited, a pure dry bulk carrier owner and operator. The second company is Camillo Eitzen & Co ASA which is a diversified company with interests within various shipping segments. Information about the companies is primarily taken from their respective 2007 and 2008 annual reports, from their quarterly reports, press releases and from their web sites.

6.1 Golden Ocean Group Limited

Golden Ocean Group Limited (GOGL) is a dry bulk shipping company listed on the Oslo Stock Exchange since 15 December 2004. GOGL demerged from Frontline Limited in order to take care of the dry bulk fleet to best realise the value of these vessels for the benefit of its shareholders, and at the same time allowing Frontline to focus on the oil tanker sector.

Soon after the establishment of GOGL, the company founded its own management companies, Golden Ocean Management AS in Oslo and Golden Ocean Management Asia Pte Ltd in Singapore, to take care of all management services. The management's strategy is to outsource large parts of the operations to independent and competing ship management companies, these operations include ship management, crewing, and accounting services.

The principal activities of the group in addition to ship ownership and operation, involves charter, purchase and sale of vessels.

6.1.1 Fleet

The group mainly operates in the Capesize and Panamax markets with a fleet consisting of 30 owned vessels, 15 chartered, 4 bareboat agreements and 10 vessels under commercial management. Hence at the moment (March 2009) GOGL controls 59 vessels. Of these 59 vessels, 28 are newbuildings with delivery from 2009 until 2011, of which 12 are of the new vessel type Kamsarmax, which is a special bulk carrier sub-class and was according to Tsuneishi Group (Zhoushan) Shipbuilding Inc. developed in 2002 in response to an order of a Panamax carrier.

Table 6.1 Golden Ocean's fleet by March 2009

Segment	Capesize	Panamax	Kamsarmax	OBO	Total
Number of vessels	3	20	0	8	31
Newbuildings	9	7	12	0	28
Total	12	27	12	8	59

Since the Kamsarmax is basically a sub-class of the Panamax, it can be said that GOGL only operates in the two largest and also least flexible segments, as pointed out in section 5.2.2. The group's operations are thus strongly dependent on the development in the steel, coal and grain markets.

The fact that GOGL only operates in the largest dry bulk segments suggests that the company is not very risk averse. However, the main reason for GOGL's choice of vessel size is the expertise the company possesses in these segments and the trades that follows the segments. Another reason for the preference of large size vessels is the exploitation of economies of scale that these vessels facilitate.

6.1.2 Key Numbers

Total revenues from voyage and time charter in 2008 amounted to USD 877.3 million, which is a remarkable increase from the 2007 revenues of USD 704 million. 2007 was a good year for GOGL with a profit of USD 200.9 million, net profit of 2008, however, practically doubled from the previous year despite plummeting rates in the second half of the year, ending up at USD 380.1 million.

Table 6.2 Golden Ocean's key numbers in million USD

	2008	2007	1Q 2009	1Q 2008
Total Value	1,006.7	1,183.8	920	1,149
Revenue (freight income)	877.3	704	67.9	218.8
Net Profit	380.1	200.9	16.3	53.7
Cash Flow	50.9	306.2	29.2	166.5

GOGL did rather well in 2008 even with the international financial crisis breathing down its neck. Still, the group had to face major losses regarding decreased value of its shares, cancellations on charters on three vessels, loss on sale of vessels and loss on charter hire expenses. From the numbers in the 1st quarter report 2009 it is obvious that GOGL's revenue is finally affected by the low rates and reduced activity in the market. The revenue was reduced with over 80 per cent from the previous year, and if the group has not given any discount on their long term time charters, it is the vessels operating in the spot market which are responsible for this low revenue. Even though the profit in 2008 was remarkably high, the remaining cash at the end of the year was rather low compared to the previous year. The reason for this is the massive payment of dividends amounting to USD 347 million, as well as increased repayment of debt and purchase of own shares.

6.1.3 Capital Structure and Taxes

Golden Ocean's gearing ratio in 2008 was 80 per cent, which was just an insignificant increase from the previous year with 79.3 per cent. This debt-to-equity ratio is rather high and GOGL would thus according to Grinblatt and Titman's findings outlined in section 4.3 have a great incentive to implement hedging strategies.

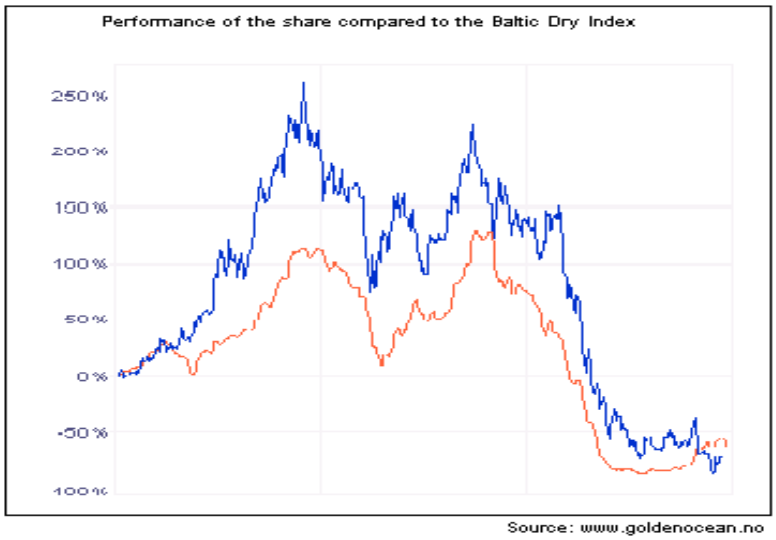
Golden Ocean Group Ltd was incorporated and its registered address is in Bermuda. Bermuda is one of the most popular flags of convenience in which companies register in order to achieve lower costs and tax benefits. In Bermuda there is currently no income, corporation, or profits tax. Hence it is only the management subsidiaries of GOGL that are subject to taxation in Norway and Singapore, in which the payable amounts reached USD

59,000 and USD 0 respectively in 2008. The capital structure of GOGL is therefore not affected by taxes, only by the costs of financial distress.

6.1.4 Stock Price Development

The Golden Ocean share has historically been volatile but normally with quarterly dividend payouts to the owners. Fully diluted earnings per share in 2008 amounted to USD 1.360 as opposed to USD 0.713 the previous year. The pattern of the stock has roughly followed the development of the Baltic Dry Index and the dry bulk industry in general see figure 6.1 where the blue line with the highest values indicates GOGL's stock, whereas the red line under represents the Baltic Dry Index.

Figure 6.1 Golden Ocean's stock development during the last two years



During the last two years GOGL's share value reached a top of NOK 44.20 29 October 2007. The stock value remained fairly high the next year and through the shipping boom of 2007 and 2008. However, the value of the stock experienced a remarkable drop from August 2008 and reached its lowest reported value of NOK 1.51 2 March 2009.

Table 6.3 Key numbers concerning Golden Ocean's shares

Current share value (19 May)	**NOK 6.25**
Top value (October 2007)	**NOK 44.20**
Bottom value (March 2009)	**NOK 1.51**
Development last 12 months	**-81.57 %**
So far this year	**39.51 %**

Source: Oslo Børs

The share is very liquid and is listed on Oslo Børs' OBX list and the number of shares traded so far this year amounts to almost 1.5 billion. As of the middle of May, the share's value is NOK 6.25 which implies a market value of NOK 2,834.31 million (Oslo Børs).

6.1.5 Risk Exposure

Through its activities in the international nature of the shipping industry, the group is exposed to a variety of risks. Market risk includes currency risk, interest rate risk, and freight rate risk and comprises the largest risk elements for the company. In addition, the company is exposed to fluctuations in bunker fuel, and credit risk has lately become an increasing issue due to the international financial crisis where several counterparties have failed to meet their obligations. The overall risk programme of the group focuses on unpredictable financial markets and aims to minimise potential adverse effects on the group's financial performance.

6.1.5.1 Freight Rate Risk

Golden Ocean is through its operations well exposed to the fluctuating freight rates as more than 99 per cent of the revenue relates to chartering operations. The group operates both in the spot market and in the longer term time charter market. The two last years, however, the company has implemented a rather conservative chartering policy where a major part of the tonnage is fixed on long-term time charter agreements and several vessels are sold in the second-hand market to secure financial resources with the intention of expanding the fleet through the newbuilding market. Number of ships operated in the spot market as opposed to in the time charter market varies, but according to Elin Saugestad senior accountant of GOGL, an average for the last year shows that 50-60 per cent of the fleet was

let on long-term time charter agreements. Moreover, the 1st quarter report 2009 reported that GOGL's spot exposure in 2009 is for the Panamax segment 35 per cent and for the Capesize segment 3 per cent, this exposure tends to increase in the future, but that is due to the expiration of the current long-term time charters.

In addition, the group occasionally uses forward freight agreements (FFAs) to manage its exposure to the spot freight market rates for the vessels that are not operating in the long-term market, and for speculating. The group did not, however, have any positions in the FFA market in 2008, in 2007 on the other hand, activities in the OTC FFA market created a total loss of USD 9.8 million as the company had assets in this market worth of USD 51 million and liabilities of USD 60.7 million.

6.1.5.2 Bunker Price Fluctuations

The group's shipping operations are subject to fluctuating future rates, especially bunker price volatility. Although several of GOGL's vessels are let on long-term time charters where the charterer is accountable for voyage costs, some of the vessels are also traded in the spot market and GOGL is thus exposed to bunker price fluctuations on these vessels, see section 5.2.1. The group does not, however, hedge its bunker price exposure.

6.1.5.3 Exchange Rate Risk

The reporting currency as well as the majority of GOGL's financial assets and liabilities is denominated in USD, and by 31 December 2008 there were no material assets or liabilities denominated in other currencies. Hence a foreign currency hedge would not be necessary.

Although, the fact that all assets and liabilities are intentionally denominated in USD is a natural hedge in itself, see section 5.4.1. Because most of their income is in USD the company has also decided to finance its assets in USD so that the exchange of currencies is not required. However, due to the different locations of the parent and the two management subsidiaries, some of the costs, especially administration costs are denominated in local currencies. The group is accordingly exposed to movements in NOK and in Singapore dollars as well as USD.

The group is well aware of the fluctuating values of its assets and liabilities owing to changes in exchange rates, and thus monitors its exposure to currency risk on a regular basis. However, the company has decided not to use forward foreign exchange contracts to manage currency risk. The reason for this is that a sensitivity analysis performed by GOGL illustrates that if the exchange rate between USD and NOK increased 5 per cent cet. par. by 31 December 2008, the decrease or increase in net assets would not be substantial.

6.1.5.4 Interest Rate Risk

The group is exposed to interest rate risk through movements in rates on interest rate bearing assets and liabilities. The exposure to interest rate movements are related to the gearing ratio of the company, see section 5.5.

GOGL considers its interest rate risk exposure on a continuous basis, and the chief financial officer monitors sensitivity of interest rates on a regularly part of his role. The sensitivity of 2008 was higher than in 2007 because of increased long-term debt due to the extensive newbuilding programme. However, by 31 December 2008 no interest rate hedges were held by the group.

GOGL's sensitivity analysis illustrates that an increase or decrease in the interest rate level of 1 per cent cet. par. by 31 December 2008, would subsequently lead to an increase/decrease in profits of USD 1 million. This change in profit would generally be because of higher/lower interest expenses on the long-term debt with floating rates.

6.1.5.5 Credit Risk

The group monitors credit risk on a daily basis and manages this risk by concentrating on activities with major shipping companies and placing bank deposits only with highly rated financial institutions.

By December 2008 more than 75 per cent of all cash and cash equivalents were held with four financial institutions with fairly high ratings according to Standard and Poor's credit rate system. If independent ratings on the institutions do not exist, the credit control department

assesses the credit quality of the counterparty considering its financial position, past experience and other factors.

By 31 December 2008 credit risk existed to the extent that approximately 64 per cent of the voyage related income was accounted for by four charterers, and 84 per cent of these four charterers' payments were actually received. In addition, GOGL has calculated maximum credit risk exposure on cash and cash equivalents and trade and other receivables at December 2008 to be USD 130.6 million which is only approximately a third of the exposure the previous year.

6.1.6 Consequences of the Financial Crisis

Golden Ocean's revenue and profit has actually increased despite the financial crisis that emerged towards the end of the year. However, the plunging rates and declining dry bulk market as a whole along with the insolvency of counterparties have resulted in losses for the group and its share value has dropped remarkably.

The company has been subject to non-performing deals in terms of counterparties being unable to meet their obligations. One example is that the now bankrupt Britannia Bulk was to buy six Panamax newbuildings now under construction. In addition, only around half of the group's newbuilding programme was financed whereas ten vessels were still left unfinanced by the end of February. As a response to the current financial crisis, Golden Ocean has increased its focus on counterparty risk and chains of charterparties.

As outlined in section 4.2.3, dividend reductions, falling stock prices and breach of covenants are signs of financial distress. Thus, it seems that the most severe consequence of the financial turmoil for Golden Ocean is financial distress mainly as a result of counterparties being unable to meet their obligations.

In order to try to deal with the situation, the group has gone through financial restructuring in terms of negotiating with creditors and issuing new equities. After selling 80 per cent of the dry bulk company's convertible USD 200 million bond issue to the largest shareholder Hemen Holding owned by John Fredriksen, Golden Ocean has agreed to buy back Hemen Holding's position in the convertible bond with a financial gain.

In the 4th quarter report GOGL notified that if the company did not get a financial restructuring it would run out of money by March and would thus not be able to meet its short term obligations. As a solution to this Golden Ocean announced that it was raising around USD 110 million in fresh equity through the issue of 180 million ordinary shares at a subscription price of NOK 4.10 per share.
The company had in addition been in negotiations with its lending banks, creditors and shipyards in order to try to ease the financial situation. The results of these negotiations are that existing covenants and other loan terms have been altered with the intention of providing more flexibility for the company in the future.

Finally, negotiations with the shipyards have also paid off. The company has succeeded in a restructuring of the contracts of 9 newbuildings, including postponement of delivery dates, cancellations and transfer of a number of vessels into a single purpose company which can be project financed. The result of the restructuring is that the financial commitments under the newbuilding programme are reduced by USD 350 million. Subsequently, the entire newbuilding programme has now secured required financing, except for 3 Kamsarmax newbuildings and one Capesize to be delivered in 2012. All the Kamsarmaxes have secured time charters with the duration of 10 years.

And thus, although the company is still not safe, the serious threat of bankruptcy is now eliminated and the aim of Golden Ocean at the moment is to become a financially strong company with a solid cash flow well prepared for the future.

6.1.7 What Could Golden Ocean Have Done Differently?

The big question here is whether GOGL could have prevented the financial distress situation and the serious threat of bankruptcy. The main source of the distress was the market collapse and the plunging rates, but another crucial reason was that several of GOGL's counterparties were unable to meet their obligations. As pointed out in 6.1.5 GOGL was perfectly aware of credit risk and had implemented a strategy where it only did business with highly rated counterparties. As there is no perfect hedge against credit risk, see section 5.9, one need to take a look at what GOGL could have done differently.

It can be argued that since GOGL is not very active in the financial derivatives market and does not implement a lot of hedges, that the financial distress could have been avoided if the company had been more active in the hedging market. However, even though the company had calculated their maximum exposure, it could not have predicted the severity of the global financial crisis where several companies that were thought of as being financially strong, such as Britannia Bulk, went bankrupt.

In addition, the fact that GOGL had a newbuilding programme extending to 35 vessels before the credit crunch without having secured sufficient financing may also be a reason for the distress situation. The market peak and record high rates encouraged GOGL to order several vessels. The plan was to sell some of them at or before delivery, but when the buyers went bankrupt and had to withdraw from the deal, GOGL had a problem. In addition to counterparties not being able to fulfil the purchase obligations, the group lacked financing for several of the vessels leading to covenant breaches and ultimately financial distress.

It thus seems like GOGL's distress was due to the disastrous circumstances and the extensive newbuilding programme, and not as a result of the absence of hedging. And it seems that the only the distress situation could have been avoided, was if GOGL would have had a capital structure consisting entirely of equity.

6.2 Camillo Eitzen & Co ASA

Camillo Eitzen & Co ASA (CECO) is a diversified international holding company listed on the Oslo Stock Exchange. The company is involved in a variety of shipping activities such as shipowning, operation, and commercial management.

Currently (March 2009) CECO commercially operated 114 vessels, of which 43 are owned/financially controlled, 20 newbuildings and 51 commercially controlled. These vessels are distributed between the diverse segments CECO operates in including bulk, gas, chemical and tank.

The gas and chemical segments are taken care of by the fully owned subsidiaries Eitzen Gas and the listed Eitzen Chemical ASA. Eitzen Maritime Services ASA is another fully owned subsidiary of CECO and provides different management services such as technical- and crew management, ship supply and logistics, marine equipment and insurance broking. In addition, CECO is the general manager of and has a 25 per cent ownership interest in the three limited partnership companies ParTankers I and II KS and ParTankers III AS.

Eitzen Bulk A/S and Eitzen Bulk Shipholding A/S are the two fully owned companies taking care of the bulk segment of CECO. The latter is dedicated to shipowning and comprises activities such as the newbuilding programme, long-term tonnage leases and general investments within the dry bulk segment. Eitzen Bulk A/S, on the other hand, is mainly a dry bulk operator trading freight, with a focus on cargo and Contract of Affreightment (COA).

6.2.1 Fleet

Eitzen Bulk operates mainly in the Handymax, Supramax and Panamax markets controlling at the moment (March 2009) 61 vessels, of which two are owned/financially controlled, 42 are under commercial control, and 17 newbuildings. The size of the fleet varies according to the

need for tonnage and the company's desired risk exposure. The vessels that are not owned by the company are either on long-term time charter generally with purchase options to Eitzen Bulk, or they are chartered in on voyage based charters.

Table 6.4 Eitzen Bulk's fleet by March 2009

Segment	Handysize	Handy/Supramax	Panamax	Total
Number of vessels	3	30	11	44
Newbuildings	2	1	14	17
Total	5	31	25	61

Eitzen Bulk's fleet consists with this primarily of small and medium sized vessels. These vessels are generally trading grain and minor bulk products, virtually from all over the world.

The composition of Eitzen Bulk's fleet suggest that the company is rather risk averse in the sense that the fleet is quite diversified and that the vessels are small and medium sized and thus more flexible with less volatile freight rates. The degree of risk aversion is also true for CECO as a group, where the group believes strongly in diversification as a way of spreading risk and hedging.

6.2.2 Key Numbers

2007 was a good year for the dry bulk shipping industry making CECO end the year with a revenue of USD 1,318 million in which Eitzen Bulk was the largest contributor comprising USD 713.6 million. Despite the negative trend and revenue that practically halved from 3rd to 4th quarter, Eitzen Bulk actually managed to increase its revenue in 2008 which amounted to USD 721.5 million; with this Eitzen Bulk was still the largest contributor to the group's aggregate revenue of USD 1,533 million.

Table 6.5 CECO's key numbers in million USD

	2008	2007	1Q 2009	1Q 2008
CECO total value	2,336.1	2,562.3	2,252.3	n/a
CECO total freight income	1,533	1,318	213	384.5
CECO total net profit	- 402.5	117.8	-5.9	-12
CECO cash flow	166	250.3	113	190
Eitzen Bulk total value	251.4	201.8	n/a	n/a
Eitzen Bulk revenue	721.5	713.6	53	177
Eitzen Bulk EBITDA	77.1	84.3	2.1	6.9

2008 was, however, a devastating year for CECO, the main reason for this is the negative economical environment affecting all market segments resulting in extraordinary write-downs amounting to USD 447.5 million. This write-down was necessary in order for the book values to be similar to market values. Eitzen Chemical was the largest contributor to the write-down with USD 401.1 million, followed by Eitzen Gas and Eitzen Bulk with USD 40.9 million and USD 5.5 million respectively. With postponements of cargoes under COAs for Eitzen Bulk combined with lower earnings and heavy write-downs for all segments, Camillo Eitzen & Co ASA ended the year 2008 with a net loss of USD 402.5 million.

The revenue, particularly the bulk revenue was rather low in the 1st quarter of 2009 compared to the previous year. The revenue had been reduced by around 70 per cent due to lower rates and reduced activity. This further suggests that the high revenue from 2008 was mainly as a result of the record high rates in the first part of the year. Even though CECO took a loss of over USD 400 million, the cash flow has been relatively stable; the reasons for this are less debt repayment, increased proceeds from sale of vessels and increased impairment, depreciation and amortisation.

6.2.3 Capital Structure and Taxes

Camillo Eitzen is aiming at an equity ratio between 30 and 40 per cent. In 2007, the group's equity ratio was 33 per cent, indicating a gearing ratio of 67 per cent. In 2008 on the other hand, CECO did not achieve its goal and the equity ratio decreased to 16 per cent and the gearing ratio thus ended up at 84 per cent, making CECO more exposed to financial distress

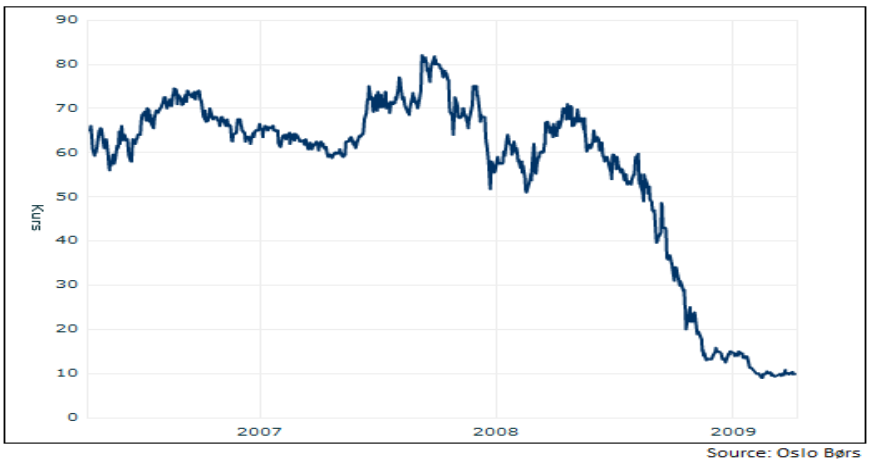
costs and interest rate risk. Accordingly, as a large firm with a high gearing ratio Camillo Eitzen & Co ASA is a perfect example of a firm that actively participates in the derivatives market, see section 4.3.

CECO's activities are subject to taxation under different tax schemes in various countries. The group's main shipping activity is located in Singapore which requires income tax, but no taxes on dividends transferred to Norway. In addition, the company is subject to a corporate tax level of 28 per cent in Norway and 25 per cent in Denmark. The group's capital structure should therefore be affected to some degree by the trade off between the benefits of tax and the costs of financial distress.

6.2.4 Stock Price Development

The performance of Camillo Eitzen & Co ASA's share has historically been stable averaging just over NOK 60 during the last three years. However, the value has dropped dramatically as a result of the dry bulk market collapse.

Figure 6.3 The development of CECO's stock price during the last three years



During the last three years the share reached its top of NOK 81.50 15 October 2007, which was more or less the same time as GOGL's share also reached its record high. From early September 2008 the value started to drop dramatically and reached its bottom of NOK 8.51 10 March 2009.

Table 6.6 Key numbers associated with CECO's shares

Share value (19 May)	**NOK 9.44**
Top value (October 2007)	**NOK 81.50**
Bottom value (March 2009)	**NOK 8.51**
Development last 12 months	**-85.03 %**
So far this year	**-26.29 %**

Source: Oslo Børs

CECO's share is not as liquid as GOGL's and is thus listed on the OB Match list, the number of shares traded so far this year amounts to just over 1 million compared to GOGL's near 1.5 billion. As of 19 may the share value reached NOK 9.44 implying a market value of NOK 391.79 million (Oslo Børs).

6.2.5 Risk Exposure

The fact that CECO is an international player in the shipping industry makes it exposed to several risks divided into three main areas; notably market risk, operational risk and financial risk. Eitzen Bulk has over the years developed and implemented a very efficient risk management programme as a response to the historically volatile market. This system is composited by closely monitoring the market and by using contractual agreements such as derivatives and sensitivity analyses. As a result the company is able to accurately view its future commitments and exposures.

6.2.5.1 Freight Rate Risk

Market risk is closely related to the fluctuating freight rates and bunker rates, and can be reduced by making long-term agreements for the vessels, see section 5.2.1. CECO exploits this type of traditional risk management to a certain degree, especially in the chemical and gas segments. In the bulk segment on the other hand, there were only 2 per cent contract coverage in 2007, thus the rest of the bulk fleet were dependent on the volatile spot market using voyage charter contracts.

Eitzen Bulk's short term goal is to be a leading operator in the spot market. The firm fixes single cargoes or Contracts of Affreightment with core customers or in the competitive spot market, and as of 27 February 2009, Eitzen Bulk had 13 COAs in its portfolio.

Because of the volatile bulk market, strict and efficient exposure management is highly necessary, and that is why Eitzen Bulk utilises the derivatives market through the use of forward freight agreements (FFA) as a tool to hedge exposures. FFAs are used to hedge both cargo and vessel commitments, as well as for short term arbitrage purposes.

Maximum exposure at the end of March 2009 was 619 days, at the same time 2,962 days were hedged against physical tonnage (COA) with the remainder of the arbitrage deals continuously balanced out against each other through for example profit or loss taking. Hence in 2008 total physical days of Eitzen Bulk were 11,668 as opposed to 9,265 the previous year.

6.2.5.2 Bunker Price Fluctuations

Exposure to bunker price fluctuations is an issue for all ship operating companies. As Eitzen Bulk's contract structure includes spot trades as well as Contract of Affreightment (COA), the company is ruthlessly exposed to the highly volatile prices of bunker fuel, see section 5.2.1.

Eitzen Bulk's risk management strategy encourages hedging, and all fuel consumption on future cargo contract commitments have been, and will continue to be hedged. Bunker fuel exposure is generally reduced through compensation clauses in contracts with clients.

CECO will enter bunker swaps, if this is considered appropriate, as a way of managing bunker price risk. As part of the group's exposure management policy, the bunker hedges are entered simultaneously with the COAs. The bunker hedges cover the bunker expenses in connection with the COA and the duration of the bunker hedge is therefore similar to the duration of the Contract of Affreightment.

6.2.5.3 Exchange Rate Risk

It is the strategy of CECO to finance the vessel in the same currency as the income and the underlying value of the vessel, this is in section 5.4.1 explained as a natural hedge. CECO's reporting currency is USD, and the group's revenue, expenses and the dominant values of the vessels are predominantly in USD, except for local costs in local currencies. The majority of the vessels are financed in USD, there are however, some vessels that receive their income in EUR and these will accordingly be financed in EUR. Furthermore, as the group has offices in Denmark and Norway, administration costs here are denominated in DKK and NOK respectively. Because of this, the group is exposed to some currency-related risks involved in income in USD and EUR and administration costs in NOK and DKK.

CECO is aiming at hedging 50 per cent of the currency risk related to the budgeted general and administration costs within the gas, bulk and corporate segments in DKK and NOK for 2009. The exposure will be hedged through the use of foreign exchange forward contracts.

The group's subsidiaries Eitzen Chemical (ECHEM) and Eitzen Gas had some newbuilding programmes in JPY. Currency swaps were entered in order to manage these exposures. In addition, foreign exchange options were also entered in order to hedge these newbuilding instalments; this gave CECO an option to call JPY/put USD at given exchange rates. But as these newbuildings are now cancelled, the currency derivatives have been terminated.

In addition, CECO, Eitzen Chemical and Eitzen Maritime Services have all issued bonds in NOK. These bonds are hedged to USD and interest rate at USD/LIBOR/EURIBOR for the entire duration of the bond tenor using interest currency swap agreements. CECO's bond loan amounts to NOK 300 million and in order to match the payments of this bond two interest currency swaps of NOK 150 million each have been entered, one with fixed rates and one with floating.

CECO's sensitivity analysis shows that a 10 per cent appreciation of the USD against EUR, NOK and DKK would have increased CECO's profit before tax by USD 7.0 million in 2008.

6.2.5.4 Interest Rate Risk

The group's exposure to interest rate risk is related to the long-term debt with floating interest rates. As outlined in 5.5 the company's gearing ratio will be vital to its interest rate exposure.

As part of CECO's strategy which aims at securing 40 to 60 per cent of its interest rate exposure, the group hedges its exposure through a combination of total bank debt hedge and through fixed financial lease structures, as well as by utilising interest rate hedges.

The hedges are completed through regular interest rate swaps and currency interest swaps and through the utilisation of financial leases, which also limit the interest rate exposures since the leases are at a fixed level throughout the leasing period.

In 2007 CECO entered an interest rate swap with Nordea Markets of USD 50 million with fixed rates. This was amended in February with an option to extend the agreement and in addition the fixed rate was reduced from 3.91 to 3.39 per cent.

As of 31 December 2008, USD 202 million of the group's bank and bond debt was hedged through various interest hedges. At the same time USD 339 million was hedged through fixed financial lease structures. CECO's aim was thus met as 42 per cent of the debt carried fixed interest rates.

The sensitivity analysis performed by CECO has calculated that a 1.5 per cent increase in interest rates in 2008 would have increased CECO's profit before tax by USD 13.5 million.

6.2.5.5 Credit Risk

The Group is exposed to credit risk through freight income and derivatives contracts in the sense that the counterparties are unable to pay when due, and additionally through paid instalments on newbuildings where for instance the ship yard goes bankrupt and is unable to deliver the vessel.

As a way of mitigating credit exposure the group is putting substantial efforts into credit analysis of counterparties and aims at trading only with creditworthy counterparties. CECO has as an additional security implemented a policy of keeping the bill of lading on board until

payments are received, and the company can thus take arrest in the cargo if the freight is not paid before the cargo has been discharged. Nevertheless, a default of a charterer will always impose a potential loss for the company.

Credit risk on payments on newbuildings are being reduced by a refund guarantee from creditworthy banks, although several of the newbuilding contracts were acquired second-hand and due to appreciated value of the contracts a higher price than contracted was paid. And the value exceeding the contracted price is not supported by the refund guarantee, and CECO is therefore exposed to credit risk by the yard building the vessel.

Credit risk concerning default on derivative contracts are managed by only entering derivative financial instruments with highly rated financial institutions, resulting in an acceptable level of credit risk. Due to the global economic downturn resulting in liquidity issues and bankruptcies for several companies of all industries, Eitzen Bulk has been forced to increase its focus on counterparty risk.

6.2.6 Consequences of the Financial Crisis

As the freight rates dropped in all segments leading to reduced estimated future earnings and thus reduced market values for the vessels, CECO had to perform a considerable write-down of vessel values to match the market values. This was the main reason for CECO's significant net loss of USD 402.5 million. Hence, the reduced freight rates towards the end of the year did not have such a significant effect on the group's total revenue. However, in the 1st quarter of 2009 the revenue was severely affected.

Since the shipping market as a whole was brutally influenced by the financial turmoil as the demand declined combined with overcapacity, falling stock prices for CECO was inevitable. The value of CECO's shares declined amazingly 89.6 per cent from the top in 2007.

Moreover, 15 February 2009 CECO reported that the company had violated two out of six covenants for the Eitzen Gas loan. On top of this, Eitzen Bulk reported a loss as a result of the decline of the dry bulk market and potential but unrealized losses on future contracts, a provision worth of USD 14 million was thus taken due to the postponement of cargoes under COAs.

The challenging shipping markets in which Camillo Eitzen as a group operates has made the company being forced to make redundancies in order to cut costs. In a press release published 25 March 2009, CECO reported that in order to adapt to the current market situation the company will have to let 17 out 106 shore based employees go. The group's aim is to achieve a 20 per cent cost cut due to the current situation and net loss, and redundancies are a part of this strategy.

The group has experienced low liquidity due to lower rates and less activity in all segments and limited ability to deleverage through sale of assets as any potential buyers lack financing. Hence, in order to improve liquidity CECO aims at divestment and/or rate improvement and try to deleverage through sale of assets.
As of 8 April 2009, CECO and Eitzen Chemical were in discussions with its lenders with the purpose of adjusting the debt repayment schedule and to alter the covenant structure in order to better match the current market environment. In addition, the group has cancelled all the newbuildings except for the two dry bulk vessels which will not be delivered until 2011 and 2013 anyway and thus will not need financing just yet. The cancellations were either possible because the yards had accepted too many orders than they could possibly deliver, or CECO had to pay penalty clauses.

Falling stock prices, covenant breaches, redundancies and losses are all examples of financial distress as outlined in 4.2.3 Hence it can be said that the global financial crisis has resulted in financial distress for Camillo Eitzen & Co ASA. And the group has tried to deal with this in terms of selling assets, negotiate with creditors and cutting costs.

6.2.7 What Could Camillo Eitzen & Co ASA Have Done Differently?

As Eitzen Bulk mainly operates in the COA and spot market it is exposed to fluctuating freight rates. The company could have, in order to secure future earnings, implemented a more conservative chartering policy with more focus on long-term time charters. However, the firm would still have been subject to credit risk and might have ended up in financial distress in any case as a lot of time charters entered before the collapse have now either been cancelled or renegotiated at lower freight rate levels.

When considering EBITDA for the various segments from the annual report of 2008 it is clear that the bulk segment was fairly stable whereas the gas segment experienced a reduced EBITDA, Eitzen Chemical and EMS on the other hand reported increased EBITDA. The group's aggregate EBITDA saw a slight increase as a result of the diverse segment reductions and increases which perfectly illustrates the offsetting effects of a diversification strategy. However, due to the considerable write-downs in the gas and chemical segments, the group ended up with a gigantic total net loss. Without these two segments in its portfolio, and if CECO only had been focusing on dry bulk and maritime services, the group might perhaps have been better off.

6.3 Summary

This case study has now analysed the two dry bulk shipping companies Golden ocean group Ltd and Camillo Eitzen & Co ASA in order to see what sort of risk management instruments they use in practice.

The results show that GOGL is a rather traditional shipping company regarding the type of contracts. Hence, GOGL performs risk management by focusing on long-term time charters for its vessels. The group does not implement a lot of hedges, and only enters FFAs occasionally for hedging or speculating purposes, but other than that the group is not very active in the derivatives market and thus leave most positions un-hedged. GOGL has lately had problems with financial distress as a result of the global financial crisis, the main reason for this situation is the extensive newbuilding programme combined with counterparties being unable to meet their obligations to pay when due.

CECO, on the other hand, is a more risk averse and diversified company which actively participates in the derivatives market. CECO implements hedges associated with interest rate risk, freight rate risk, bunker price risk and currency risk. The types of contracts most commonly used are forwards and swaps, forward contracts are entered concerning freight, currency, and bunker price risk, whereas swaps are entered in order to minimise interest rate exposures. Even though CECO is very active in the derivatives market and have a strict

hedging strategy, the company still ended up in financial distress as a consequence of the world financial crisis. The main reason for the distress was owing to severe write-downs of asset values which was a direct result of the plunging freight rates.

7. Summary and Conclusions

This thesis suggests that since shipping is such a high-risk industry riddled with cyclicality, volatility, seasonality and unpredictability in general, risk management is very important. The thesis has identified that the most significant risk factors for shipowners are freight rate risk followed by bunker price risk, exchange rate risk, interest rate risk, and more recently credit risk has gained increasing focus due to the worldwide financial downturn.

Traditional and modern types of risk management are available in order to reduce the risk exposure. Traditional risk management includes entering long-term time charters in order to secure a stable and predictable income. The modern type of risk management however, includes activities in the derivatives market and is also referred to as hedging. The market agent takes the opposite position of his exposure in the physical market so that the two will offset each other and thus reduce a potential loss. There are four basic derivative instruments, these include futures, forwards, options and swaps, and they all have their own distinctive features. In addition, this thesis justifies hedging as it reduces the volatility of the cash flows and reduces distress costs and the probability of bankruptcy.

In order to see what sort of hedging instruments are being employed in practice, the two dry bulk shipping companies Golden Ocean Group Ltd and Camillo Eitzen & Co ASA have been analysed. The results show that the two companies are rather different regarding their risk management strategies. Golden Ocean is relatively conservative and enters mainly long-term time charters. Eitzen Bulk, on the other hand, focuses on contracts of affreightment and the spot market. What is more is that Camillo Eitzen as a group is rather active in the derivatives market hedging freight, bunkers, exchange rates and interest rates, whereas Golden Ocean only enters Forward Freight Agreements occasionally.

This thesis has also been looking at the dry bulk collapse that appeared towards the end of 2008 mainly as a result of excess supply of vessels and declining demand for sea transport as the global financial crisis enlarged. It is interesting to see that, regardless of their strategies, both companies have experienced financial distress as a result of the crisis. Golden Ocean's distress is mainly a result of failing counterparties, whereas it was the extensive write-down

of vessel value due to the plunging freight rates that have caused distress for Camillo Eitzen. As the two companies have different hedging strategies, it seems that hedging will not prevent a financial distress situation as the world is in a financial crisis. If the circumstances had been normal, however, the results might have been different.

Consequently, it seems that as long as there is a global financial crisis negatively affecting all industries, hedging will not prevent financial distress and bankruptcy. The only thing that could make a difference in a world in crisis is the gearing ratio. Thus an all equity company is the only company that will not be affected as severely by a financial crisis and can therefore take advantage of the low vessel prices and buy cheap now in order to sell later for an escalated price.

8. References

Almeida, H. and Philippon, T., 2007. *The Risk- Adjusted Cost of Financial Distress*. The Journal Of Finance, Vol. LXII, 6 December 2007. EBSCO Host [Online] Available at: http://web.ebscohost.com/ehost/pdf?vid=6&hid=6&sid=c5f37bef-f5cc-4904-bf49-3a036725b833%40sessionmgr3 [Accessed 25 may 2009]

Bernrud, E, Filbeck, G, Upton, T.R., 2005: *Derivatives and Risk Management*. [e-book] Dearborn Trade, A Kaplan Professional Company. Available at University Library/ebrary: http://site.ebrary.com/lib/agder/docDetail.action?docID=10155082 [Accessed 18 February 2009]

Bjørndal, B., 2009. *Golden Ocean Klinker Til*. Dagens Næringsliv [internet] 25 May. Available at: http://www.dn.no/forsiden/resultater/article1676179.ece [Accessed 28 May 2009]

Bodie, Z., Kane, A. And Marcus, A.J., 2008: *Investments*. 7th edn. McGraw-Hill International Edition

Buckley, A., 2004: *Multinational Finance*. 5th edn. Harlow: Pearson Education Limited

BunkerWorld, 2009. Chuan, C., Christina.Chua@bunkerworld.com. *Price Chart*. [E-mail] Message to Linda Korsfur (lkorsf03@student.uia.no) Sent Thursday 2 April 2009, 08:24 am.

Byberg, Ø. 2009. *Tredobling fra Bunn*. Hegnar Online [internet] February 9. Available at http://www.hegnar.no/bors/shipping/article359180.ece

Camillo Eitzen & Co ASA, 2008: *Annual Report 2008*. [Online] Available at: http://www2.eitzen-group.com/data/File/CECO/CECO%20Annual%20report%202008(1).pdf

Camillo Eitzen & Co ASA, 2007: *Annual Report 2007*. [Online] Available at: http://hugin.info/135041/R/1219441/255911.pdf

Camillo Eitzen & Co ASA, 2009: *1st Quarter Report 2009*. [Online] Available at: http://www.camillo-eitzen.com/index.php?pk_menu=223&feed=Uk9ITQQQbyI1MGotMyAhJyUlICQgKn4yPT57Fnlma2xqb21yDg1PU1JTXVVTSFlaW11ZVVxBCBwe&action=view [Accessed 20 May 2009]

Camillo Eitzen & Co ASA, 2008*: 4th Quarter Report 2008*. [Online] Available at: http://hugin.info/135041/R/1293778/293250.pdf

Camillo Eitzen, 2009. [Online] Available at: http://www.camillo-eitzen.com/

Clarkson (RSL) Research Services Limited, 2009: *Dry Bulk Trade Outlook February 2009*. Volume 15, NO. 2. [Online] Available at: http://www.crsl.com/

DN, 2008. *Spår Nedtur i Tørrbulk*. Dagens Næringsliv [internet] 4 February. Available at: http://www.dn.no/forsiden/naringsliv/article1306857.ece

DNV, 2009. Det Norske Veritas: *DNV Bulk Carrier Update NO. 1 – 2009*. [internet] Available at: http://www.dnv.com/industry/maritime/publicationsanddownloads/publications/dnvbullkcarrierupdate/2009/2009/ [Accessed 10 May 2009]

Golden Ocean Group Limited, 2007: *Consolidated Financial Statements for the year ended December 31, 2007*. [Online] Available at: http://www.goldenocean.no/reports/135378/R/1246508/269569.pdf

Golden Ocean Group Limited, 2008: *Consolidated Financial Statements for the year ended December 31, 2008*. [Online] Available at: http://www.goldenocean.no/reports/135378/R/1310375/303089.pdf

Golden Ocean Group Limited, 2009: *Interim Report March 2009*. [Online] Available at: http://www.goldenocean.no/IR/ [Accessed 25 May 2009]

Golden Ocean Group Limited, 2008: *Preliminary Fourth Quarter and Financial Year 2008 Results.* [Online] Available at: http://www.goldenocean.no/reports/135378/R/1293463/293033.pdf

Golden Ocean Group Limited, 2009. [Online] Available at: www.goldenocean.no

Grinblatt, M. and Titman, S., 2002: *Financial Markets and Corporate Strategy*. 2nd edn. New York: McGraw-Hill.

IMAREX ASA, 2009. [Online] Available at: www.imarex.com

International Maritime Organization, 2006: *International Shipping Carrier of World Trade*. [Online] Available at: http://www.marisec.org/shippingfacts/uploads/File/worldtradeflyer.pdf

Kavussanos, M.G., 2002: 'Business Risk Measurement and Management in the Cargo Carrying Sector of the Shipping Industry'. Ch. 30 in Grammenos, Costas TH. (ed.): *Handbook of Maritime Economics and Business*, pp 661-692. London: LHH

Kavussanos, M.G. & Visvikis, I.D., 2006a: *Derivatives and Risk Management in Shipping*. 1st edn. London: Witherbys Publishing.

Kavussanos, M.G. & Visvikis, I.D., 2006b: 'Shipping Freight Derivatives: a survey of recent evidence'. From *Maritime Policy and Management*, July 2006 VOL. 33, NO. 3, pp 233-255. London: Routledge.

Korteweg, A., 2007. *The Costs of Financial Distress across Industries*. [Online] Available at SSRN at: http://papers.ssrn.com/sol3/papers.cfm?abstract_id=945425 [Accessed 25 May 2009]

Leung, W., 2009. *Pacific Basin expects more Dry-Bulk failures as Rates Collapse*. Bloomberg [internet] 13 January. Available at: http://www.bloomberg.com/apps/news?pid=newsarchive&sid=agVL835jRdBQ [Accessed 29 January]

Madura, J. and Fox, R., 2007: *International Financial Management*. London: Thomson Learning

Nightingale, A., 2009: *Half of Commodity Shippers May Breach Loans by April, RBS Says*. Bloomberg [internet] 14 January. Available at: http://www.bloomberg.com/apps/news?pid=newsarchive&sid=a4_KsvpSdIRc

Nomikos, N.K. & Alizadeh, A.H., 2002: 'Risk Management in the Shipping Industry: Theory and Practice'. Ch. 31 in Grammenos, Costas TH. (ed.): *Handbook of Maritime Economics and Business*, pp 693-729. London: LHH

Oslo Børs, 2009. [Online] Available at: www.oslobors.no

Platou, 2008: *The Platou Report 2008.* R.S Platou ASA. Available at: http://www.platou.com/loadfileservlet/loadfiledb?id=1205311719484PUBLISHER&key=1205499801725

Platou, 2009: *The Platou Report 2009*. R.S. Platou ASA. Available at: http://www.platou.com/loadfileservlet/loadfiledb?id=1235645222062PUBLISHER&key=1236854479218

X-rates, 2009. [Online] Available at: http://www.x-rates.com/d/NOK/USD/graph120.html [Accessed 15 May 2009]

Ross, S.A., Westerfield, R.W. and Jaffe, J.F., 2002: *Corporate Finance*. 6th edn. New York: McGraw-Hill.

Saugestad, E., gold_esa@goldenocean.no, 2009. *Risikostyring*. [E-mail] Message to Linda Korsfur (lkorsf03@student.uia.no) Sent Friday 20 March 2009, 2:25 pm.

Shipping Facts, 2009. *Information about the international shipping industry,* [Online] Available at: http://www.marisec.org/shippingfacts/home/ [Accessed 16 February 2009]

Shipping Times, 2008*: Bulk Shipping Firm Goes to the Wall*. Shipping Times [internet] 19 December. Available at: http://www.shippingtimes.co.uk/item_10199.html

Stopford, M., 2009: *Maritime Economics*, 3rd edn, London: Routledge

Stopford, M., 2008: The *Great Shipping Boom 2003-8 Can we avoid a great shipping slump?* Fifth City Biennial Meeting 18-19th November 2008. EBSCO Host [Online] Available at: http://search.ebscohost.com/Login.aspx?lp=login.asp&ref=&authtype=ip,uid [Accessed 4 February 2009]

Stopford, M., 1997: *Maritime Economics*, 2nd edn. London: Routledge

The Baltic Exchange, 2009. [Online] Available at: www.balticexchange.com

The Baltic Exchange Information Services Ltd, 2009 [online] Available at: http://www.balticexchange.com/default.asp?action=article&ID=3 [Accessed 7 February 2009]

Tsuneishi Group (Zhoushan) Shipbuilding INC. [Online] Available at: http://www.tsuneishi-zs.com/en/products/kamsarmax.html [Accessed 10 March 2009]

UNCTAD, 2008: *Review of Maritime Transport 2008*, report by UNCTAD secretariat, UNITED NATIONS PUBLICATION, New York and Geneva. [Online] Available at: http://www.unctad.org/en/docs/rmt2008_en.pdf