ANALYSIS OF MARKET CHARACTERISTICS FOR CAPESIZE BULK CARRIERS

By

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ABSTRACT

Iron ore and coal play a key role in the global economy and their consumption per capita is indicative of a country's standard of living. Their vast majority is transported by sea, making many countries rely on the efficiency and cost of transportation by capes.

The cape market has closely followed the dry bulk market since the introduction of capes in the late 1960s. It is highly cyclical, creating big investment opportunities with potential for high and fast returns. China's recent economic expansion has impacted capes in particular as they account for the vast majority of iron ore transportation. The rapid increase in demand combined with the short-run inelasticity of supply due to capacity constraints has led to a record-high market. This combined with lack of confidence has some very interesting implications. The price gap between newer and older vessels has narrowed significantly, while a modern cape is worth about 50% more than ordering a newbuilding. Since 1986 when a 9-year-old cape was of scrap value, the market has moved to the opposite extreme with a 13-year-old cape worth as much as a newbuilding.

The industry and its development is analyzed before focusing on the current market and its prospects. Extensive analysis is carried out on a wide range of factors contributing to the outcome of the market in terms of freight rates, time charter rates, ship values and newbuilding prices. Examples include Chinese steel production and iron ore imports, Australian port congestion and queue lengths, oil prices, newbuilding orders and delivery times, the orderbook and the scrapping pool, all of which are at record high levels. Other factors include exchange rates, GDP growth, policies and demolition rates.

The analysis is carried out using databases of newbuilding orders, fixtures and S&P transactions as well as a wide range of numerical data from a variety of sources. The futures market is also investigated, as well as its relation to the physical market. A wide range of current investment opportunities are finally considered from a buyer's and a seller's perspective. These are analyzed and compared before making the relevant recommendations.

Thesis Supervisor: Henry Marcus

Title: Professor of Marine Systems

Acknowledgments

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1. Introduction

Bulk Carriers are divided into five main size groups. The smallest ones are the Handysize vessels or "Handys", which are between 10Kdwt and 35Kdwt. These are usually geared, they are very flexible due to their size, and they are used in a wide variety of trades. Handymax vessels cover the range of 35Kdwt to 60Kdwt. These are also usually geared and transport a wide range of cargo.

Panamaxes are the largest vessels that can transit the Panama Canal, which imposes a restriction of 32.2m on the beam. Due to developments in design, materials and naval architecture, the permissible size in terms of capacity has grown substantially over the years and is currently about 75Kdwt. Panamaxes are mainly used in the transportation of coal, iron ore, grain and phosphates. Following the announcement of the Panama Canal expansion, which will be complete by 1914, there will no longer be a need for vessels of these particular dimensions. Other considerations will come into play and a new and larger Panamax design will evolve.

Bulk carriers larger than Panamaxes have to sail around Cape Horn and hence they are called "capesize bulk carriers" or "capes". They are typically around 175Kdwt and are mostly used for the transportation of coal and iron ore. Though Capes are not involved in the transportation of most cargos, changes in these markets can have a significant impact on the demand for capes through a knock-on effect. When Chinese steel exports increase for example, as in 2005, the demand for Handymaxes increases. More Handymaxes are used in this trade and Panamaxes become more heavily involved in trades that are shared between the two vessel types. This effectively reduces the supply of panamax ships in the grain or iron ore trades. The demand for capes therefore goes up as it did significantly in 2005 for this reason. The markets of the various size groups follow each other though there tends to be short periods of divergence. This is also shown in Fig 1.

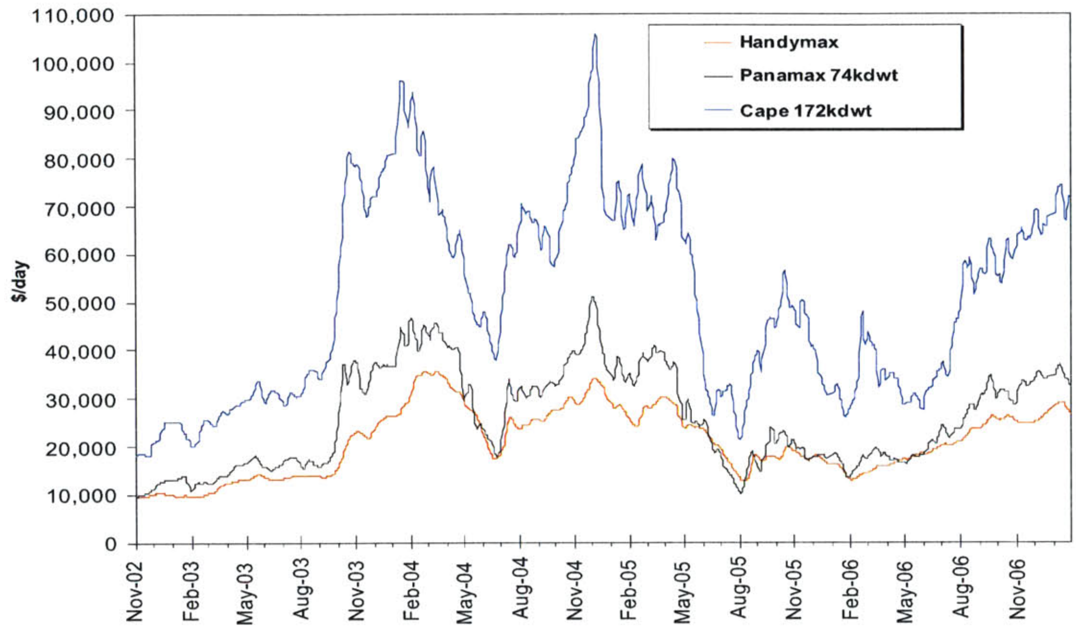

Fig 1: Bulk Carrier Earnings tend to go Together [SSY 2007b]

Fig 1: Shows the ratio of cape earnings to panamax earnings over time. This has varied within the range 1.2 to 2.8 over the past five years. The average value is about 2.

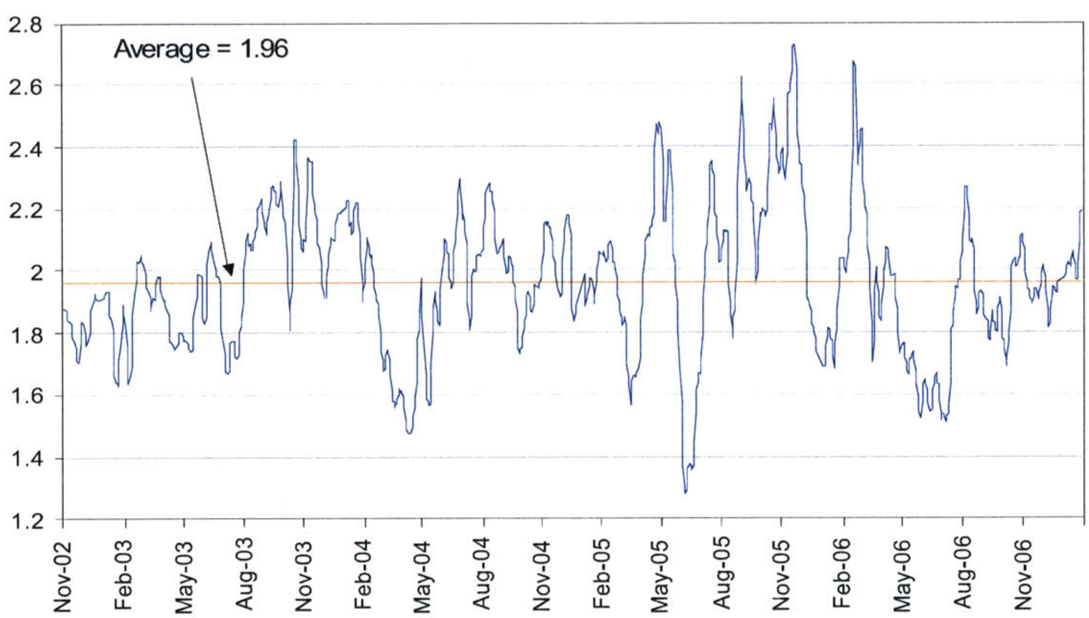

Fig 2: Ratio of Cape to PMX Earnings Over Time [SSY 2007b]

Specialized ore carriers are designed specifically for high-density cargoes such as iron ore. Due to the high stowage factor of the cargo, these are compact and have a capacity that often exceeds 300Kdwt with only a modest increase in overall dimensions. This however renders them inefficient for the transportation of the high stowing coal and has made them less profitable over the past few decades. They are therefore few in number and the majority of iron ore is transported in Capesize vessels. The largest iron ore carrier in the world is the *Berge Stahl*, built in 1986, shown in Fig 3. It measures 343m long and its deadweight capacity is 364,767dwt.

Fig 3: *Berge Stahl* - The World's Largest Dry Bulk Carrier [Van Dyck 2004]

There are currently 711 capes in the world fleet with a total capacity of 120.6Mdwt. About 10% of these are over 200Kdwt and about 1% are over 300Kdwt. 185 capes of 37Mdwt are currently on order until 2012, of which 28 are large ore carriers and 17 are over 300Kdwt. Only 1 cape has been scrapped since last year so the capesize fleet is increasing at a high rate [Clarksons 2007b]. The development of the capesize fleet since the 1970s is illustrated in Fig 4.

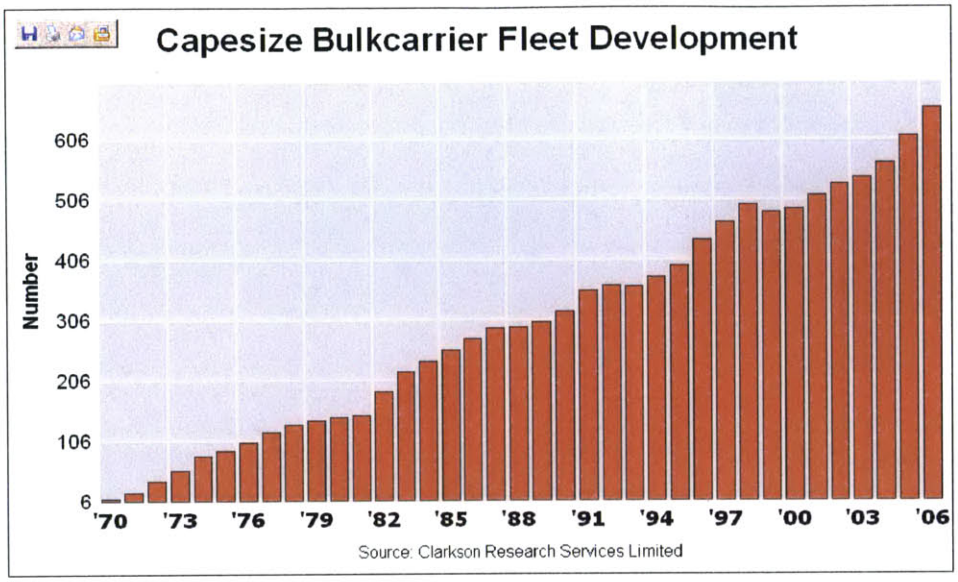

Fig 4: The *Capesize Fleet* Development since 1970 [Clarksons 2006a]

Capes are designed for a fatigue life of about 30 years. Their trading life however is affected both by structural and economic factors. Life extension is worthwhile when the market (or expected market) is such that predicted returns over the projected remaining ship life outweigh the required costs. Fig5 shows the age distribution of the fleet along with the current orderbook.

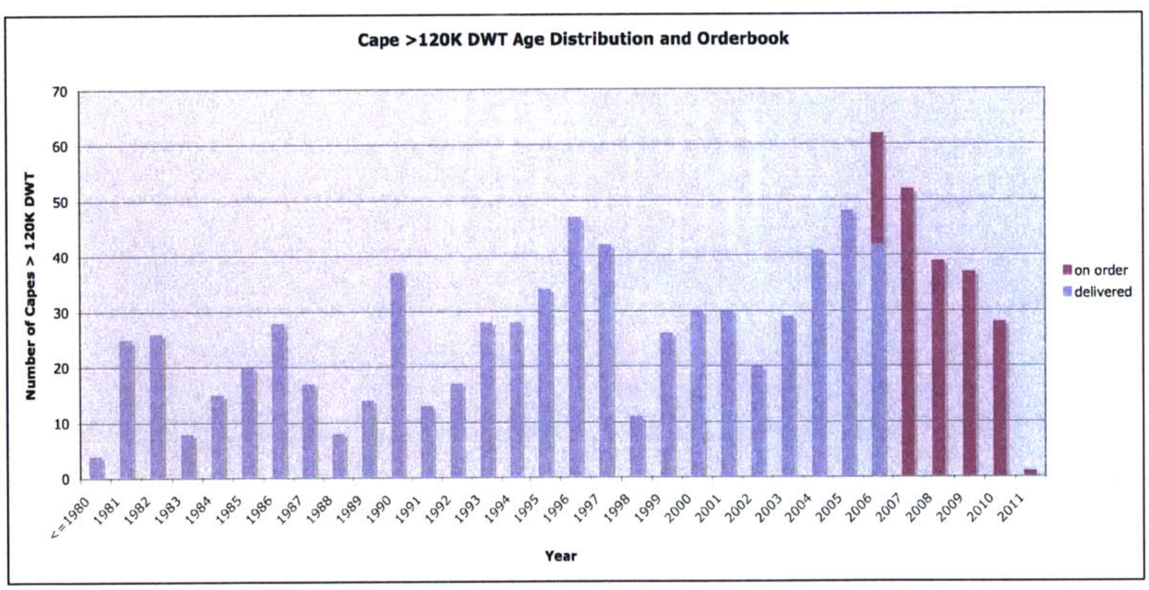

Fig 5: The *Capesize Fleet* Development since 1970 – using data from [Braemar 2006]

The 711 capes in the world fleet are divided among 162 owners. The biggest one is Mitsui O.S.K. Lines with 35 vessels of an average 176Kdwt at an average age of 9 years. This fleet is worth about $3bn in today's market but only accounts for 4.9% of the world fleet. The top 50 owners own three quarters of the world fleet while the top 20 own about half and the top 10 own about a third. This is shown in Fig 6, as the percentage owned by the top 5 owners (1st to 5th), the second five owners (6th to 10th) and so on.

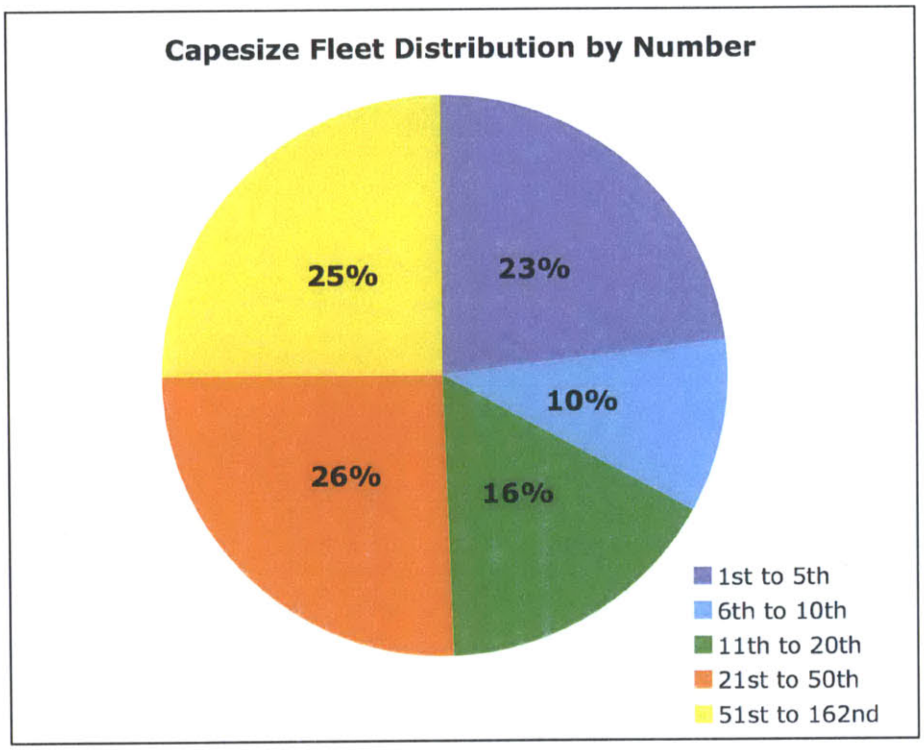

Fig 6: The Capesize Fleet Distribution Among Owners using Data from [Clarksons 2006c, LR 2007]

The number of owners owning 4 to 35 vessels is indicated in Fig 7, which shows the fleet distribution among the top 50 cape owners.

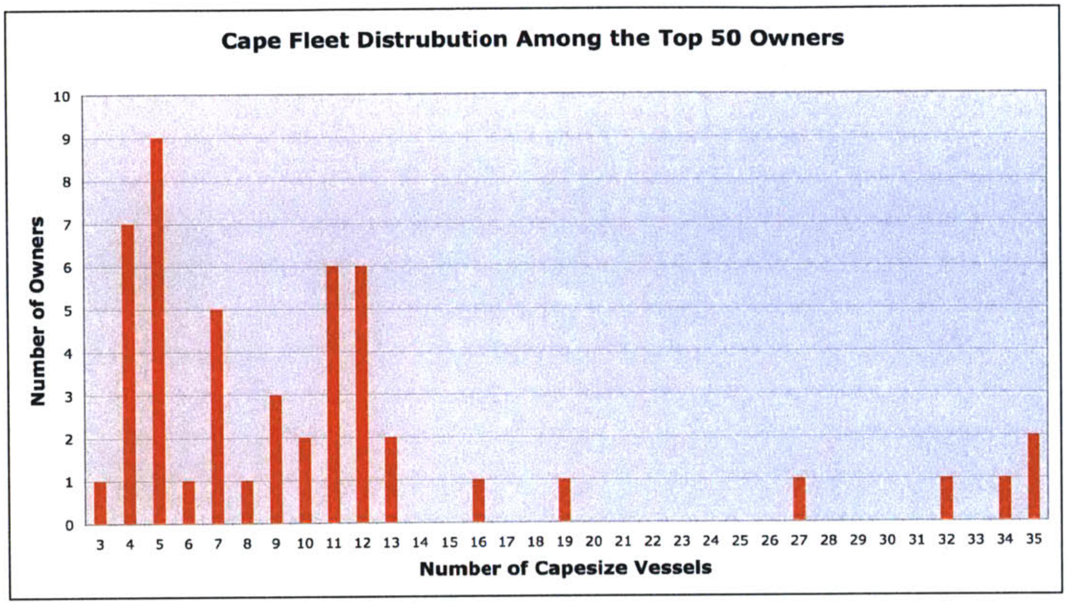

Fig 7: The Capesize Fleet Distribution Among top 50 Owners by Number of Vessels - using Data from [Clarksons 2006 & GSD 2007]

As mentioned earlier, Capes are mainly used mainly in the transportation of iron ore and coal within specific trade routes. The prevalence of iron ore over other cargos however is clear in Fig 8, which shows the approximate shares of commodities transported by capes as tabulated by values from [Braemar 2007a] and [DNV 1997].

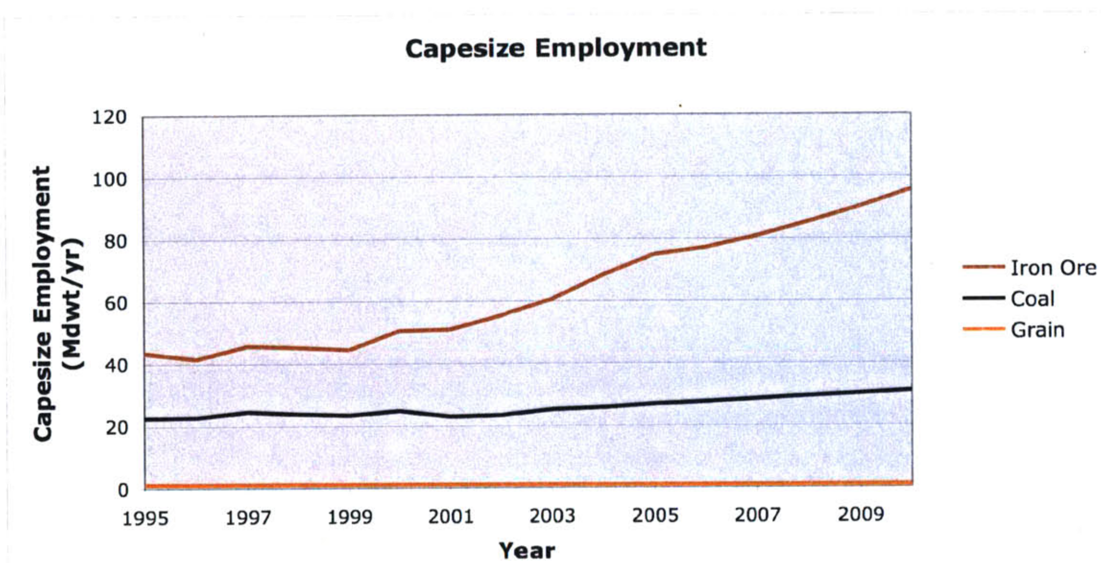

Fig 8: Capesize Trading Cargoes using data from [Braemar 2006 & DNV 1997]

Iron ore as a commodity is crucial to economic development and its consumption per capita is an index measuring the standard of living. Many countries depend heavily on its transportation and since the sea separates producers from consumers, typically by a large distance, this makes marine transportation of iron ore a vital aspect of economic growth.

Marine transportation of iron ore has been increasing steadily for the past several years while China's expansion has caused a tremendous increase in demand since the start of the new millennium. Currently, 716 million tonnes (the vast majority) of iron ore are being transported by sea annually making it the largest dry bulk trade as shown in Fig 9.

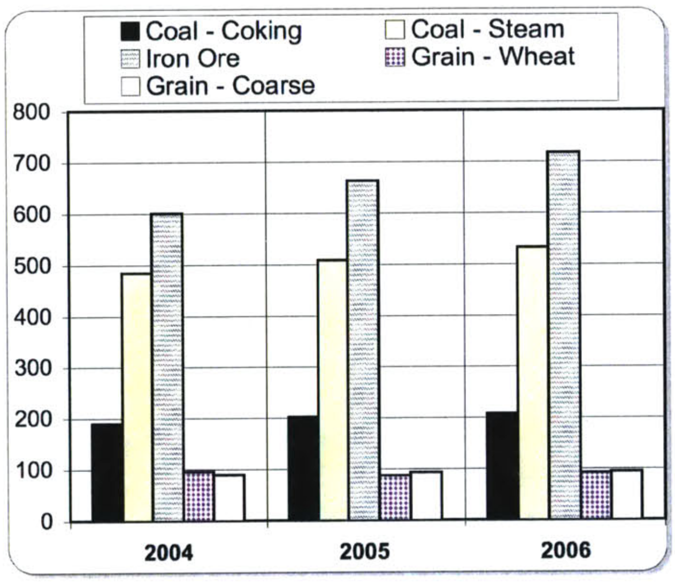

Fig 9: Seaborne Dry Bulk Trades in Mt for the years 2004 – 2006 [SSY 2006a]

At its origin, iron ore is extracted from the ground in mine fields and then transported to nearby ports via trains. It is then stockpiled onto big land surfaces within the ports and from there loaded onto ships by means of conveyor belts. Ships then transport the cargo to other terminals in which it is unloaded using large grabs and then taken to close by steel plants (the final destination) by trains. Almost all iron ore (98%) is used to make iron and steel [Kirk 2006].

The dry bulk shipping is highly competitive with relatively low barriers to entry. These include knowledge, ISM certification and other regulations, high prices and economies of scale. Economies of scale however are much more significant on a ship and its size as opposed to the size of a firm and its fleet. A new entrant therefore also has access to these EOS reducing the significance of this barrier. The market consists of many relatively small charterers and shipowners and deadweight capacity is distributed relatively evenly amongst them. The influence of a single player on the market's outcome is therefore very limited creating a highly competitive environment.

To a great extent, the above also applies to the more specific cape industry. The cape fleet however is relatively small. Furthermore, the cape market is highly sensitive on supply and if that is reduced by say 15% when the market is already on an upward trend, this can have a big impact on rates. A Taiwanese owner, Nobuyoshi Morimoto managed to take advantage of this and cornered the market to some extent in 2005, making in excess of $1bn through a series of futures and subsequent charters.

Shipping is a highly cyclical market both in terms of charter rates and in terms of ship prices. This creates opportunities for high profits if one enters and exits at the right time. There are however many factors contributing to the outcome of the market and this makes it very unpredictable. Fig 10 shows an overview of the dry bulk market over the past twenty years since the great shipping crisis in 1986. The main peaks and bottoms are then outlined below.

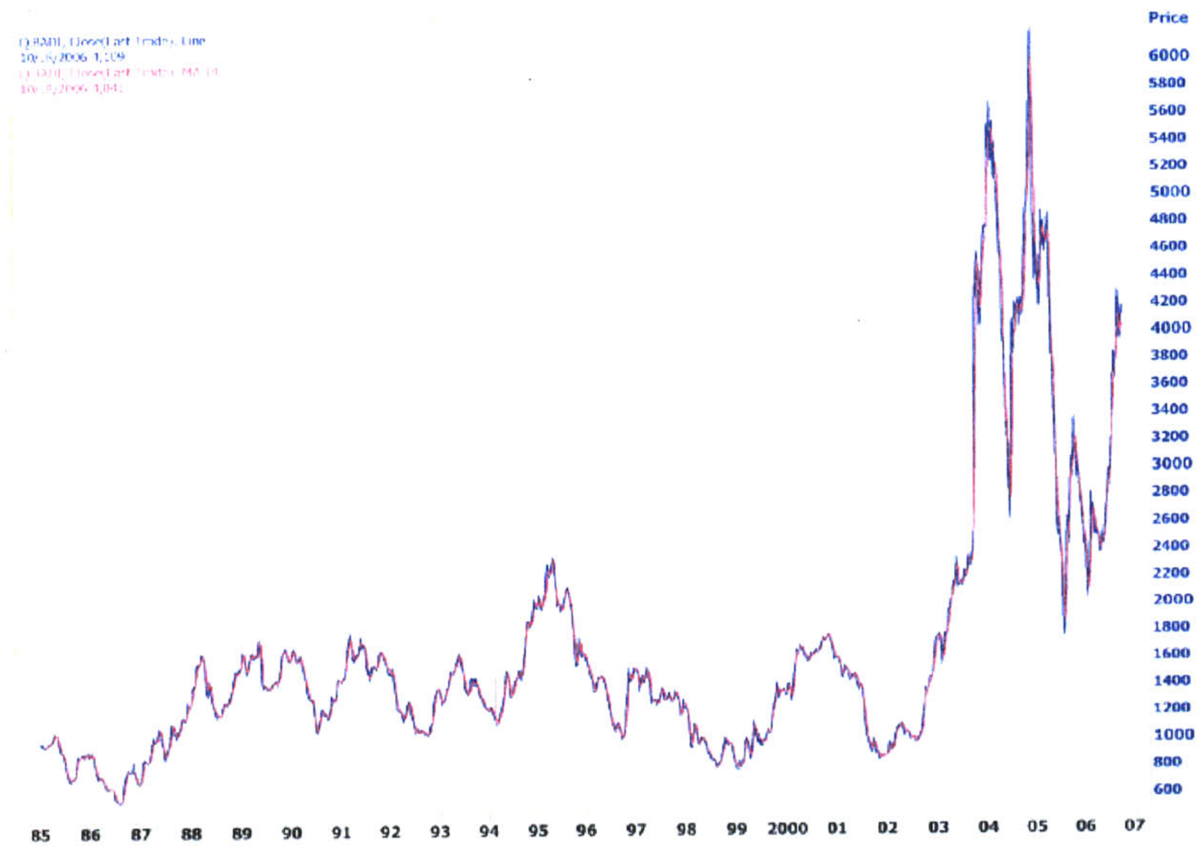

Fig 10: The Baltic Dry Index since the 1986 crisis [Reuters 2006]

1970s: The first capes are constructed in the late 1960s / early 1970s

1976: The 1973 oil crisis leads to a world recession that results in the shipping crisis of 1976

1986: The 1979 oil crisis and the high interest rates of 1980/81 to counteract inflation lead to a world recession. This combined with the oversupply of ships results in the shipping crisis of 1982-1986

1988: Increasing demand as economies recover, combined with decreasing supply as yards shut down, lead to recovery of the shipping market towards the end of the 1980s

1995: Increase in demand from China leads to a boom in the shipping market

1999: The stock exchange crisis of 1998 in the Far East (the tiger markets) that was then followed by Russia and Brazil led to the 1999 crisis in the shipping market

2002: The 11th of September tragedy, which led to the economic depression and the Enron scandal that led to the deep stock market crisis, resulted in the 2002 shipping crisis

2003: The current boom was largely driven by China's expansion but America's demand in 2006 has led to an increase in backhaul rates. The increase in oil prices has also led to the economic expansion of oil producing countries and to increased use and transportation of steam coal

2. Demand for Capes

2.1 Economic Factors

Demand for shipping is closely related to the global economy. The domestic growth of any country requires imports and also increases its output thereby creating exports. A country's demand for shipping is therefore related to its gross domestic product (GDP). Fig 11 shows how the GDP of China and the world average GDP has varied over the years.

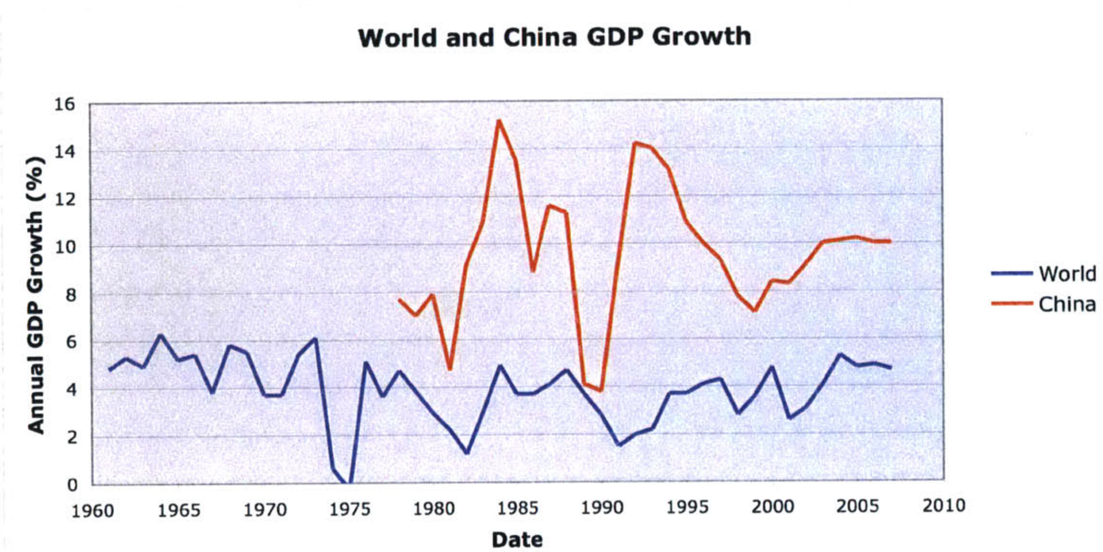

Fig 11: World and China GDP Growth – using data from [Clarksons 2007a]

China is a developing country and therefore has a higher GDP growth rate than the world average. Its growth currently dictates the dry bulk shipping market, and particularly the capesize market more than any other factor. The previous shipping boom was also driven by China's demand in 1995 when GDP was at high levels (see Fig 10).

As one would expect, the world average GDP growth fluctuates less than that of China but is still far from stable and this has implications on the demand for shipping. Fig

12 shows the world average GDP growth along with that of developing and advanced countries and the annual growth in dry bulk trade since 1997.

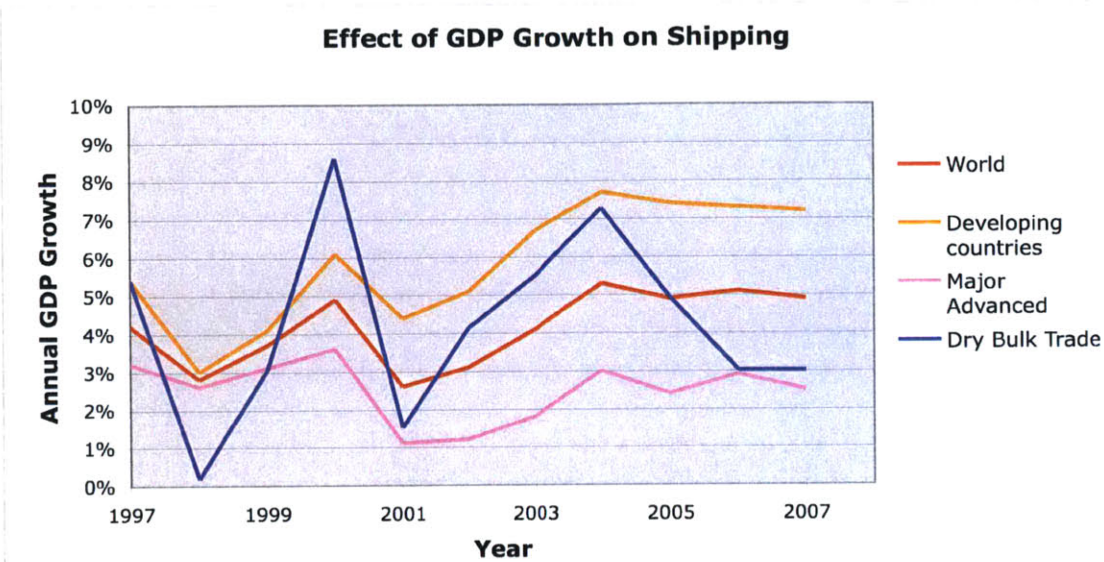

Fig 12: Disproportionate effect of GDP on Shipping – using data from [Braemar 2007a]

It can see that not only is dry bulk trade related to GDP, but it is affected disproportionately with peak growth being as high as the GDP growth of developing countries and bottom growth being as low as the GDP growth of advanced countries. According to OECD, a slow down in European economic growth is expected from 2.6% in 2006 to no more than 2.2% in 2007. This is also supported by the unexpected slowing of the services sector (the largest sector in the European economy) in December and the reduction in manufacturing and retail sales [Clarksons 2007d]

GDP accounts for a number of sectors such as housing and services. The most relevant to shipping however is industrial production because it translates directly to imports and exports creating demand. China and the USA are big markets and therefore have a greater effect. Fig 13 shows the industrial production of various big markets.

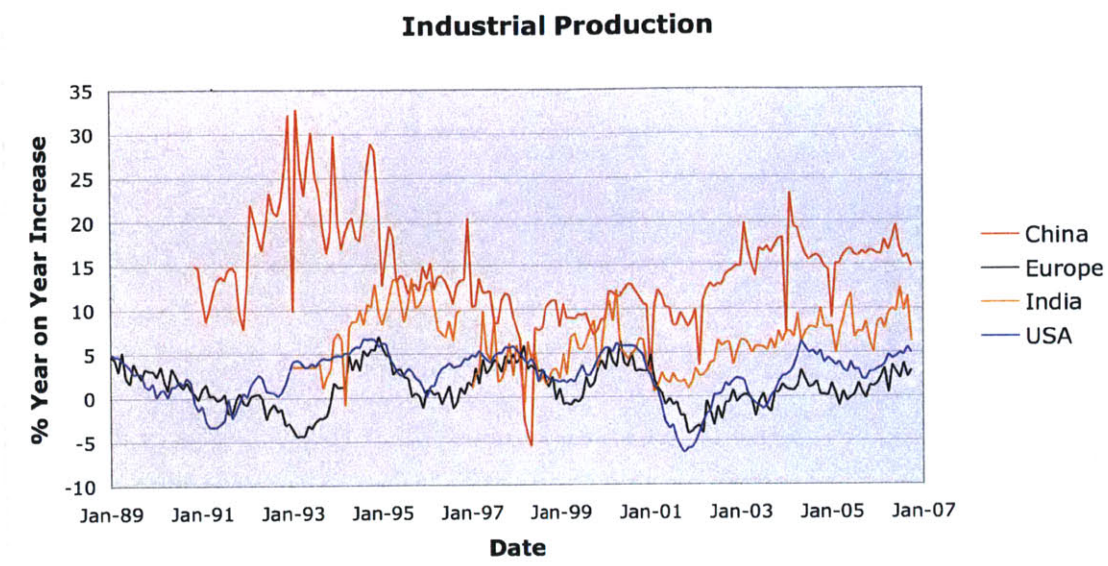

Fig 13: Industrial Production Increase – using data from [Clarksons 2007a]

One can see by comparing Fig 12 and Fig 13, that industrial production has a similar trend to GDP growth. Chinese Industrial production has been high overall while Europe and the USA have been growing at similar levels.

Economic activity is also closely linked to shipping. The stock market crises in 1998 and 2002 both resulted a shipping crisis in 1999 and 2002 respectively. Fig 14 shows the major world market Indices. These are affected by GDP growth.

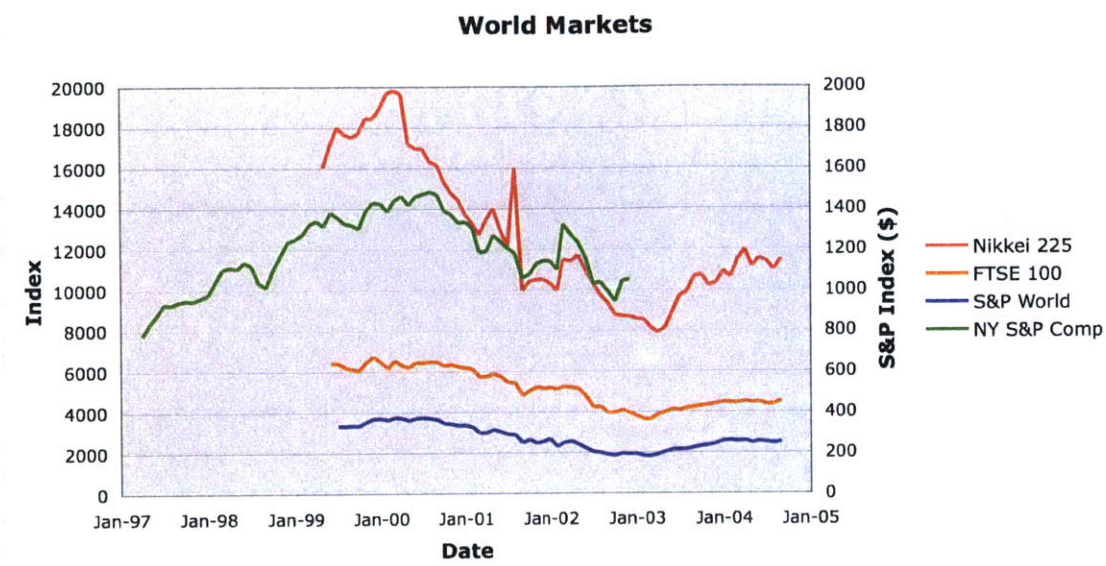

Fig 14: The Major World Market Indices – using data from [Clarksons 2007a]

USD exchange rates affect the market in particular because shipping business is conducted (and measured) in USD. A low USD boosts the shipping market because commodities, ship chartering and ships are all cheap. The low USD is one of the reasons why the market is currently very high. Fig 15 shows how the USD has varied against other important currencies.

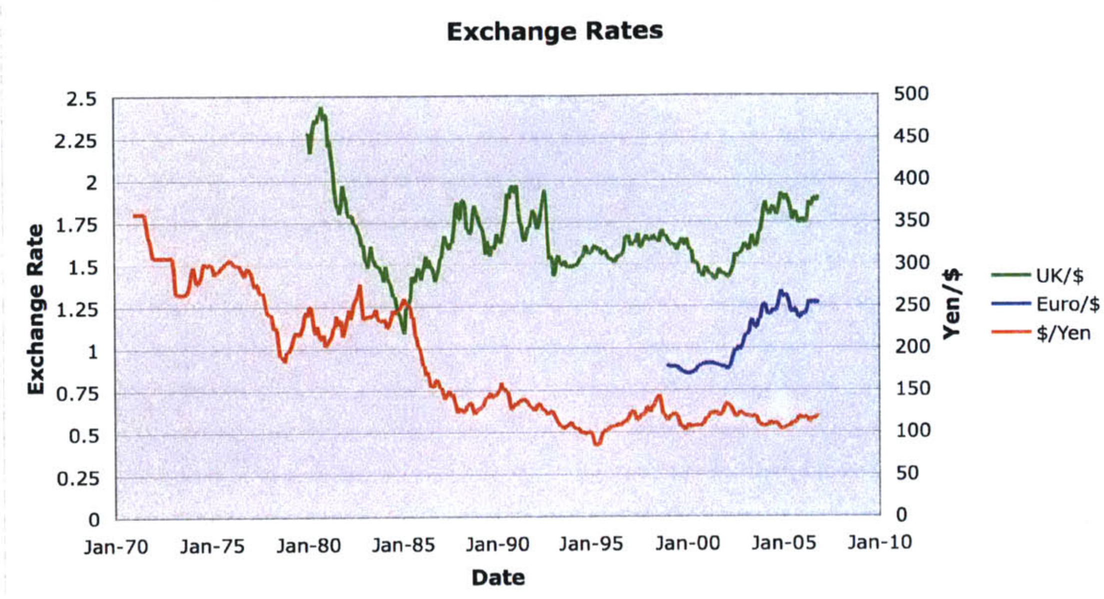

Fig 15: Variation of the USD against the other important currencies - using data from [Clarksons 2007a]

Low interest rates help the shipping market as they promote investment and business, which creates imports and exports. This leads to an increase in freight rates. Furthermore, nearly all ships have a debt, so when interest rates are low, the capital cost of buying a ship is lower. This leads to an increase in ship prices. Fig 16 shows how LIBOR has varied since the beginning of the 1990s.

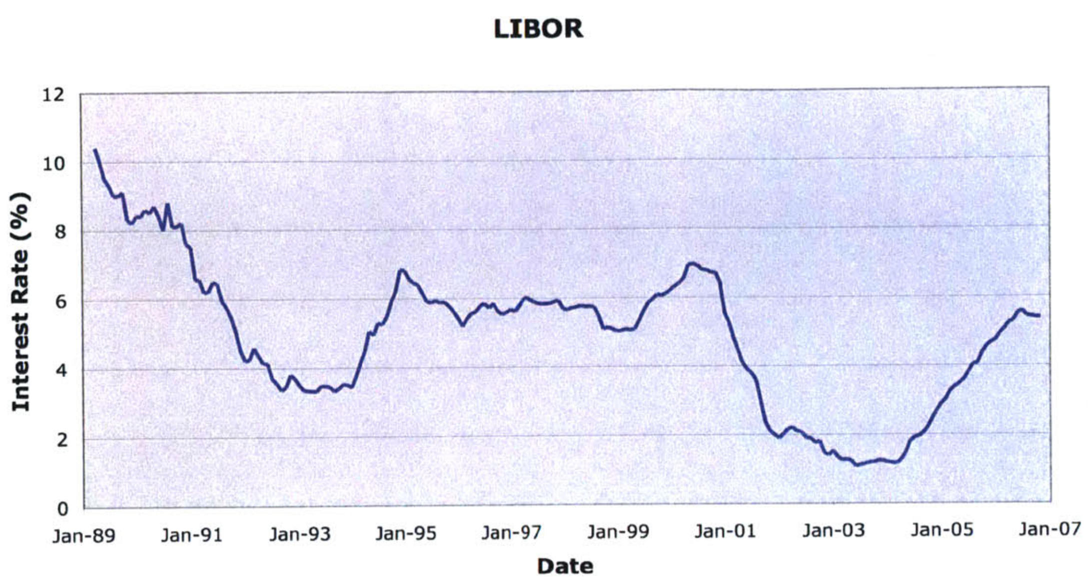

Fig 16: LIBOR since 1989 - using data from [Clarksons 2007a]

2.2 Dry Bulks

Transportation of commodities such as iron ore, coal and grain typically accounts for a small percentage of total cost while profit margins on finished steel are relatively high (UNCTAD 2005). Furthermore, though there are many owners of capes and PMXs, there are no competing transportation modes. This makes demand relatively inelastic for the industry as a whole, but very elastic as perceived by each individual owner.

Due to the existence of combination carriers or Ore Bulk Oil vessels (OBOs), which constitute part of the dry fleet, the demand for oil transportation also plays a role. Demand for oil transportation is partly met by combination carriers and therefore translates to dry bulk demand. As the number of combination carriers is decreasing, their effect is becoming less significant. Fig 17 shows this trend since the beginning of the 1980s, when there was a larger number of OBOs

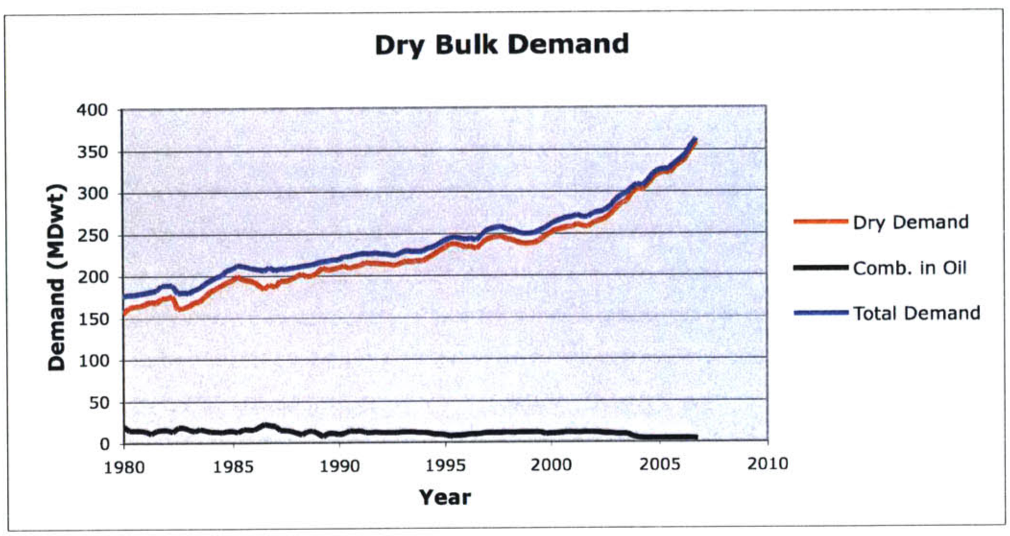

Fig 17: The Effect of Oil Demand on Dry Bulk Demand – using data from [Marsoft 2007a]

As shown in Fig 8, capes are used mainly in the transportation of iron ore and coal. Fig 18 shows the increase in global demand for iron ore and coal along with the total demand for dry bulk cargos since 1980.

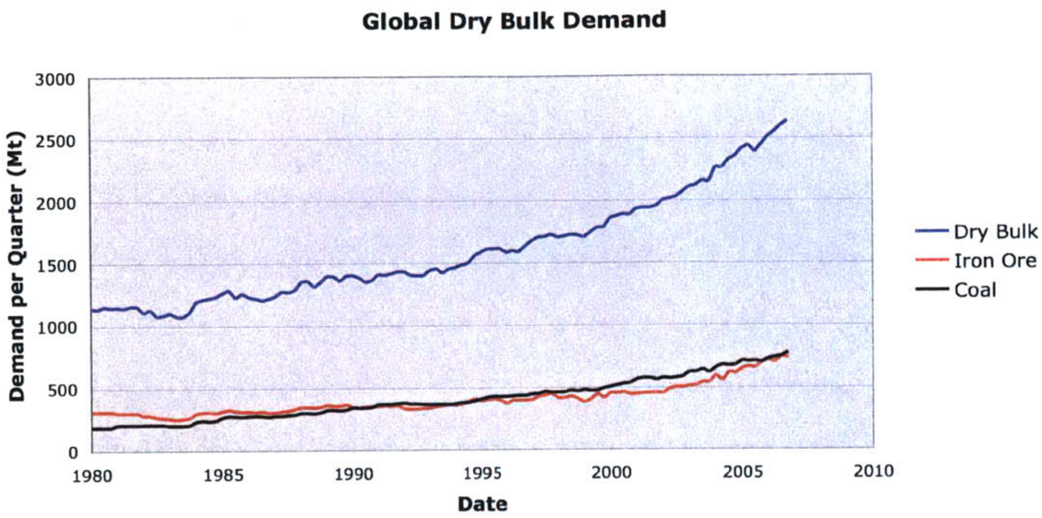

Fig 18: Global Demand for Dry Bulk, Iron Ore and Steam Coal [Marsoft 2007a]

The coal that is transported in capes is either metallurgical or steam coal. Metallurgical coal is used with iron ore to produce steel while steam coal is used in power plants to produce energy. A large fraction of the cargo transported in capes is therefore derived from the demand for steel. Fig 19 shows the steel related cargos and steam coal as a percentage of total dry bulk cargo for various major countries, the world average and for capes.

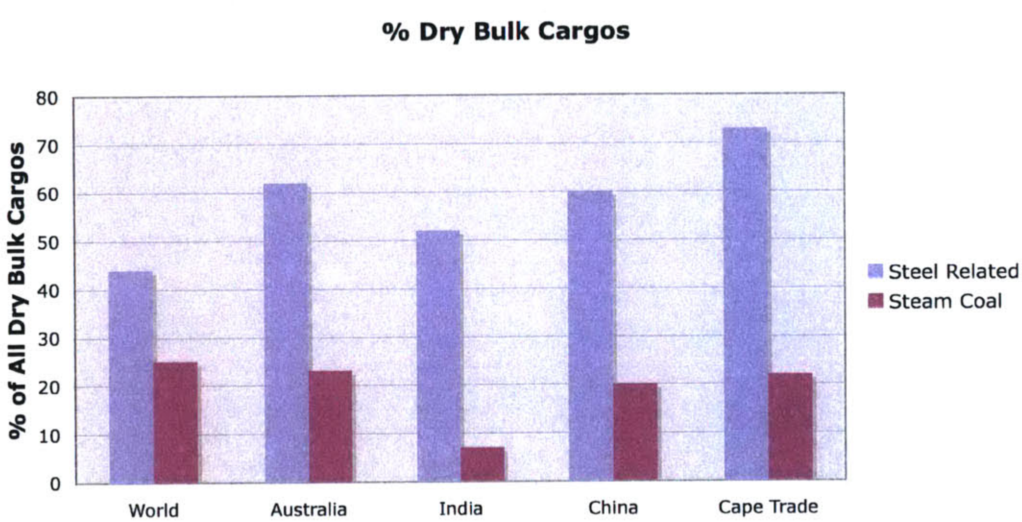

Fig 19: Steel Related Cargos and Steam Coal as a fraction of Dry Bulk Cargos – Using data from [Braemar 2007a]

As shown in Fig 19, steel related cargos account for a significant fraction of dry bulk trade, particularly for the major traders, while capes are heavily involved in their transportation. Demand for steel is therefore critical for capes even though steel is usually transported in handymax vessels. Capes are also used occasionally in the transportation of grain. Fig 20 Shows the global demand for cape cargos along with the demand for steel since 1980.

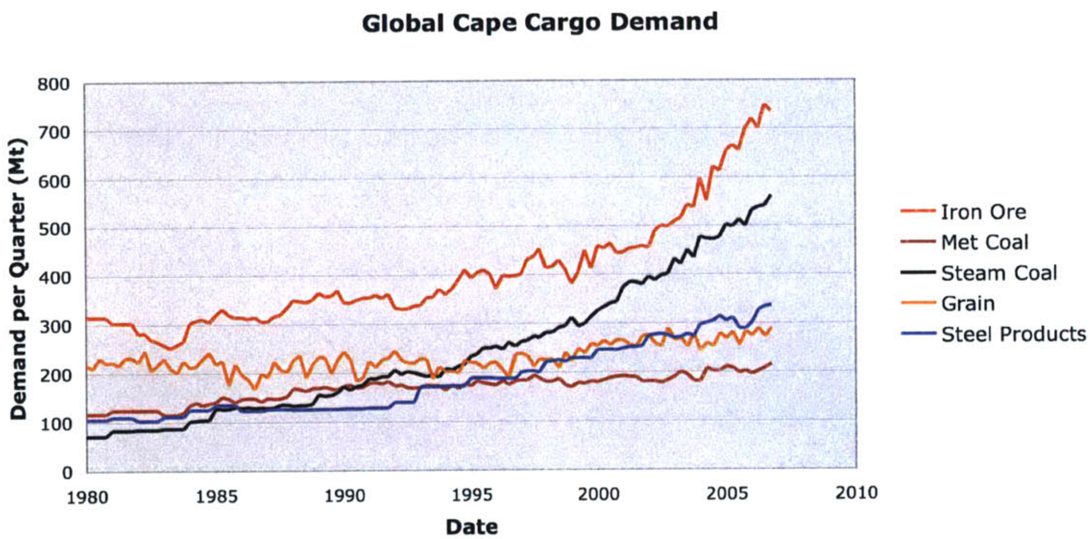

Fig 20: Global Demand for Cape Cargos and Steel – using data from [Marsoft 2007a]

As shown in Fig 19 and Fig 20, there has been a steady increase in demand for all cargos transported by capes, particularly steam coal and iron ore. Fig 21 shows how the world consumption of steel and steam coal has increased since the 1990s and how it is expected to increase until 2015.

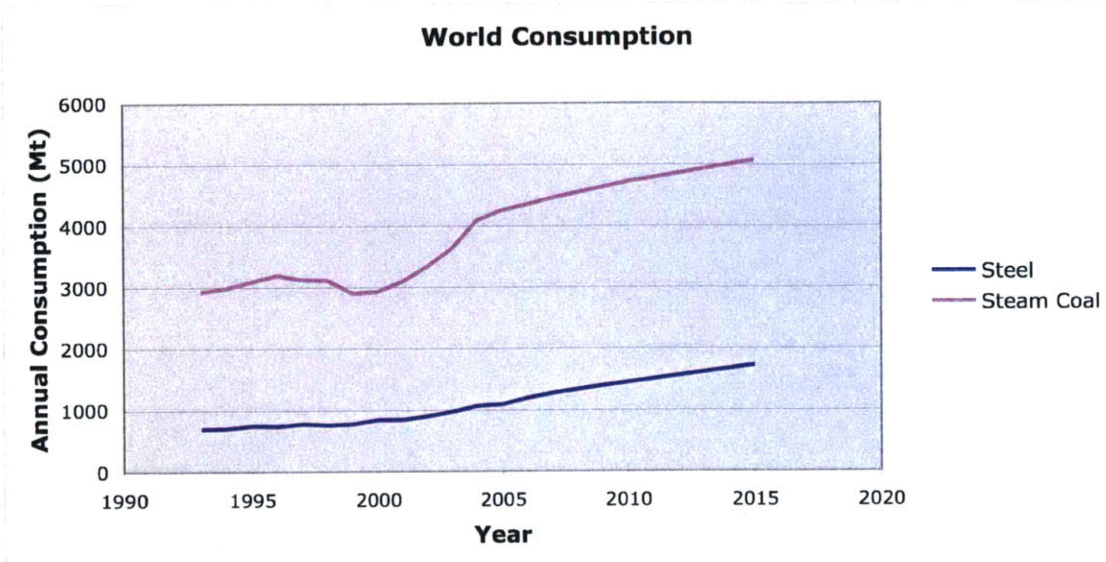

Fig 21: World Consumption of Steel and Steam Coal using data from [Braemar 2007a]

These projections suggest a very high demand for dry bulk shipping, particularly for capes over the next ten years. According to current data, iron ore trade is expected to grow by 5% to 10% per year and dry bulk trade is expected to grow by at least 3% per year until 2015 while China and India are the biggest drivers of the market [Braemar 2007c]. China actually accounts for about one third of global iron ore imports and over a quarter of the world's steel production [UNCTAD 2005]

2.3 Iron Ore

Iron ore transportation has been increasing steadily over the past 10 years and the fraction transported by sea has increased substantially since 2000 as shown in Fig 22.

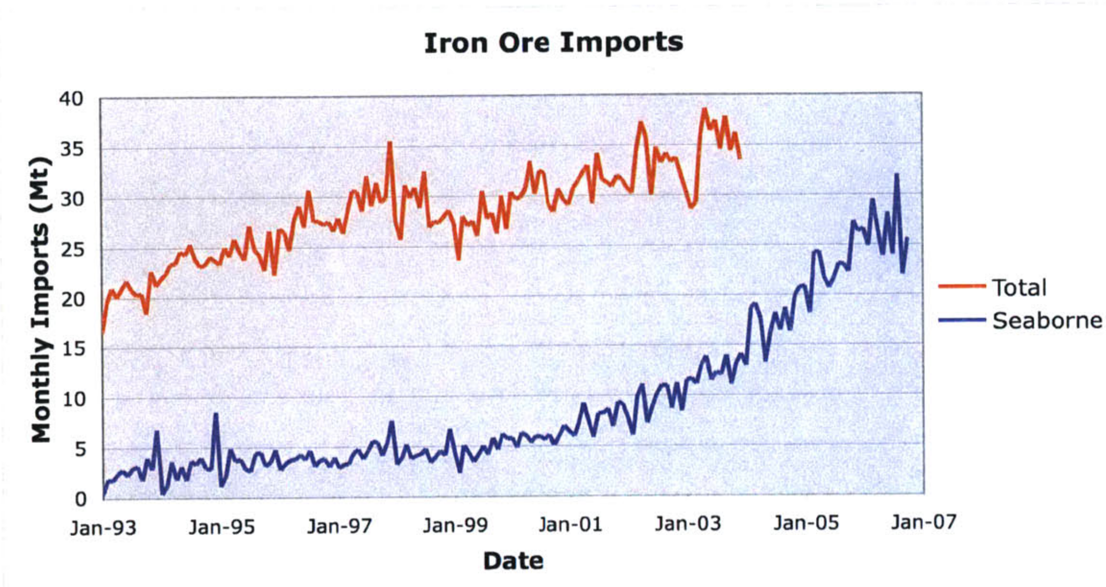

Fig 22: Total and Seaborne transportation of Iron Ore - using data from [Clarksons 2007a]

China's expansion since the start of the century is the driving force behind the great increase in demand for seaborne iron ore that has led dry bulk freight rates to unsurpassed values over the past few years. This is clearly demonstrated in Fig 23, which shows the annual imports by the largest importers and the world total since 1980.

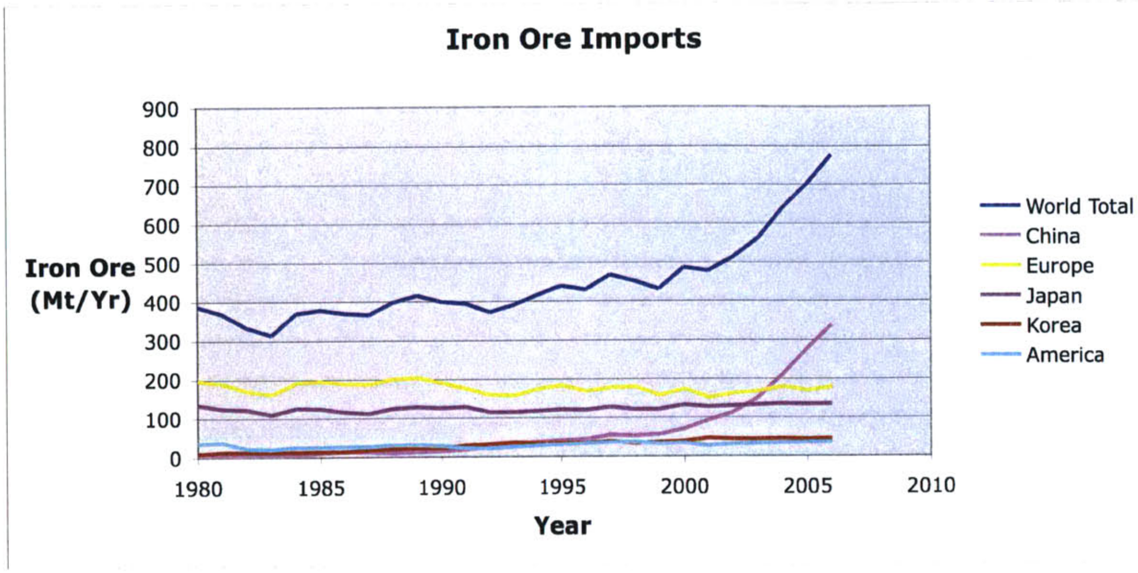

Fig 23: Annual Iron Ore Imports of today's 5 Largest Importers and the World Total Since 1980 using data from [SSY 2006a & SSY 2006c]

The largest importer in Europe is by far Germany (Rotterdam), followed by France, Italy and the UK [SSY 2006a]. Fig 24 shows the annual exports by the largest exporters and the world total since 1980.

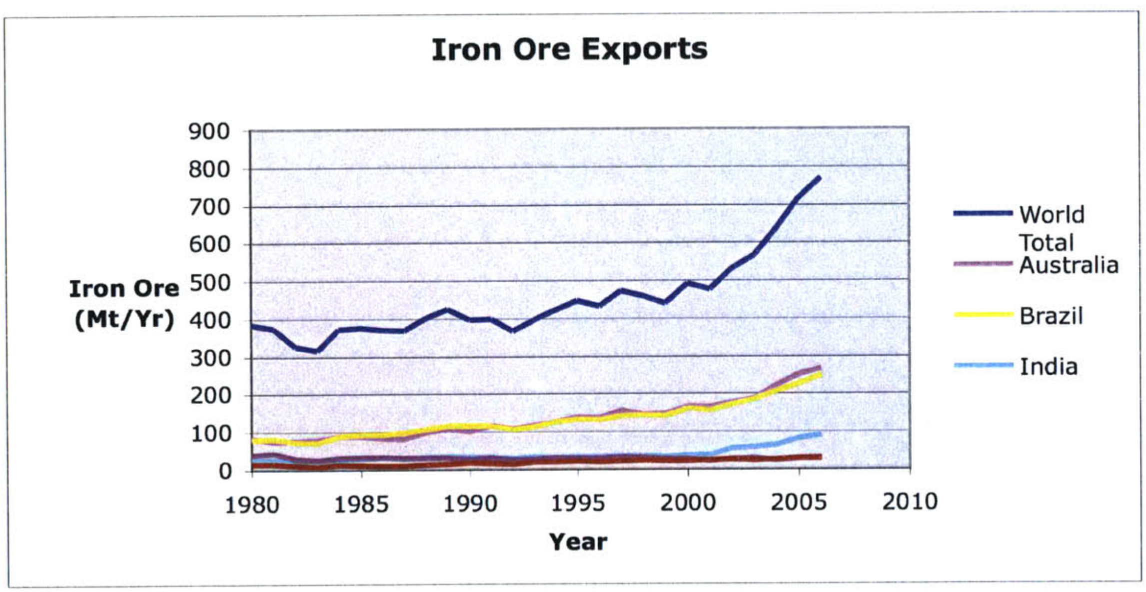

Fig 24: Annual Iron Ore Exports of today's 5 Largest Exporters and the World Total Since 1980 - using data from [SSY 2006a & SSY 2006c]

Fig 25 shows the monthly imports of the world's greatest importer since 2002, just before the start of the ongoing shipping boom. Fig 26 shows China's monthly imports for each year since 2004 superimposed on the same graph.

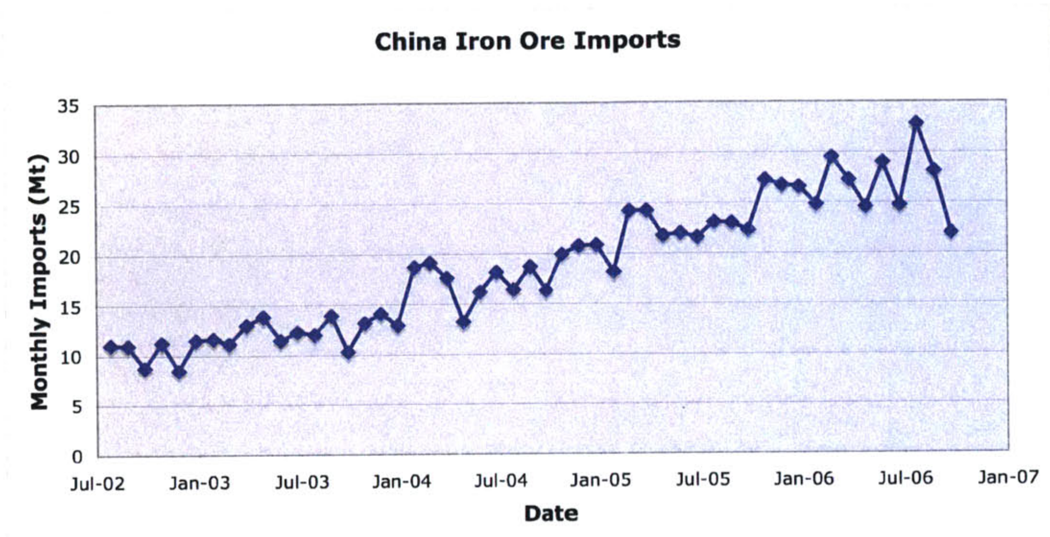

Fig 25: Iron Ore Imports by the World's Geatest Importer since 2000 – Using data from [Doll 2006 & Braemar 2006]

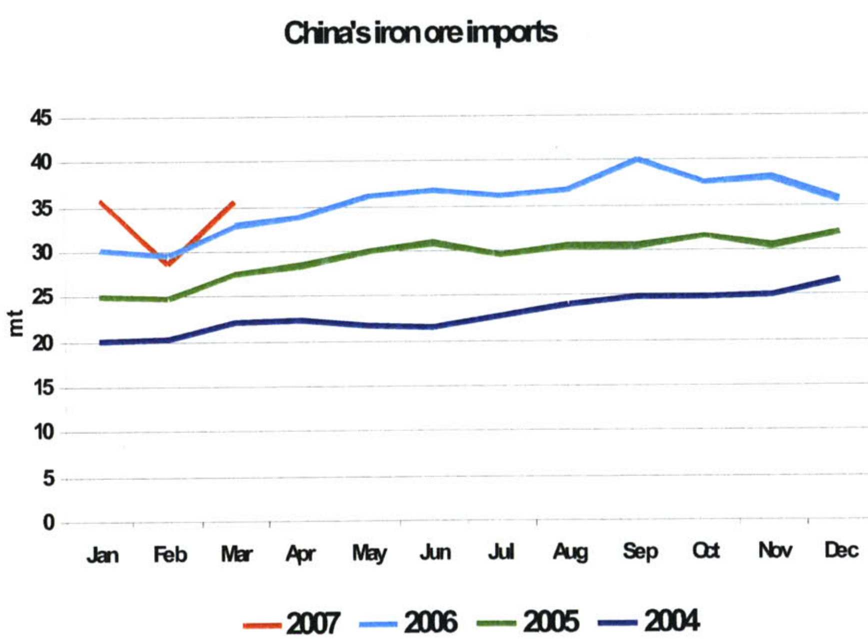

Fig 26: China's Monthly Iron Ore Imports Each Year Since 2004 [Clarksons 2007b]

Besides importing, China's internal output of iron ore has also increased significantly to facilitate its rapid expansion. Fig 27 shows the Chinese annual iron ore output and imports along with projections until 2010 and the equivalent number of additional capes required in the world fleet to meet the demand.

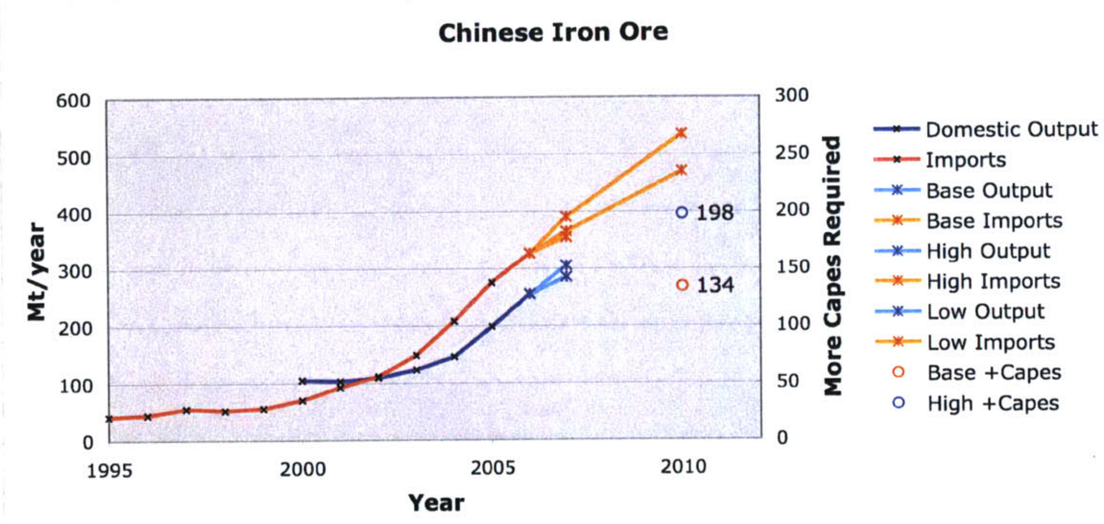

Fig 27: Chinese Output and Imports of Iron Ore with Projections until 2010 and Estimated Additional Capes Required – using data from [SSY 2007a]

Based on simple calculations, an additional 134 to 198 capes will be required to meet the Chinese demand for iron ore imports in 2010 according to the projections. Chinese iron ore is of low Fe-content and its production costs are about 45 - 60 $/ton. This is high enough to justify the imports from Brazil and Australia who are producing at a cost of 10 - 15 $/ton [Carksons 2006b].

Domestic Chinese production is expected to peak at about 550Mt [Carksons 2006b]. Pig iron and steel production are increasing while stocks will be required for a better negotiation base for next year so imports are expected to increase substantially. Port stocks are currently 40Mt and the capacity is 60.5Mt [Clarksons 2006b]. Fig 28 shows China's iron ore imports by country along with projections until 2015 by *Braemar Seascope Ltd.*

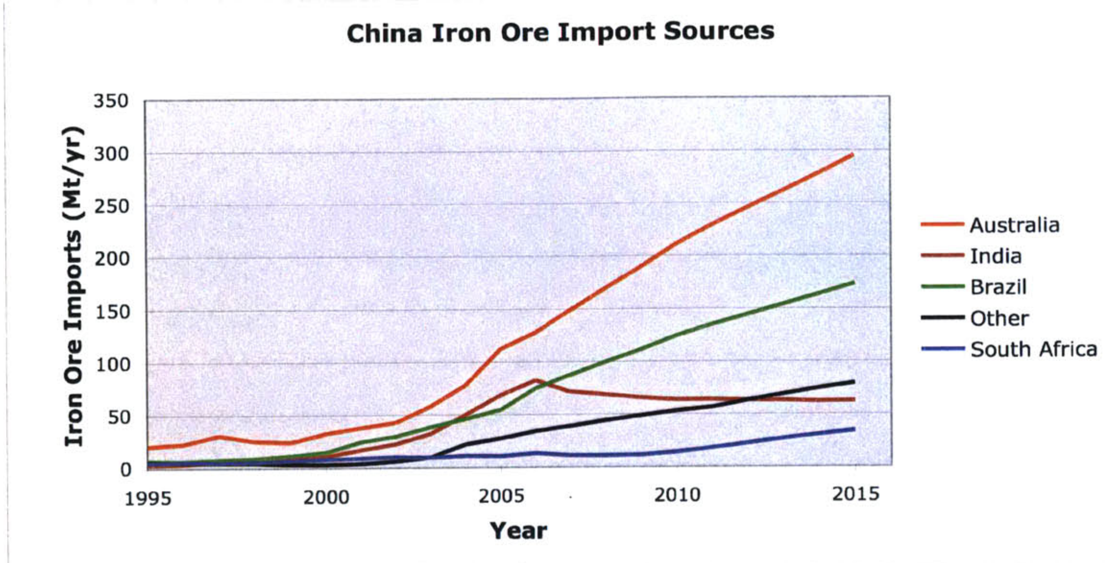

Fig 28: Chinese Iron Ore Imports by Country – using data from [Braemar 2007a]

Brazilian Iron Ore is of a higher grade than the Australian and is therefore more desirable. The China - Brazil trade is also better for Capesize demand as the Iron Ore is imported over a longer distance. Most of Indian iron ore is on spot and fluctuates according to competitiveness with Chinese prices. It also competes with domestic needs and its exports are declining due to internal consumption. It is relatively cheaper for China to import from India than Brazil but India is finding it difficult to get this trade because of fixed contracts with Brazil.

The demand for marine transportation of iron ore is forecasted to keep increasing for a number of years as illustrated in Fig 29. China is expected to continue expansion throughout the current decade and other countries such as India or Brazil are expected to follow and gradually become importers. Demand may therefore remain at high levels for a number of years.

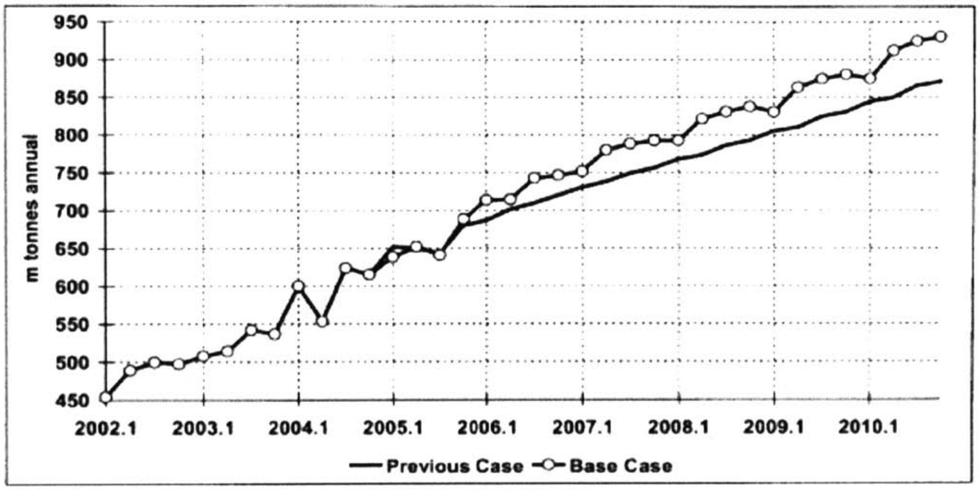

Fig 29: Total Global Iron ore Imports for the Current Decade [Marsoft 2006]

3.4 Coal

Unlike iron ore, which is transported primarily in capes and the larger specialized ore carriers, coal is also transported in smaller bulkers. Fig 30 shows the share of each bulk carrier size group in the transportation of coal.

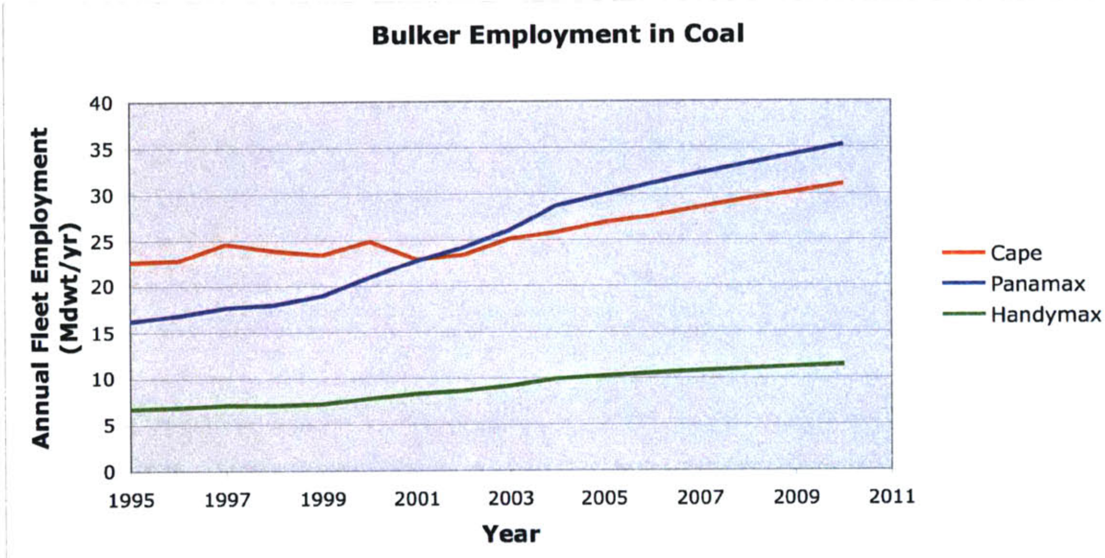

Fig 30 Coal Transportation by Bulk Carrier Type with projections - using data from [Braemar 2007a]

The amount of coal transported is increasing steadily and this is expected to continue for all bulk carrier types. The increasing demand for steel creates demand for the transportation of metallurgical coal, which is required for its production. Meanwhile, power plants around the world are converting to coal because of the high oil prices. This creates demand for the transportation of steam coal. Fig 31 shows the monthly imports of the major coal importers and fig 32 shows the monthly exports of the major exporters since the early 1990s.

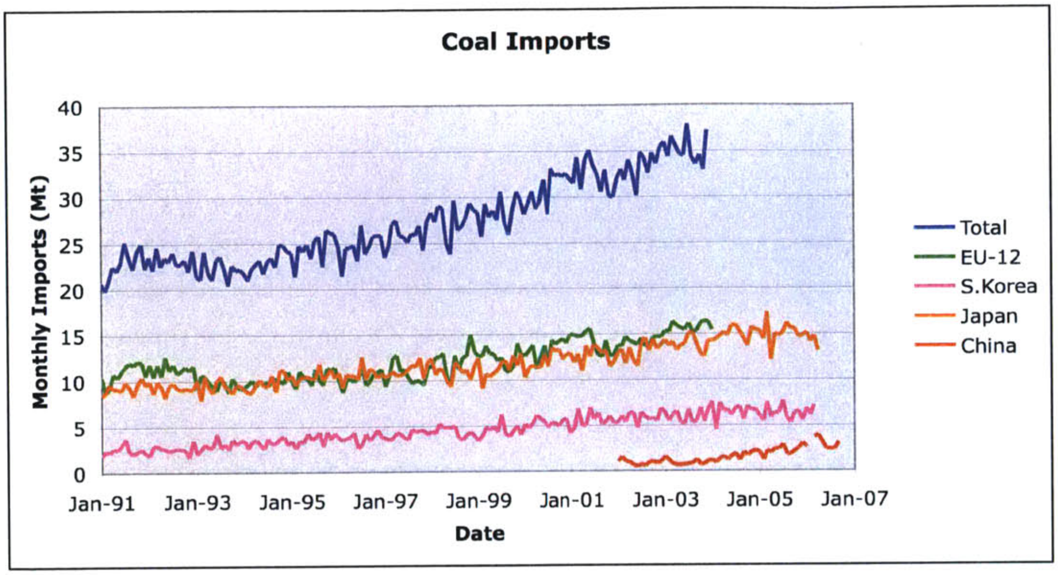

Fig 31: Imports by the Major Coal Importers – using data from [Clarksons 2007a]

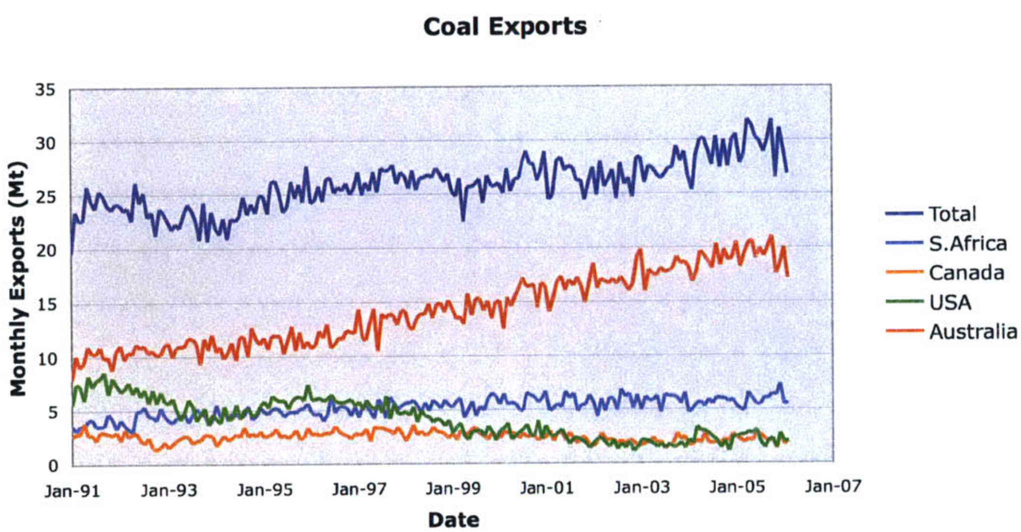

Fig 32: Exports by the Major Coal Exporters – using data from [Clarksons 2007a]

Though China appears not to be playing a significant role in the coal trade, quite the opposite is actually happening. Its annual coal production is about 1bn tonnes and most of it is consumed internally. Chinese coal trade balances however have a big impact on the market. Fig 33 shows China's imports and exports of coal since the start of the shipping boom in autumn 2003.

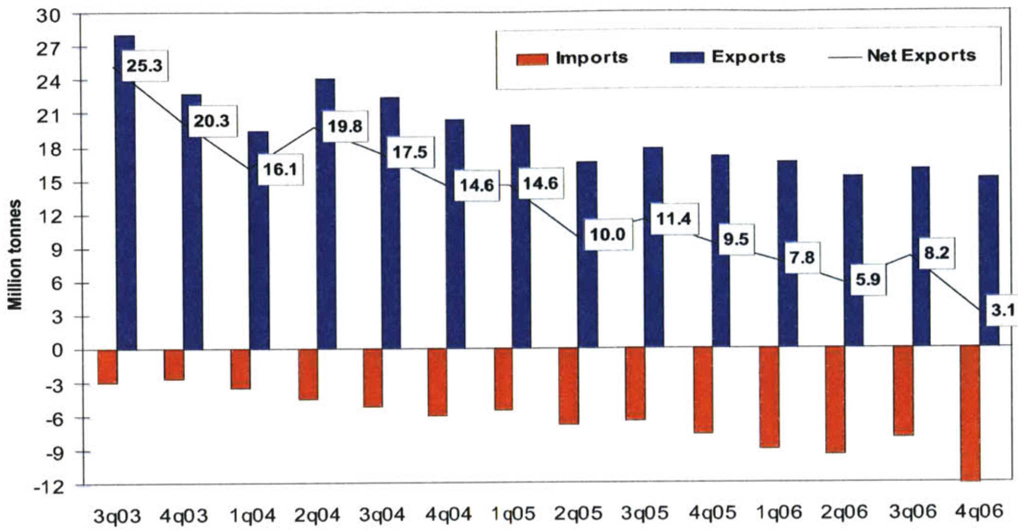

Fig 33: China's Coal Imports and Exports since 2003Q3 [SSY 2007b]

China used to export to nearby countries but is increasingly consuming its produce and becoming an importer. This has caused other countries to go to Australia for imports leading to high congestion levels in Australian coal ports. This is currently the most important factor responsible for the very high temporary charter rates.

The steady decrease in Chinese coal exports, is clear in Fig 34, which shows the Chinese dry exports since 2002. The increase in steel exports is also evident.

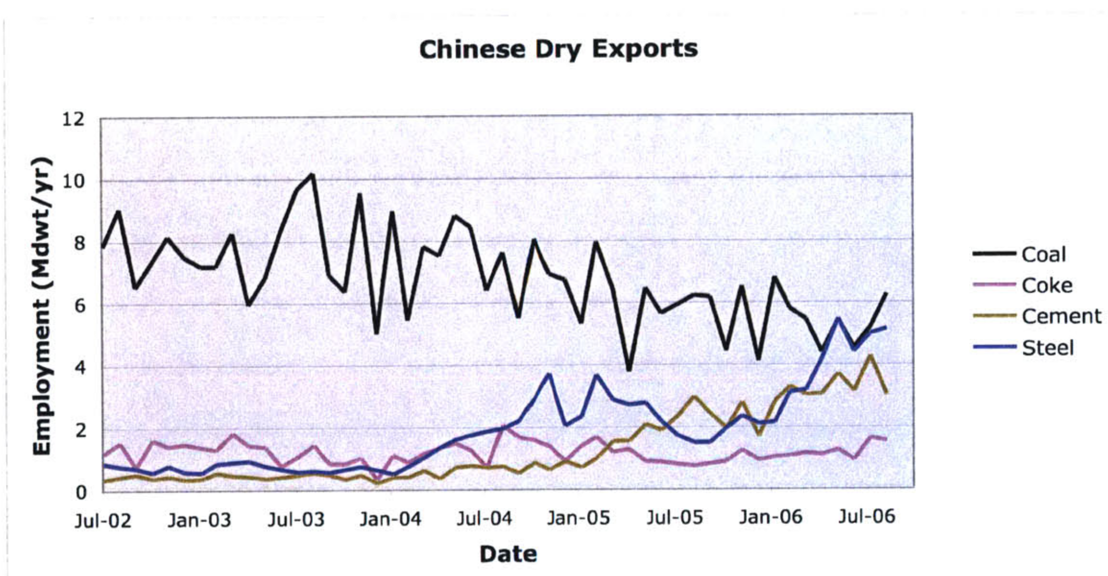

Fig 34: Chinese Dry Exports since 2002 – using data from [Braemar 2007a]

2.5 Steel

Though capes do not transport steel per se, its high demand has resulted in growing trade of steel-making raw materials and this has had a big impact on the cape market. The strong increase in steel production led to increased iron ore imports in 2006 and steel is expected to continue to drive the market over the next few years. Fig 35 shows the monthly production of the major steel producers since the early 1990s along with the steel trade weighted index.

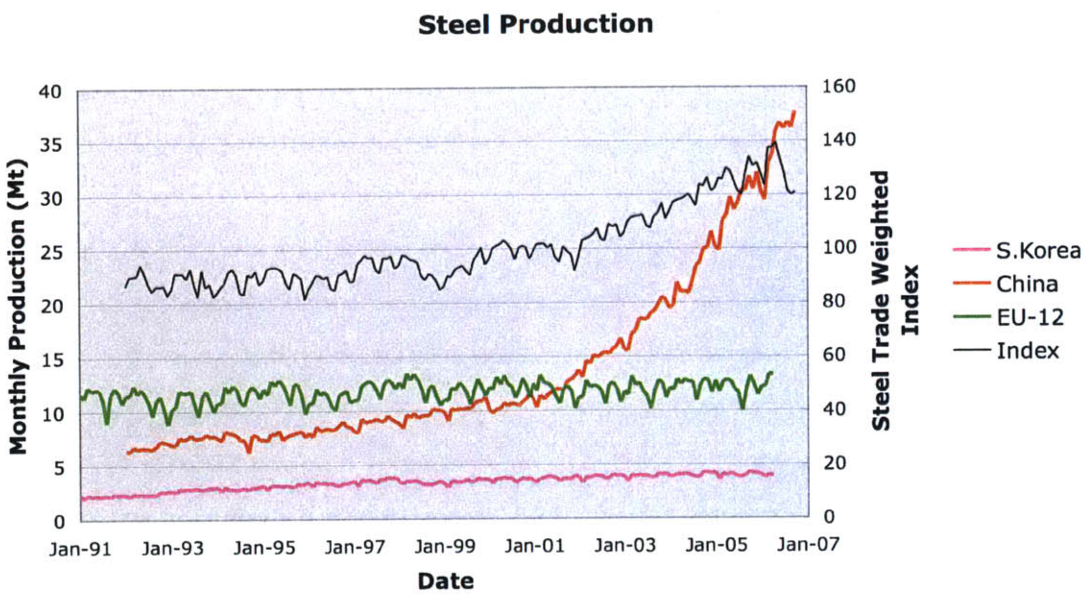

Fig 35: Steel Production by the Major Steel Producers – using data from [Clarksons 2007a]

As shown in Fig 36, China is responsible for the increase in global steel production since 2002 and is expected to be the driver well into the future according to current projections.

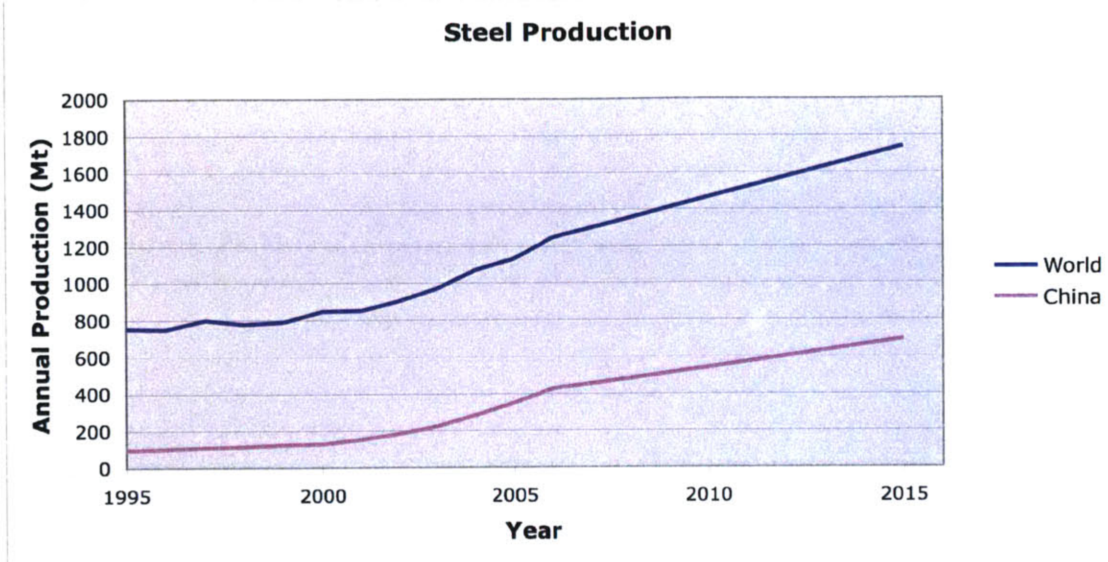

Fig 36: Global and Chinese Steel Production – using data from [Braemar 2007a]

China currently accounts for 8.9% of steel output for the international market [Clarksons 2007b]. A large amount of its steel production is also consumed internally. Fig 37 shows the amount of steel used domestically and that which is exported from China each year since 2001.

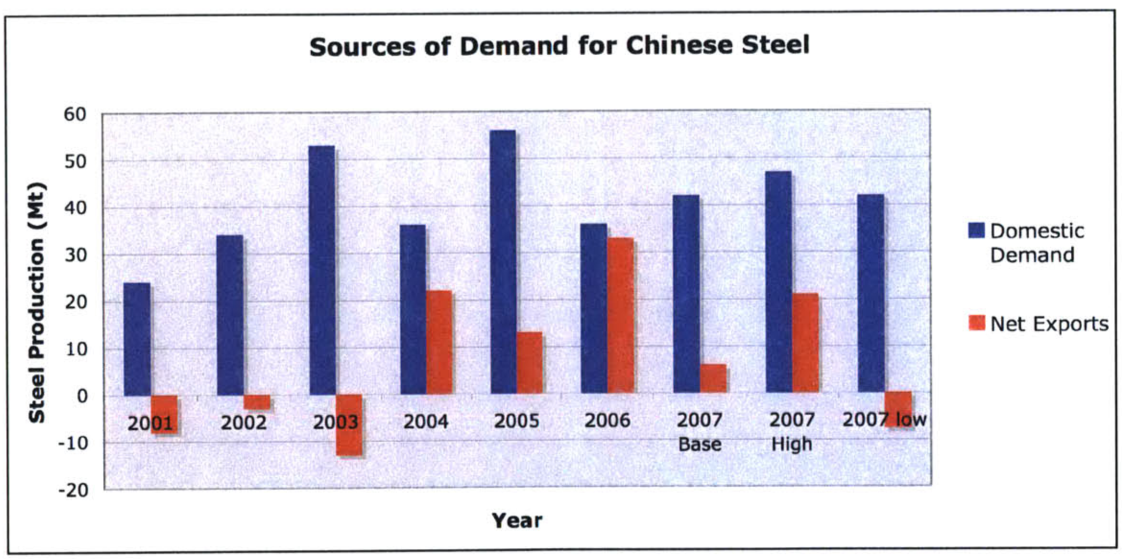

Fig 37: Sources of Demand for Chinese Steel Production – using data from [SSY 2007a]

It is clear from Fig 37 that Chinese steel production depends heavily on both the internal and the global markets. Fig 38 shows the annual percentage growth in China's domestic steel demand and steel exports along with base, high and low scenario projections by *SSY Shipbrokers Ltd*

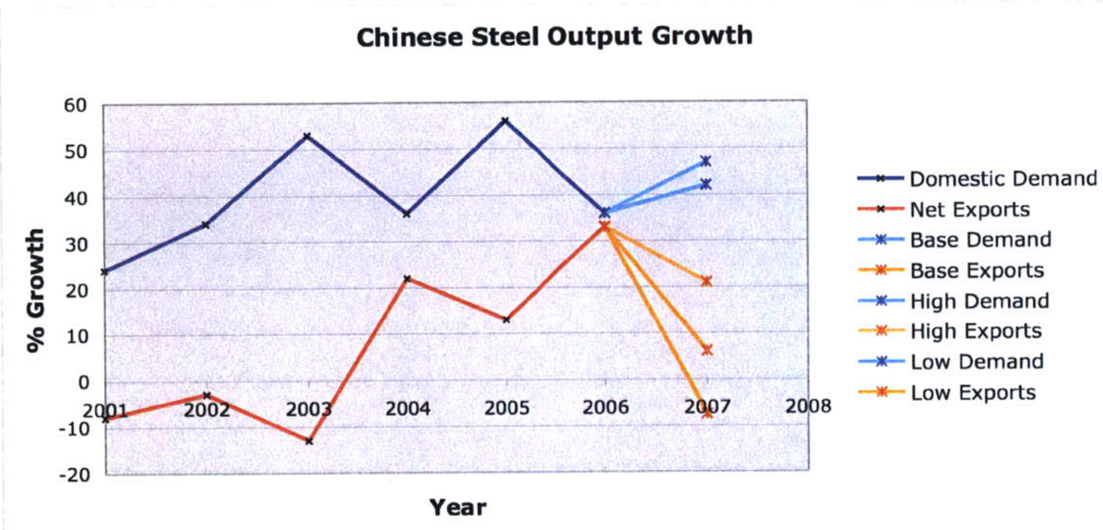

Fig 38: Chinese Steel Demand and Export Growth – using data from [SSY 2007a]

China's steel consumption per capita is much higher in the coastal regions, but the average is 269kg/capita, which is low relative to its neighbors [Clarksons 2006b]. The same applies to India. Fig 39 shows the consumption per capita and the population of various countries including China and India.

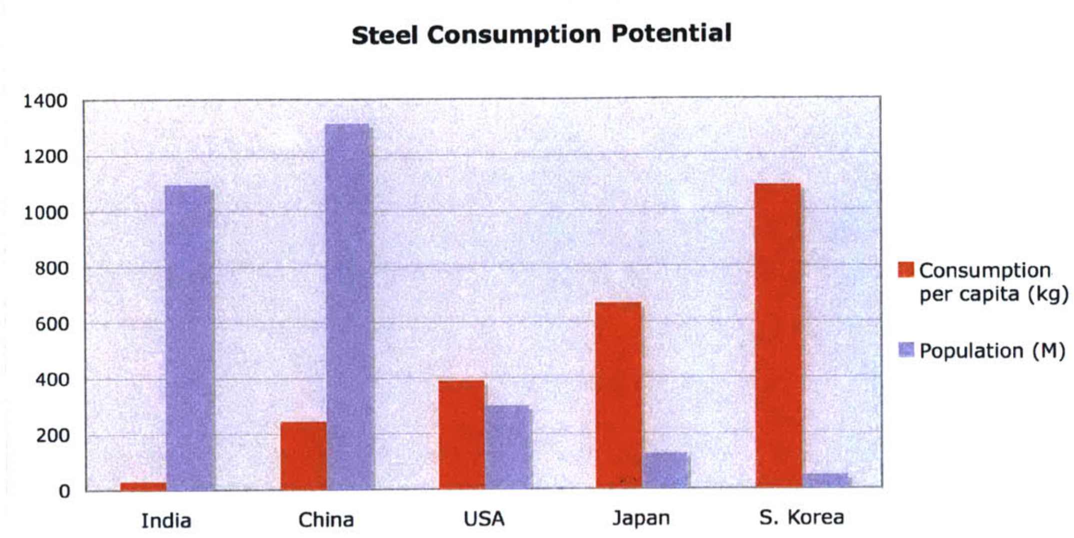

Fig 39: Steel Consumption Potential – using data from [Braemar 2007a]

The big difference in consumption per capita of China and India with the other countries, combined with their high population indicates that there is potential for very high demand for steel as they develop and catch up (in consumption per capita). Fig 40 shows previous trends and current projections of steel consumption per capita and population for China and India until 2015.

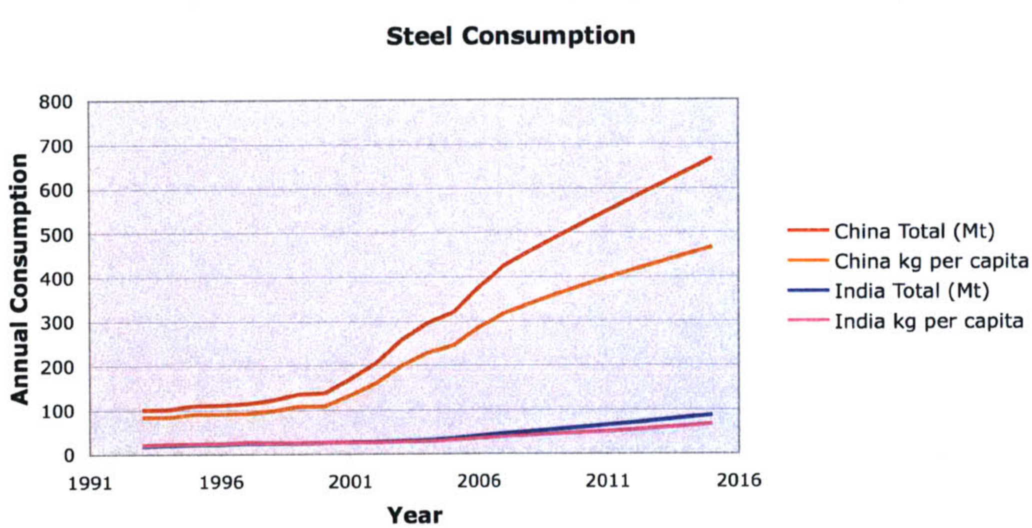

Fig 40: Chinese and Indian Consumption per Capita and Population Trends – Using data from [Braemar 2007a]

According to the National Development and Reform Commission of China the domestic steel product consumption will increase by 10% up from last years 9.8%. Table 1 shows the steel demand for 2006 and estimates for 2007 by the International Iron and Steel Institute (IISI). A growth of 5.2% is expected, which is mainly driven by China, as it would only be 2.5% if China were excluded.

IISI Steel Demand Estimates			
	2006	2007	Increase
China (Mt)	374	413	39
Asia – Other (Mt)	239	248	9
Europe (Mt)	204	204	0
Nafta (Mt)	152	151	-1
FSU (Mt)	47	51	4
RoW (Mt)	105	112	7
Total (Mt)	1121	1179	58
Growth (%)	8.9	5.2	
Growth ex China (%)	6.4	2.5	

Table 1: IISI steel demand estimates for 2007 [Reuters 2007]

Until 2003, Japan was very steel intensive and therefore the Japan steel plate price has been a key figure for the shipping market with implications on demand and newbuilding prices. Fig 41 shows how this has varied since the end of the 1990s.

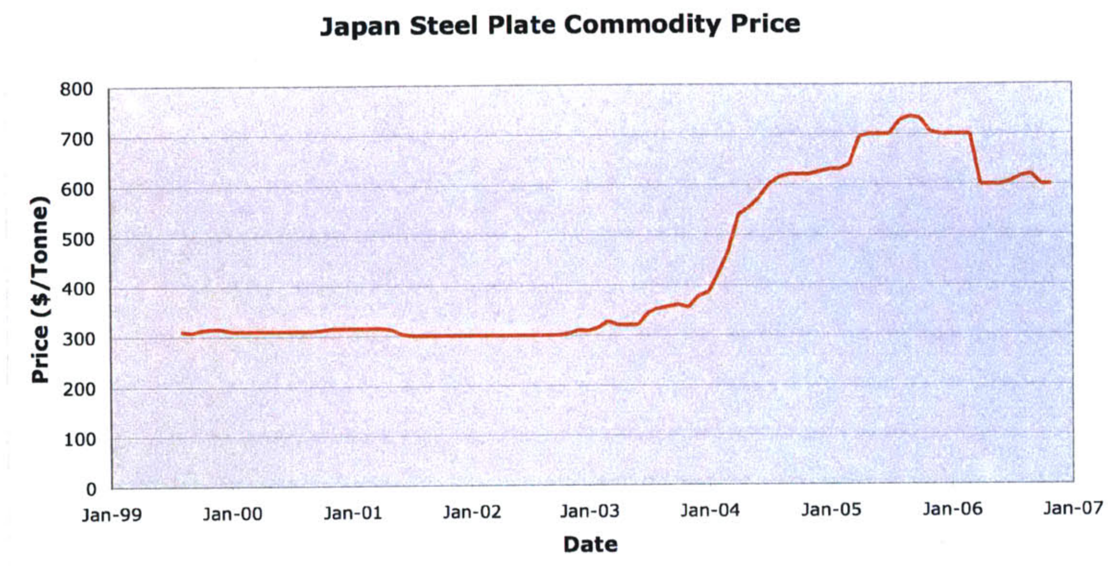

Fig 41: Japan Steel Plate Commodity Price – using data from [Clarksons 2007a]

High steel price implies a high market for two reasons. High steel price is the result of high demand for steel, which translates to a high freight market. Furthermore, when steel is expensive, newbuildings are expensive and therefore ship values are high.

2.6 Conclusions

- GDP growth has a disproportionate effect on dry bulk shipping and this explains why China and India are the drivers of the current market. There is also high potential for future steel demand by both.
- The weak $ and low interest rates are helping the market to stay strong
- Chinese iron ore demand is the key indicator of the freight market
- China is gradually becoming a coal importer and its exports are decreasing while coastal coal movements were high in 2006. This led to increased demand for Australian coal with serious implications on port congestion.
- India's increasing coal/grain imports and steel/iron ore exports have a strong positive effect on the market
- World steel demand grew rapidly in 2006 creating import demand for raw materials. This led to very high freight rates. Steel production is expected to increase, supporting iron ore import growth despite further increases in supply of low-grade Chinese iron ore.
- Chinese steel production growth in 2006 was powered by domestic demand (+36 Mt) and net exports (+33 Mt). The future Chinese steel output (& iron ore imports) therefore depends on global as well as domestic markets.
- The world economy should be strong enough in 2007 to deliver healthy growth in steel and energy demand and thereby creating a strong demand for capes

3. Supply

3.1 Supply and its Elasticity

Supply is limited by the capacity of the shipyards. It takes several months to construct a newbuilding vessel, during which the ship is mainly in block stage, while the berth is occupied for just two months. The limited number of berths combined with a high and increasing demand as that of today however, can lead to high prices and delivery times ranging to a couple of years. The next berth today for example is only available in 2010 / 2011. This constraint makes supply very inelastic in the short run.

Distance between the location of ships and the ports where they are needed has a similar effect. The number of ships that can arrive at a given location, or in other words supply at that location, increases with time. Unexpected accidents or events that affect supply locally can have a dramatic impact on prices, which further emphasizes the inelasticity of supply in the short run. In 2005 for example, VLCC rates exceeded $200k/day for about a week due to a Suez grounding. Ship owners on the other hand, are faced with a number of alternatives such as coal or grain trades so the quantity of ships available for trading iron ore will decrease substantially following a decrease in iron ore freight rates. This increases price elasticity of supply.

3.2 Capesize Fleet, Scrapping and Newbuildings

The supply of ships is controlled through ordering and scrapping of vessels. Following the increase in demand over the past several decades, supply has adjusted and the world fleet of capes has increased steadily since their development in the late 1960s as illustrated in Fig 42. Deliveries, demolitions and losses per month are shown as bars whose value is read from the left axis while the resulting fleet size is shown as a line whose value is indicated on the right axis. A similar graph in terms of total deadweight instead of number of vessels can be found in Appendix A.

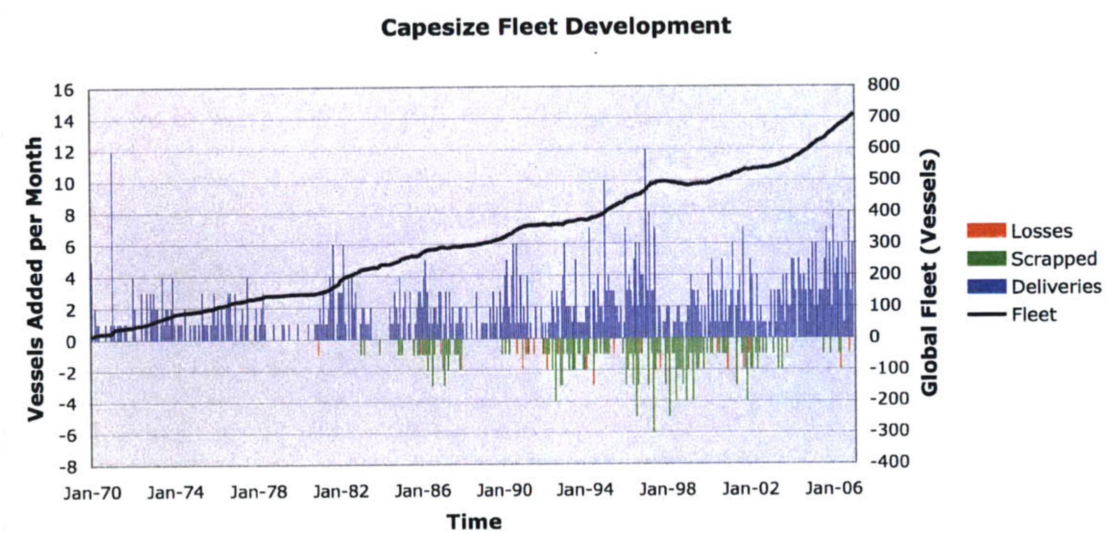

Fig 42: The *Capesize Fleet* Development since 1970 – using data from [Clarksons 2007a, Intercargo 2004, Lloyds 2003 & Intercargo 2002]

Scrapping was very low until the 1990s because the capesize fleet was still modern. Today, scrapping rates are again very low because of the very high freight rates since 2003. Fig 43 shows the net change is the capesize fleet over the past 10 years along with predictions until 2008.

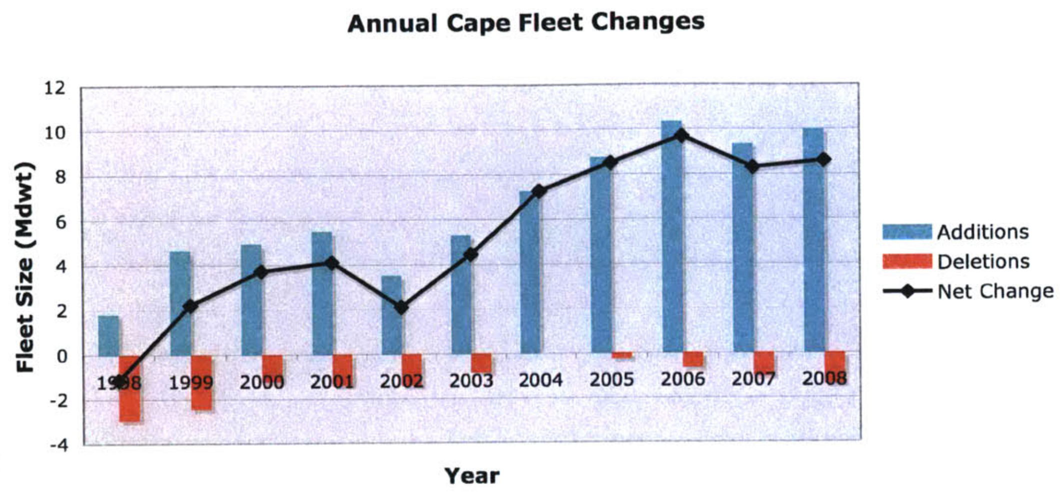

Fig 43: Net Change in Global Capesize Fleet since 1998 and Predictions to 2008 – Using data from [SSY 2007a]

Unlike deletions, which depend on the level of the market and other uncontrollable factors such as accidents, the number of additions over the next few years is relatively easier to predict. This is because the orderbook is almost full until the end of 2011 and only minor changes are expected. Fig 44 shows how the order book has varied over the past 10 years along with the number of contracts per month. This is also shown in terms of deadweight in Appendix A.

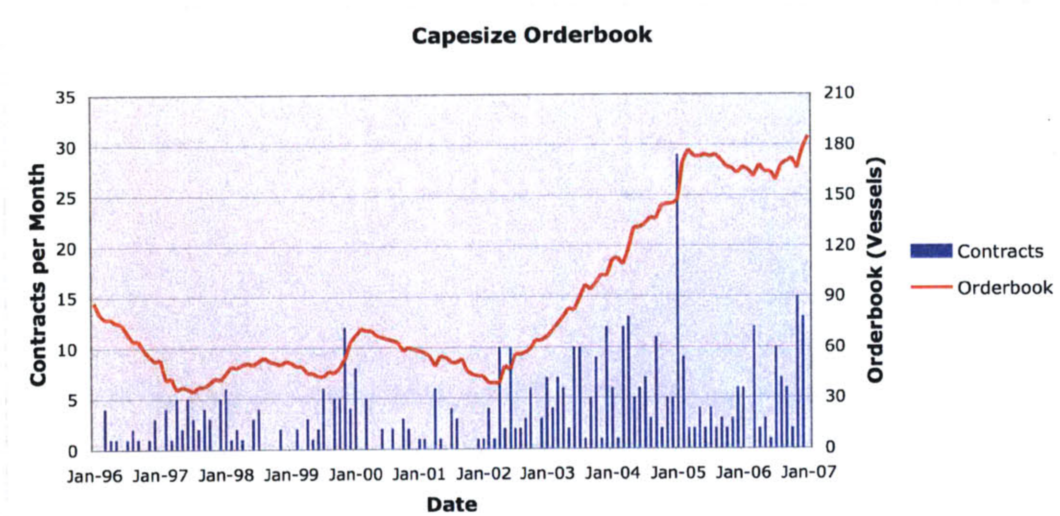

Fig 44: Capesize Orderbook and Monthly Contracts over the past 10 years – Using data from [Clarksons 2007a & Clarksons 2007c]

Clearly, the orderbook is currently at very high levels historically indicating that there will be a significant increase in supply over the next several years. Table 2 shows how cape newbuilding contracting currently compares with other ship types.

Newbuilding Contracting		
Ship Type	**Contracting in 2006 (Mdwt)**	**Increase since 2005 (Mdwt)**
All 10,000+ DWT Vessels		
Tankers	76.0	+44.2
Dry Bulk Carriers	36.0	+16.0
Containers	17.6	+0.2
Gas Carriers	5.4	-0.1
TOTAL	**135**	**+60.3**
Dry Bulk Carriers		
Capesize	15.0	+7.3
Panamax	7.9	+2.5
Handymax	8.7	+5.4
Handysize	4.5	+2.2
TOTAL	**36.1**	**+17.4**

Table 2: Newbuilding Contracts of 2006 and Change from 2005 for Main Ship Types – [LR Fairplay 2007]

As shown in Table 2, contracting of tankers is far higher than that of bulk carriers but it should be noted that the majority of those vessels are replacing single hull tankers that are being phased out. Capes account for over 40% of bulk carrier and over 10% of all 10,000+dwt vessel newbuilding contracts by dwt. Cape newbuilding contracts also increased since 2005 by more than all other dry bulk carrier types. Fig 45 shows the current orderbook compared to the existing fleet for capes of various sizes and for other dry bulk carrier types.

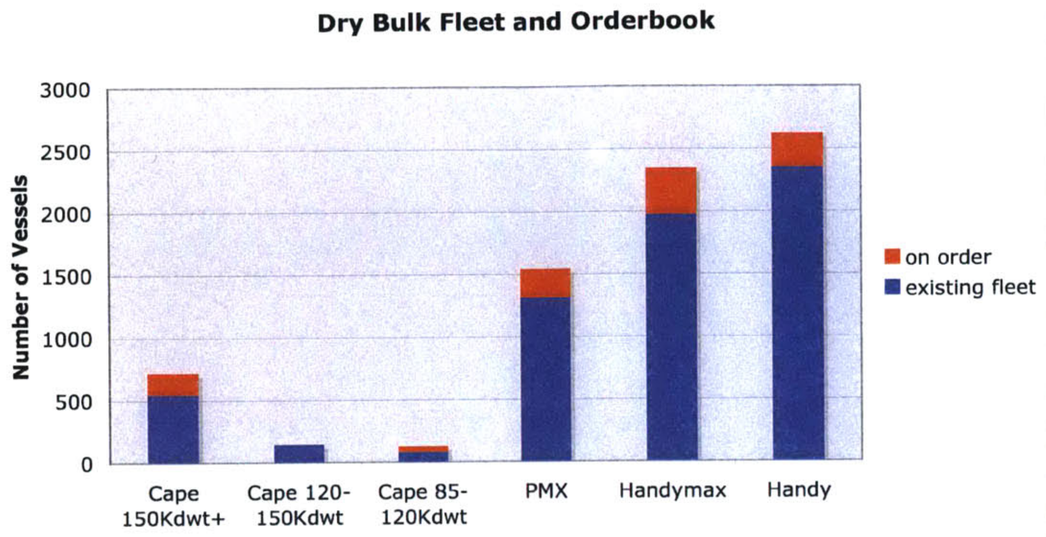

Fig 45: Existing Fleet and the Current Orderbook for Dry Bulk Cariers – using data from [Braemar 2007a]

It is clear from Fig 45 that the cape orderbook is relatively large compared to the existing fleet. Furthermore, it consists of relatively large vessels so the anticipated supply will have a big impact. Many of the 85-120Kdwt ships were ordered in response to the decision of widening the Panama Canal in 2014 so they can also be considered as modern panamaxes. Fig 46 shows the age distribution of the capesize fleet over 120Kdwt.

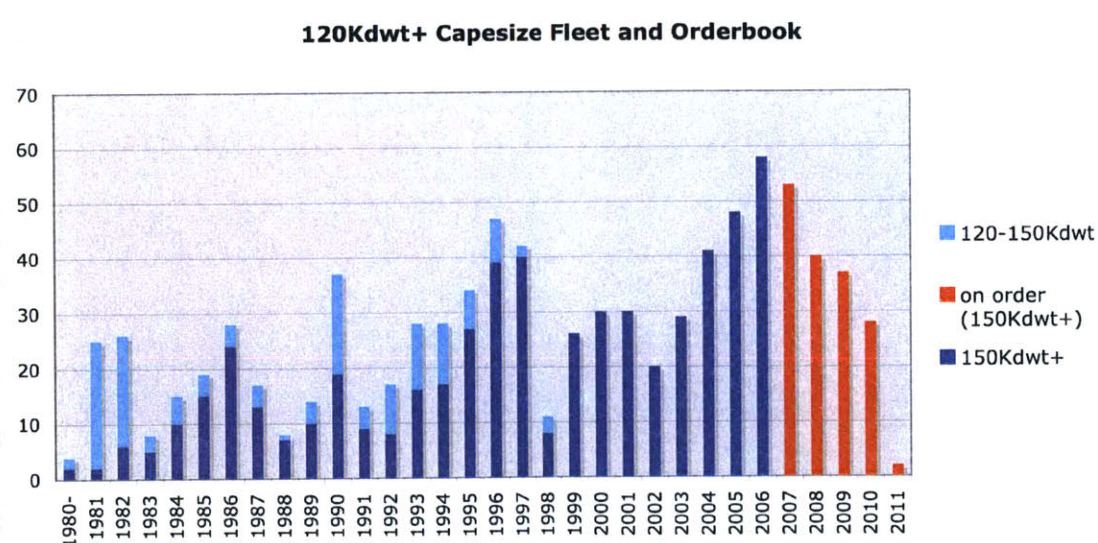

Fig 46: Capesize Fleet Age Distribution and Oderbook – using data from [Braemar 2007a]

Unlike the handy and handymax fleets, the capesize fleet is relatively modern with a decreasing average age, which is currently less than 10 years. All orders are currently over 150Kdwt with the typical size being about 180Kdwt. The modernity of the cape fleet compared to other dry bulk carriers is clear in Fig 47, which shows the orderbook and 20 and 25-year scrapping pool for the dry bulk carrier groups.

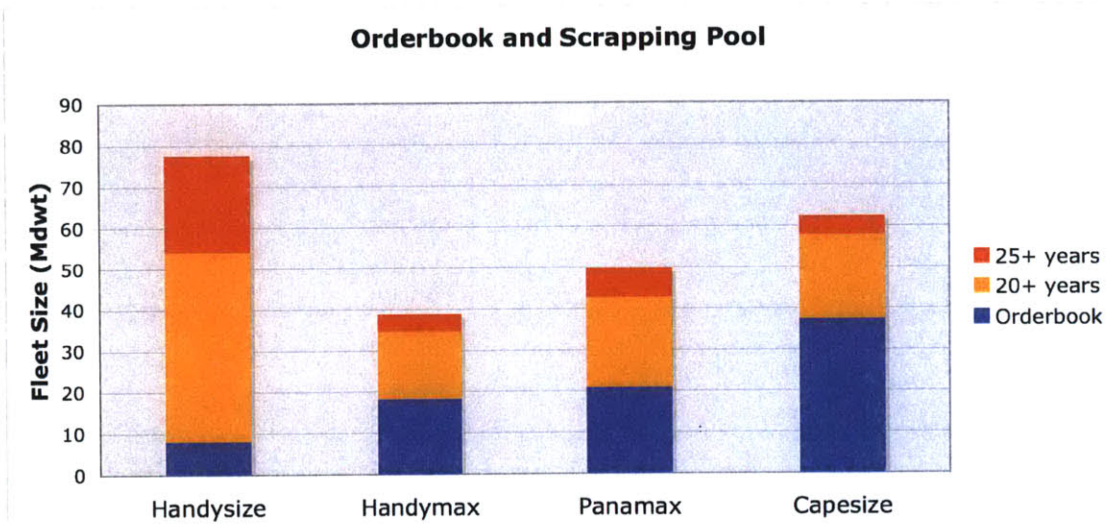

Fig 47: Orderbook along with 20 & 25-year Scrapping Pool for Bulk Carrier Groups – Using data from [SSY 2007a]

There are currently between 700 and 800 capes in the world fleet and approximately one cape per week is going to be delivered on average in 2007. Furthermore, the number of orders per month since the beginning of 2007 has been increasing along with the market and has been much higher than 2006 meaning that the orderbook is increasing. Table 3 shows the number of contracts per month for the various bulk carrier groups since January 2007.

2007 Newbuilding Contracts								
Month	**CAPE**		**PMX**		**HANDYMAX**		**DRY BULK**	
	No.	**KDwt**	**No.**	**KDwt**	**No.**	**KDwt**	**No.**	**KDwt**
Jan	10	1,673	18	443	27	3,830	64	6,494
Feb	20	3,732	21	579	46	1,248	93	5,679
Mar	41	7,293	7	1,768	22	2,614	74	11,875
Apr	33	6,084	5	1,404	67	1,475	125	9,239
Total	**104**	**18,718**	**51**	**4,194**	**162**	**9,167**	**356**	**33,286**

Table 3: Dry Bulk Carrier Newbuilding Contracts Since Jan-2007 – Using data from [SSY 2007a, Clarksons 2007a, Clarksons 2007c, Braemar 2007a]

There were only 2 demolitions in 2005 and another 2 demolitions and 2 losses in 2006. High demand for steel combined with minimal scrapping due to the high opportunity cost of the good market has led to record-high scrapping prices. A record-high price was set in October by a Bergen product tanker that was sold for $481/ltd [Lillestolen et al 2006]. Fig 48 shows the demolition prices in India and Bangladesh, where the vast majority of cape scrapping takes place, along with the average scrapping value of capesize bulk carriers.

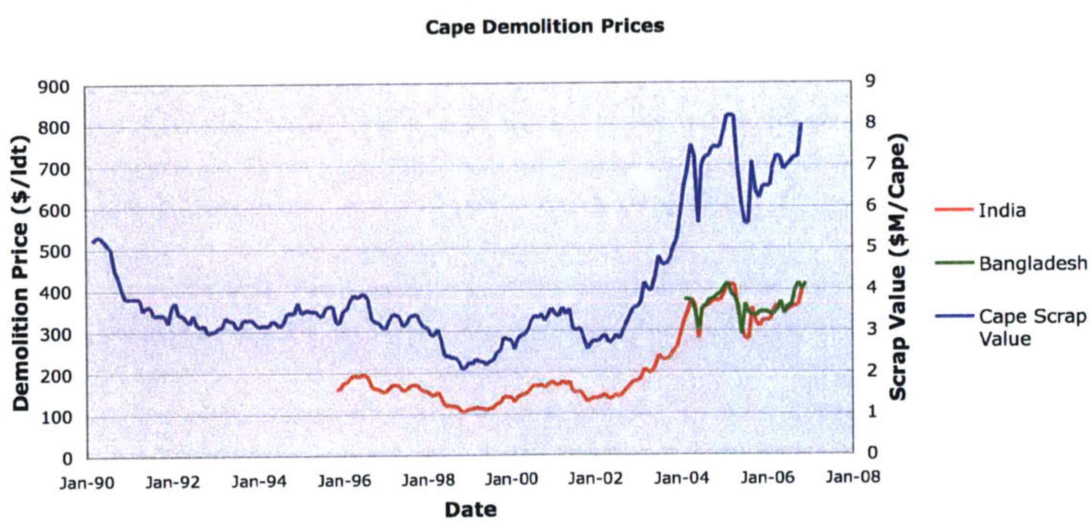

Fig 48: Demolition Prices and Average Cape Scrap Values – using data from [Clarksons 2007a]

Minimal scrapping due to high earnings along with the optimistic market outlook indicates that the scrapping pool is going to increase. Fig 49 shows projections of the scrapping pool for the various bulk carrier groups based on the current age distribution and the market outlook. A 23-year scrapping pool is chosen because that has been the average scrapping age over the past 30 years.

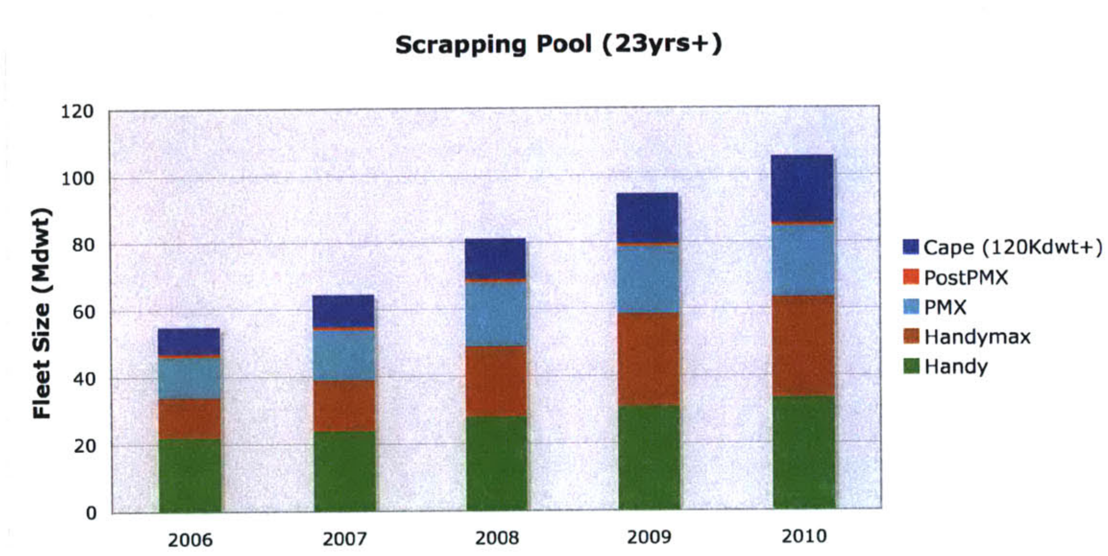

Fig 49: 23-year Scrapping Pool Projections for the Various Bulk Carriers – using data from [Braemar 2007a]

The scrapping pool is expected to increase substantially as long as the market remains firm. This is true for all bulk carriers but for the handymax fleet in particular as it is relatively old. A high scrapping pool means that if earnings decrease, old vessels will be scrapped which will help prevent a market crisis.

Historically, owners in the dry bulk industry order more ships as earnings increase and fewer when earnings are decreasing. As a result, the annual change in deliveries with time has been almost out of phase with the change in earnings as illustrated in Fig 50.

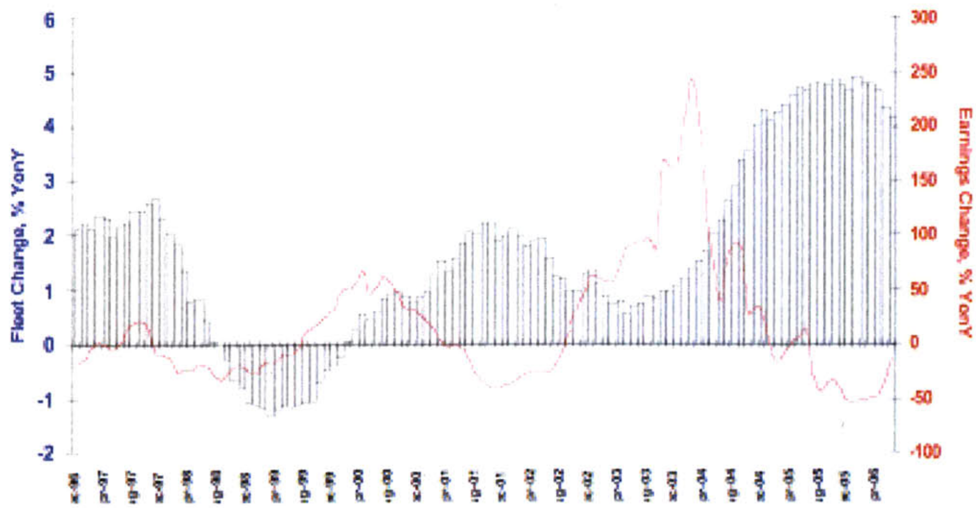

Fig 50: Out of Phase Annual Change in Fleet and Annual Change in Earnings [Clarksons 2006b]

By comparing Fig 44 with Fig 10, it is also observed that the capesize orderbook has been approximately in phase with the dry bulk market, which leads to the same conclusion. This results due to the rush of shipowners to order new vessels when the market is high, combined with the limited capacity of shipyards that makes supply inelastic in the short-run. The rush is similar for buyers in the secondhand market as shown in Fig 51, which indicates that cape sales volume is higher when ship prices are high. A similar graph with sales in terms of volume can be found in Appendix A.

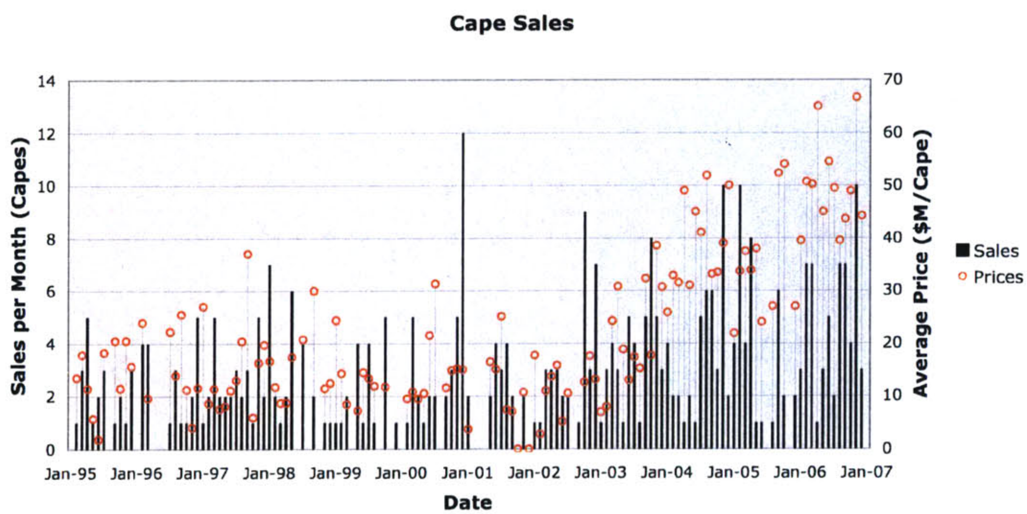

Fig 51: Cape Sales per Month and Average Sale Prices – using data from [Braemar 2007b, Tradewinds 2007, Vafias 2007, Levene 2006, Clarksons 2006a & Clarksons 2006c]

3.3 Shipyards

The vast majority of capes have been built in the Far East. Japan has always been the major supplier with numerous relatively small shipyards. Korea has had a strong presence for many years with few relatively large shipyards. Taiwan has also built a significant number of capes and China is currently emerging with shipyards of a wide range of experience and quality. Table 4 provides a summary of the number of shipyards of the existing capesize fleet and of the fleet on order for each country.

Capesize Fleet and Orders by Shipyard Country		
Country	**Number of Shipyards of Existing Capesize Fleet**	**Number of Shipyards with Capesize Orders**
Japan	22	7
Korea	6	3
China	3	5
Taiwan	2	1
Other	16	0
TOTAL	**49**	**16**

Table 4: Cape Shipyards of Each Country – using data from [LR 2007, Braemar 2007a, SSY 2007a, Clarksons 2007c]

As of the end of 2006, the existing fleet consisted of 711 capes and 185 capes on order. Fig 52 shows the distribution of the 711 existing capes amongst the 49 shipyards that built them.

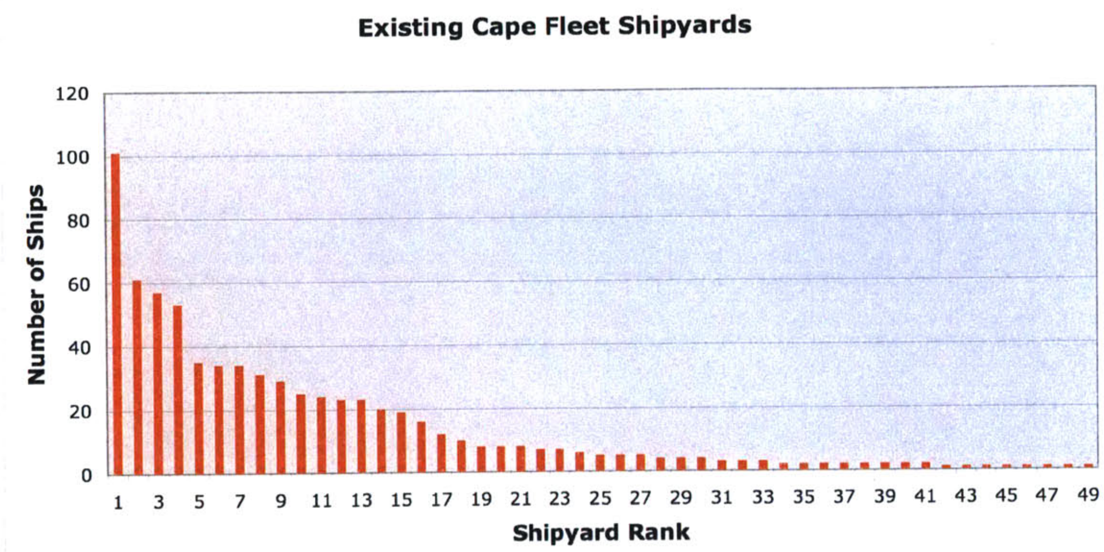

Fig 52: Capesize Fleet Distribution Amongst Shipyards – using data from [LR 2007, SSY 2007a, Clarksons 2007a]

Korea-Ulsan based Hyundai Heavy Industries (H.H.I.), which is the largest shipyard in the world, has built 101 of the 711 capes. As shown in Fig 52, it is significantly larger than any other shipyard in its share of the existing capesize fleet. Fig 53 shows the number of capes of the existing fleet by shipbuilding country.

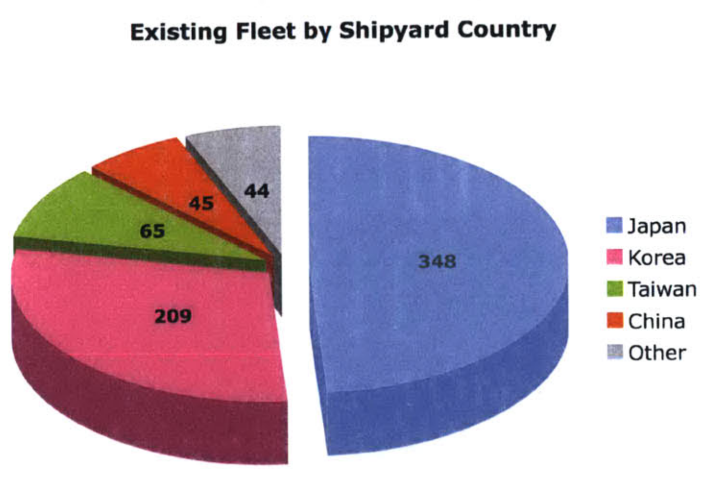

Fig 53: Capesize Fleet Distribution Amongst Countries – using data from [LR 2007, SSY 2007a, Clarksons 2007a]

The dominance of Japanese and Korean capes in the existing fleet while only 44 vessels have been built in 16 yards in 10 other countries that are not in the Far East. The next largest country in its share of the existing capesize fleet after China is Italy with a total of 8 capes, followed by Rumania and Brazil with 7 each. Fig 54 shows the distribution of the 185 capes on order amongst their 16 shipyards.

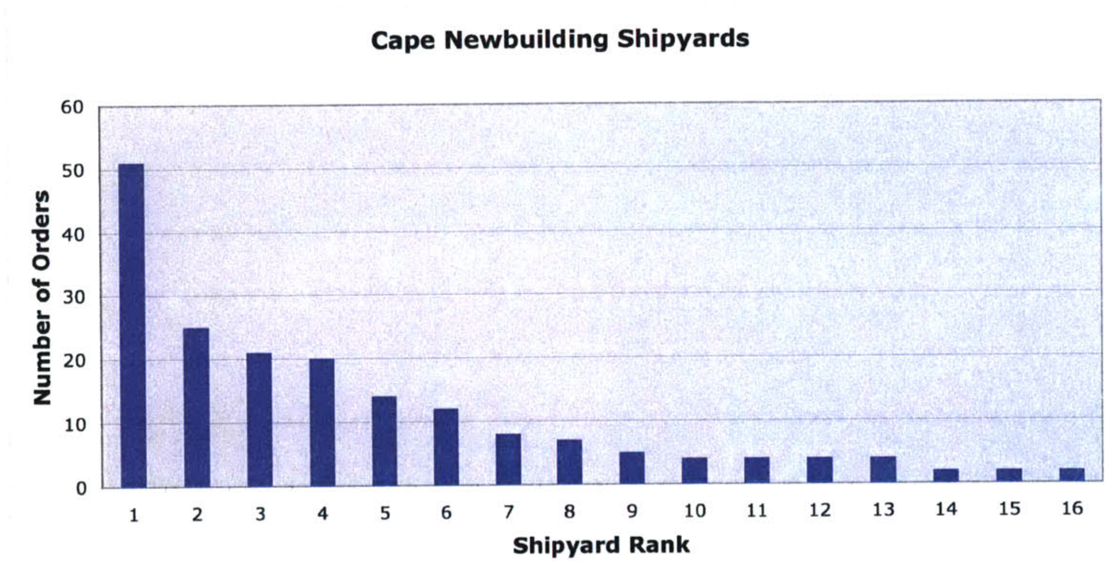

Fig 54: Capesize Orderbook Distribution Amongst Shipyards – using data from [Braemar 2007a, SSY 2007a, Clarksons 2007c]

China-Shanghai based Waigaoqiao S/Y (SWS) is by far the largest shipyard in the world in terms of current capesize orders with an orderbook of 51 capes out of the 185. Being the most experienced, it is also generally the most preferred shipyard out of the ones in China and is relatively more expensive. Fig 55 shows the number of capes on order by shipbuilding country.

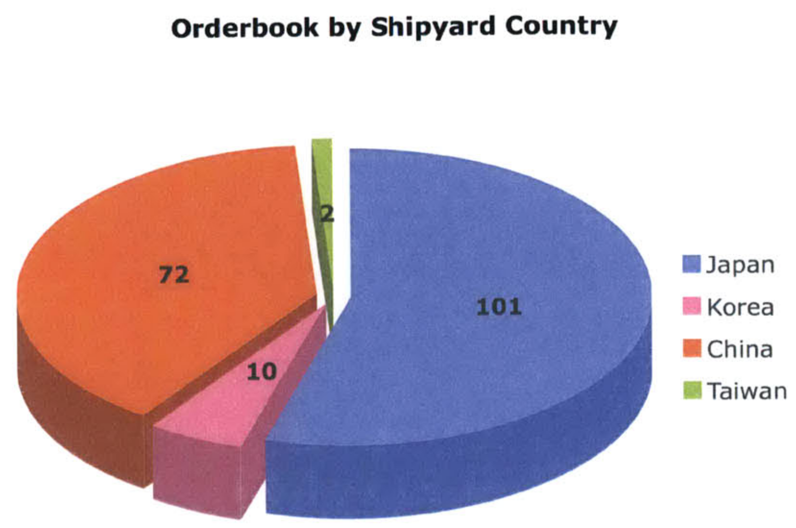

Fig 55: Capesize Orderbook Distribution Amongst Countries – using data from [Braemar 2007a, SSY 2007a, Clarksons 2007c]

It is evident by comparing Fig 53 and Fig 55 that China is becoming a major player in capesize newbuilding while Korea's share has decreased substantially. Japan remains strong and there are zero orders in countries out of the Far East.

3.4 Port Congestion

Port capacity is another constraint that makes supply inelastic in the short-run. The inability to cope efficiently with demand has resulted in high congestion of ships at both iron ore and coal terminals particularly in Australia. Delays measured in weeks are not uncommon while average charter rates are currently in excess of $100K daily.

According to a study performed by [Clarksons 2006b], congestion in capesize iron ore terminals corresponds to a decrease in supply by about 28% for ships discharging in China. Congestion may be affected by several factors such as the Chinese New Year or bad weather. Fig 56 shows the average mid-month delays at iron-ore terminals in Australia until Sept 2006.

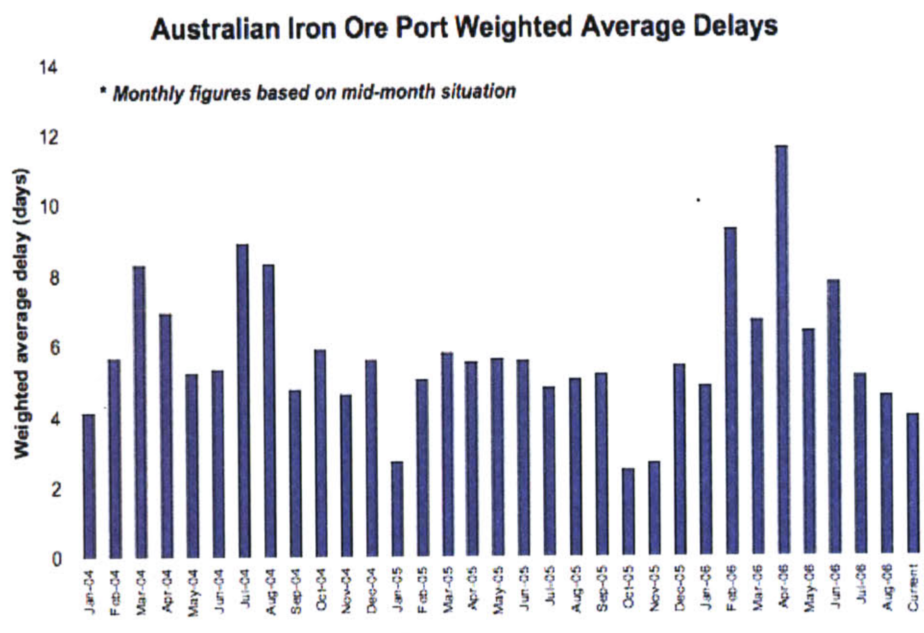

Fig 56: Australian Iron Ore Port Congestion Indices [SSY 2006b]

Fig 57 shows the average delays and the queue length at Australian iron ore ports between January-22 and April-30 2007.

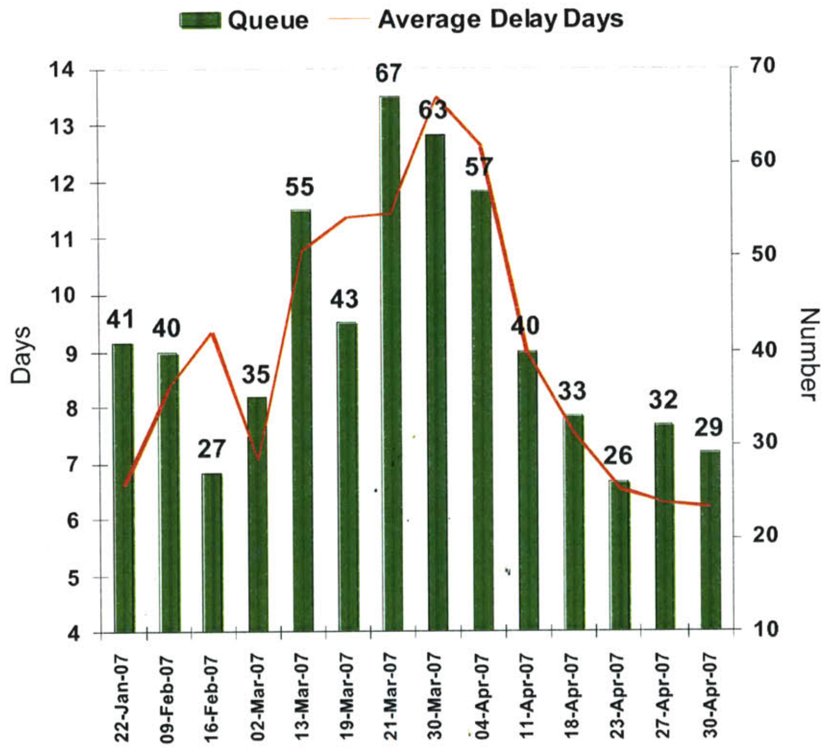

Fig 57: Australian Iron Ore Port Congestion and Queue Length [Clarksons 2007b]

Increasing iron ore loading rates can reduce congestion, but this is dangerous particularly for older vessels that have a lower deballasting capacity. Loading rates depend on the loading abilities of existing vessels and are mainly limited by their deballasting capacity. Peak loading rates of up to 16,000–18,000t/hr have been achieved in Ponta de Madeira (Brazil) while some ports are aiming in the future to go up to 32,000t/hr [Ferguson et al 1993]. Though average rates are usually close to 50% of peak values, high loading rates are known to be the cause of serious failures and ship losses [Corbett 2006, Isbester 1998, Intercargo 1998, IACS 1997, MER 1997].

Improving loading rates at already fast ports will only further compromise safety. Doing so in other parts of the world however by investing in more efficient conveyor belt systems may be effective as equipment in most ports is rather old. Congestion can also be effectively improved by newer ships with high deballasting rates; larger ships that will reduce the number of berthing/unberthing delays; more loaders, loading terminals and berths that will increase turnover; higher storage capacity at terminals that will buffer against inland accidents, bad weather etc.; aligned improvement of inland transportation, loading and discharging ports to avoid bottlenecks etc.

Both Ponta de Madeira in Brazil and the port of Dampier are adding one terminal each this year. Improving tracks, boogies and locomotives that operate between mines and ports can also be effective. "Breakthrough teams" working for Hamersley achieved a great increase in rail system capacity by reducing the time spent by trains unloading at Dampier port before returning to the mine from 90 to 30 min. [Renwick 2002].

It is important to understand however that these solutions may be effective in the short-run, but they involve heavy investment and will be a huge loss in the long run if Chinese demand drops or the world economy goes into recession.

An allocating system was implemented last year in Australia and was very effective in reducing congestion. There has been criticism however that it favored some shippers over others and that has delayed its re-implementation this year.

Besides iron ore port congestion, coal port congestion increased substantially during the final quarter of 2006 and this had a big impact on freight rates. As discussed earlier, the main reason for this is that China is becoming a net importer and the countries to which it previously exported have now turned to Australia.

Waiting time at the Australian port of Newcastle reached 20 days at the end of 2006 with queues of up to 55 vessels waiting to load [Clarksons 2007d]. Congestion has further increased since then causing charter rates to reach record high levels. Fig 58 shows the Australian coal port congestion index until January 2006 and Fig 59 shows the average delays along with the queue length since then.

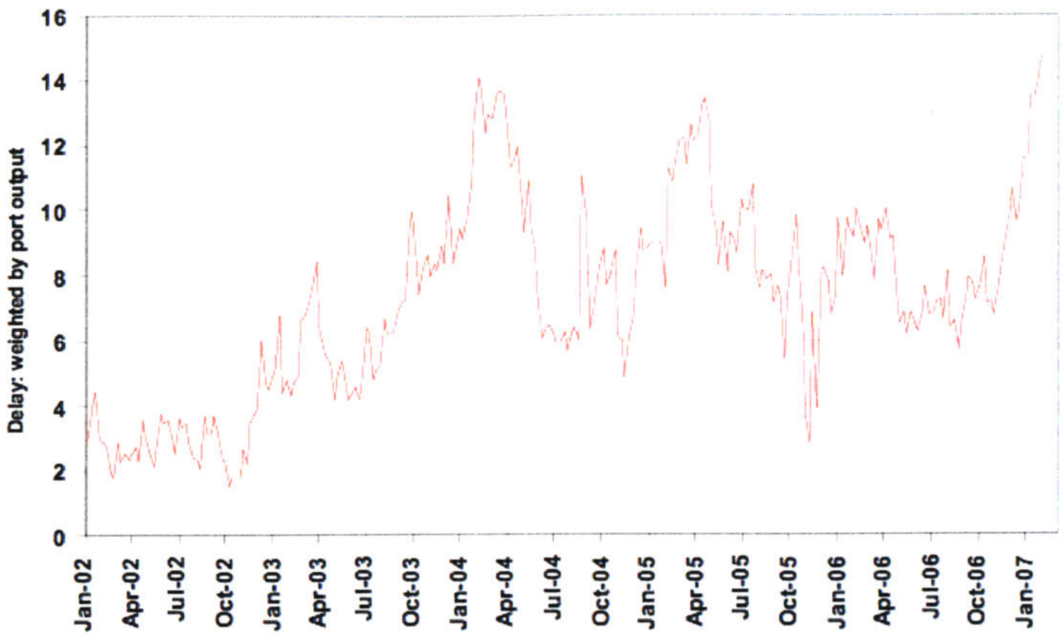

Fig 58: Australian Coal Port Congestion Index [SSY 2007b]

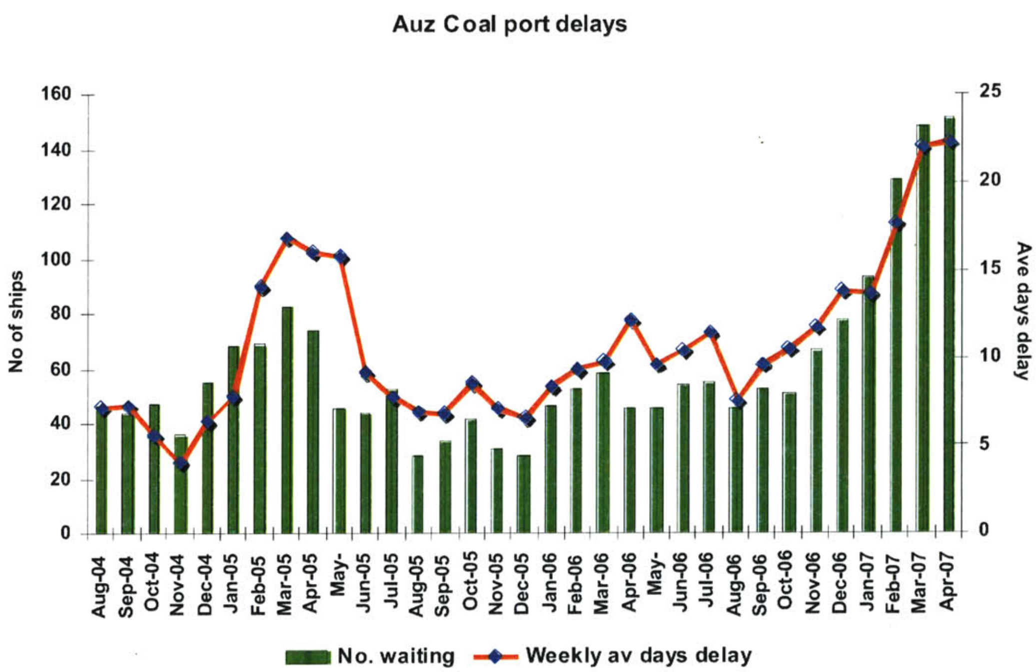

Fig 59: Australian Coal Port Congestion and Queue Length [Clarksons 2007b]

Fig 60 shows the transpacific capesize daily earnings along with average coal port delays until January 2007.

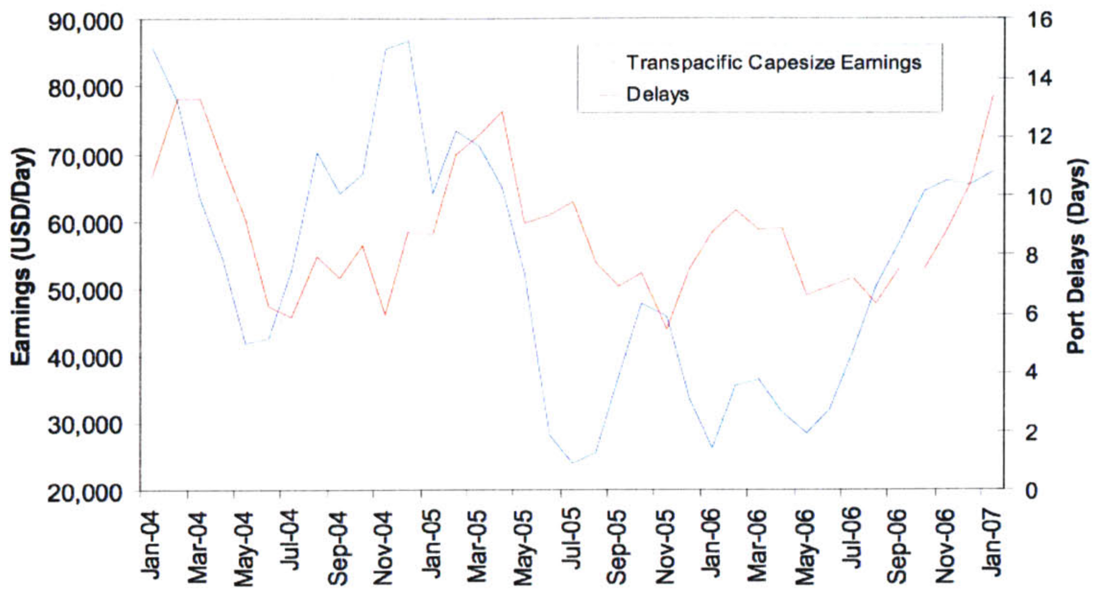

Fig 60: Transpacific Capesize Earnings and Delays [SSY 2007b]

It is clear from Fig 60 that there is a close correlation between freight rates and congestion. According to [SSY 2007b], congestion corresponds to a decrease in supply of the order of about 50% and this is what has caused freight rates to be so high. One can treat congestion as a reduction in supply because it corresponds to a number of vessels being idle. On the other hand, congestion can be interpreted as a decrease in overall productivity of the fleet. This leads to an increase in demand, as more ships of a lower productivity are required to transport the same amount of cargo. The latter approach is the one adopted by Marsoft in their estimates of fleet utilization to predict freight rates.

3.5 Oil Prices and Operating Costs

The increasing price of crude oil translates to an increase in bunkering costs for shipowners. It therefore shifts the supply curve to the left and increases price (freight rates). This has the opposite effect of improvements in naval architecture, materials, technology and automation, which increase efficiency and reduce operating and construction costs, shifting the supply curve to the right. Fig 61 shows marine diesel oil prices in Rotterdam and Singapore, the two major bunkering ports for capes.

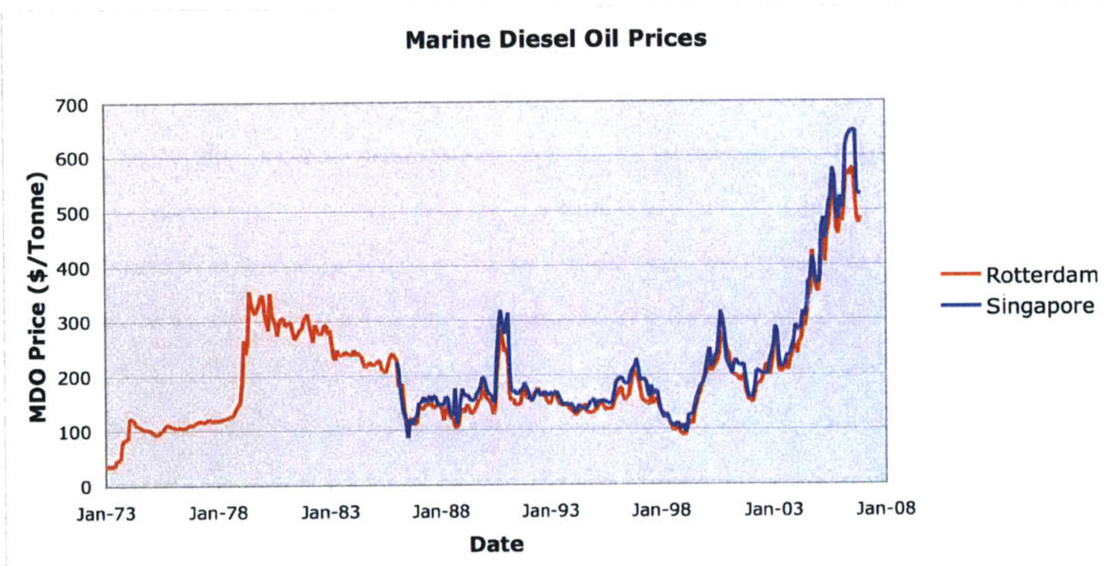

Fig 61: MDO Prices in Rotterdam and Singapore - using data from [Clarksons 2007a]

The increase in operating costs alone would reduce output and revenues if demand were elastic. This however has been greatly offset by the increase in demand for transportation. The demand for steam coal transportation increases significantly with oil prices as many factories and power plants around the world switch to coal. This has a positive effect on dry bulk freight rates. Fig 62 shows crude oil prices (in red) along with the Baltic Dry Index (in blue).

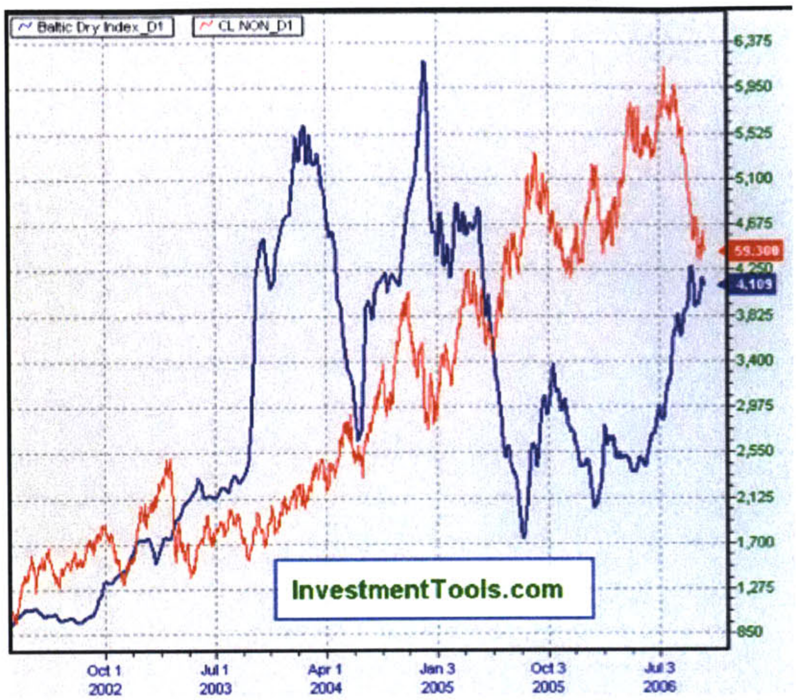

Fig 62: Baltic Dry Index (blue) and Crude Oil (red) [Investment Tools 2006]

3.6 25-Year Age Limit on Ore-Trading Capes

High-density cargos like iron ore have been the cause of several dramatic casualties in the past with not enough reaction time to even send a distress signal. Examples include the capes *Alexandre P.*, *Pasithea* and *Algarrobo,* all of which disappeared virtually without trace in 1990 while loaded with iron ore [LR, Peckham, Ferguson 1991] and the *Mineral Diamond* in 1991 again loaded with iron ore.

Most recently, only 7 out of the crew of 33 were rescued after the rapid failure and sinking of *Alexandros T.* in May off the coast of Port Alfred in South Africa. The ship was transporting iron ore from Brazil to China – a very common route. Naturally, this has attracted public attention and has been of great concern to many involved in the shipping industry.

Cargo owners and charterers have recently responded by introducing a 25-year age limit on vessels that are allowed to transport iron ore. This will force the older vessels out leading to a reduction in supply that will counteract the effect of deliveries and perhaps push the rates up over the coming years.

3.7 Conclusions

- Port and shipyard capacity constraints as well as the distance between the location and demand of ships, make supply inelastic in the short-run

- Substitutability between capesize trades make supply price elastic causing freight rates along the various routes to move in parallel

- Minimal scrapping due to high rates and excessive ordering has led to a record high net fleet growth and newbuilding orderbook

- The inability of shipyards to cope with demand has led to record high prices and delivery times

- Fleet annual cargo carrying capacity will increase substantially and the supply increase is expected to have a big impact on shipping

- China is quickly becoming a major player in the cape newbuilding industry while capturing a great portion of Korea's share of the market

- Bulk carriers are likely to become a key target for shipbuilders this year

- Newbuilding ordering is in phase with earnings causing deliveries to be approximately out of phase with the cyclical market

- The sharp increase in Australian coal port congestion during the final quarter of 2006 led to record-high freight rates that are ongoing

- Solutions to improve congestion are available but they include drawbacks such as safety, investment risk and criticism of favoring certain shippers

- The soft spot in the market will be dictated by the resolution of the Australian port congestion problem and pacific rates will be the first to drop

- The increasing scrapping pool as a result of low scrapping creates a buffer because a decline in rates will induce scrapping, leading to a market recovery

- The 25-year age limit imposed on iron ore transporting capes effectively leads to a decrease in supply

- Congestion effectively decreases supply, though it can also be treated as a decrease in the fleet productivity and therefore an increase in demand

- Increasing oil prices effectively decrease supply as they imply higher operating costs. This however is more than offset by the corresponding increase in demand for steam coal transportation as factories switch to coal

4. Market Equilibrium and Ship Earnings

4.1 Equilibration of Supply and Demand

Shipping is a cyclical market and the large number of factors that affect it renders it almost impossible to make future predictions. The fact that it is cyclical however implies that it is not totally random. As for any good or service, the market price for a voyage or a period charter is determined by supply and demand at any given location and time. In practice, equilibrium may never be achieved due to the high dynamics of the market but average prices and trends will always be governed by supply and demand. Fig 63 shows the supply and demand for capes since 1995 with extrapolations until 2010.

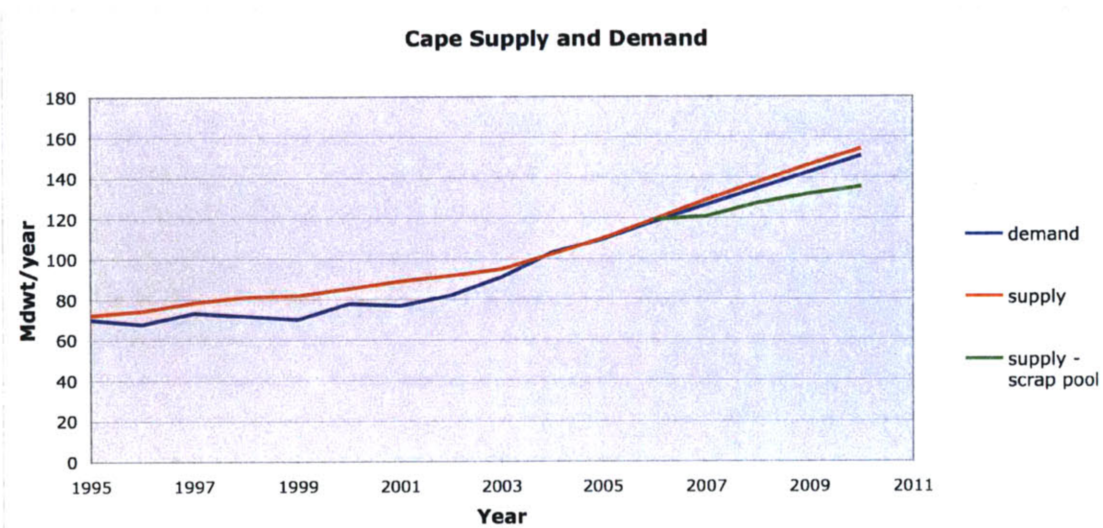

Fig 63: Supply and Demand of Capes along with a 23-year scrapping scenario – using data from [Braemar 2006 & Braemar 2007a]

The demand projection (in million tonnes transported per year) is based on WTO (World Trade Organization) predictions about the industries related to capesize trades (iron ore, coal and grain). The summation of the estimated demand for capesize deadweight capacity along the various trade routes gives the total demand curve shown.

Estimates of GDP growth in major players such as China have also been incorporated, using historical correlations between GDP growth and the bulk carrier market.

The supply projection is based on the existing fleet and the capesize orderbook, which is known until the end of 2010. The red projection assumes that there will be no capesize scrapping while the green projection assumes that all capes above 23 years old will be scrapped. 23 years is the 30-year average scrapping age but a 30-year scrapping age or no scrapping at all is more likely in today's market. The red and green curves therefore provide a useful upper and lower bound for supply until 2010.

A tight balance between supply and demand is therefore expected for capes until 2010 but supply has the potential of decreasing significantly if demand drops. This means that old vessels will be scrapped following a decline in rates so a market crisis is unlikely.

It is reasonable to assume that demand for transportation is price inelastic because prices of the final products are relatively high and they usually have high profit margins. Freight rates are therefore driven by annual changes in demand and supply while the volume transported is to a large extent unaffected by freight rates. Fig 64 shows the annual percentage change in bulk carrier supply and demand over the past 10 years.

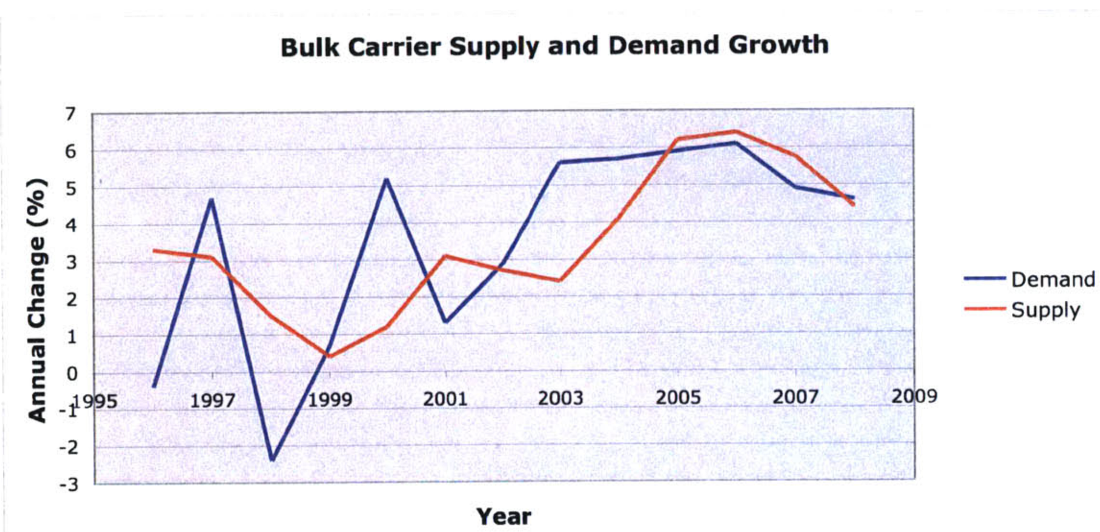

Fig 64 Annual Percentage Change in Supply and Demand for Bulk Carriers – using data from [SSY 2007a]

When Demand is rising faster than supply, meaning that the blue line is above the red line in Fig 64, freight rates increase and vice versa.

Marsoft base their predictions of the market on their estimates of fleet utilization. Utilization is defined as the percentage ratio of demand to supply. The forecast of demand in tonne-miles is based on extensive data of countries' trade predictions and geographical distances. Tonne-miles are then converted to deadweight (MDwt) using the estimated fleet productivity, which incorporates port congestion, average sailing speed and other parameters. Supply is based on the anticipated scrapping and newbuilding deliveries.

The Idle fleet is simply the difference between supply and demand while fleet utilization is the percentage ratio and is used as an indicator of the market. Note that supply, demand and the idle fleet can be measured in deadweight, deadweight per year, tonne-miles or tonne-miles/year. Fig 65 shows the fleet size, demand and the idle fleet in MDwt along with fleet utilization as a percentage since 1980.

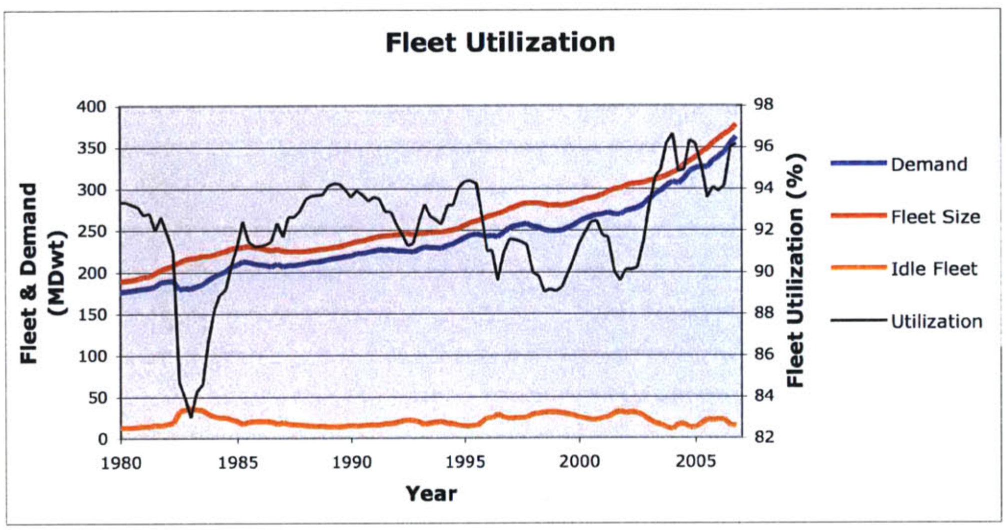

Fig 65: Fleet Utilization and its Components since 1980 - using data from [Marsoft 2007a]

Note that Fig 65 shows only actual historical data without predictions. We are now experiencing record-high utilization rates while there is a very tight balance between supply and demand and this explains the record-high market. By comparing Fig 65 with Fig 10, it can be seen that the peaks in utilization rate coincide with the peaks of the dry bulk market (1980, 1985, 1989, 1995, 2001 and now) and so do the bottoms (1983, 1986, 1993, 1999 and 2002). The utilization rate therefore is a good market indicator though it is hard to predict.

The above fleet utilization is for dry bulk carriers. A cape-specific pseudo-utilization rate is derived using cape specific data of supply and demand and then incorporated. Its effect however is not very significant, as the cape market tends to follow the dry bulk market closely. Historical correlation between freight rates and (100 - fleet utilization) is used to predict the market because fleet utilization is usually close to 100 and small percentage changes are common.

4.2 Dry Bulk Earnings

The Baltic Index for capes has closely followed the dry bulk market over time. The current boom over the last few years however is more intense for capes than for other bulk carriers. That is because it is driven by China and iron ore imports while the majority of iron ore is transported in Capes. Fig 66 shows the daily earnings of capes and other bulk carriers since 2001.

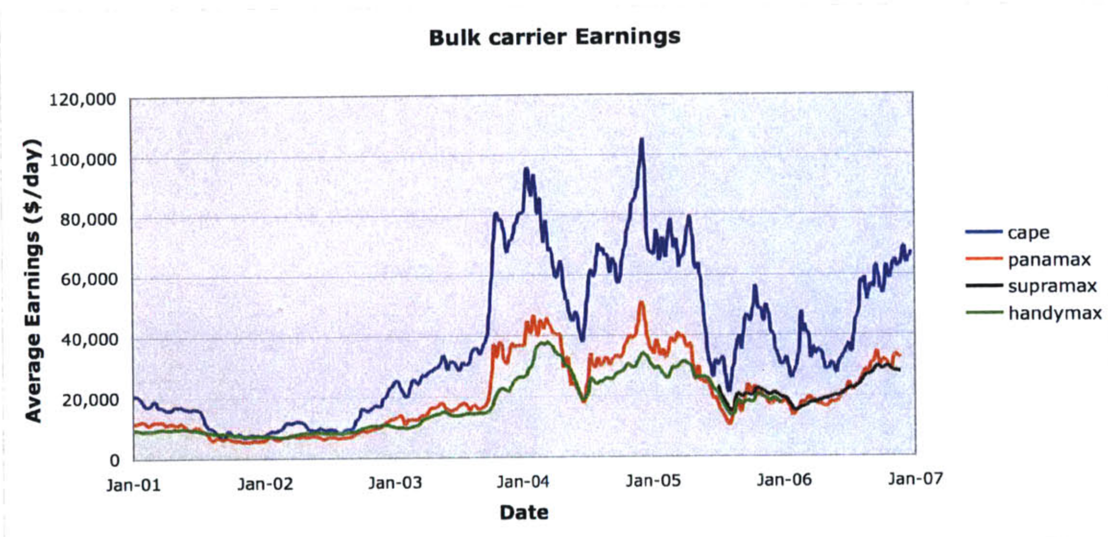

Fig 66: Dry Bulk Carrier Average Earnings [Baltic Exchange 2007]

The similarity between the trends of the cape market and the other dry bulk markets explain why the effect of the cape specific factor not very significant in the fleet utilization. The reason for this similarity is the knock-on effect between the dry bulk markets as discussed in Section 1. The relatively higher percentage increase in cape earnings compared to other bulk carrier groups in the current boom is shown in Table 5.

Increase in Bulk Carrier Earnings Between Sept-2001 and Dec-2004			
Average Rates	**Cape**	**PMX**	**HMX**
Sept-10, 2001	$6,140/day	$6,306/day	$8,070/day
Dec-7, 2004	$105,520/day	$49,518/day	$33,945/day
Increase	**1,619%**	**685%**	**321%**

Table 5: Increase in Average Rates from Sep-2001 to Dec-2004 – using data from [Baltic Exchange 2007]

It should be noted that a similar increase occurred by January 15th 2004 when average cape earnings reached $96K/day and today the market is even higher with average cape earnings of about $115K/day and further increasing.

4.3 Freight Rates and Earnings

The main cargos transported by capes are coal and iron ore and the main destinations are China and Rotterdam. Iron ore freight rates along the main routes to Rotterdam and China by capesize bulk carriers are shown in Fig 67 and Fig 68 respectively.

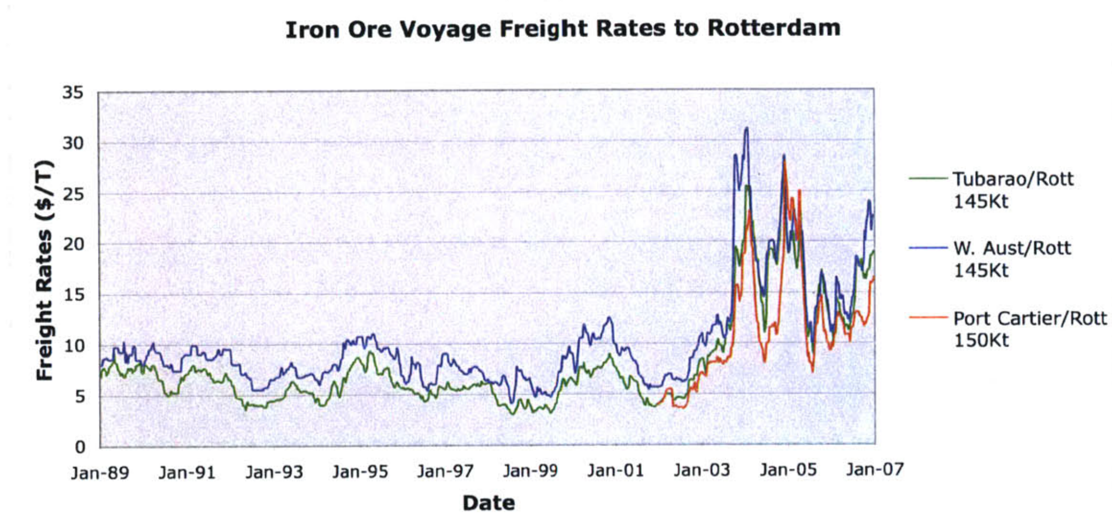

Fig 67: Iron Ore Freight Rates along the Main Routes to Rotterdam [Clarksons 2007a]

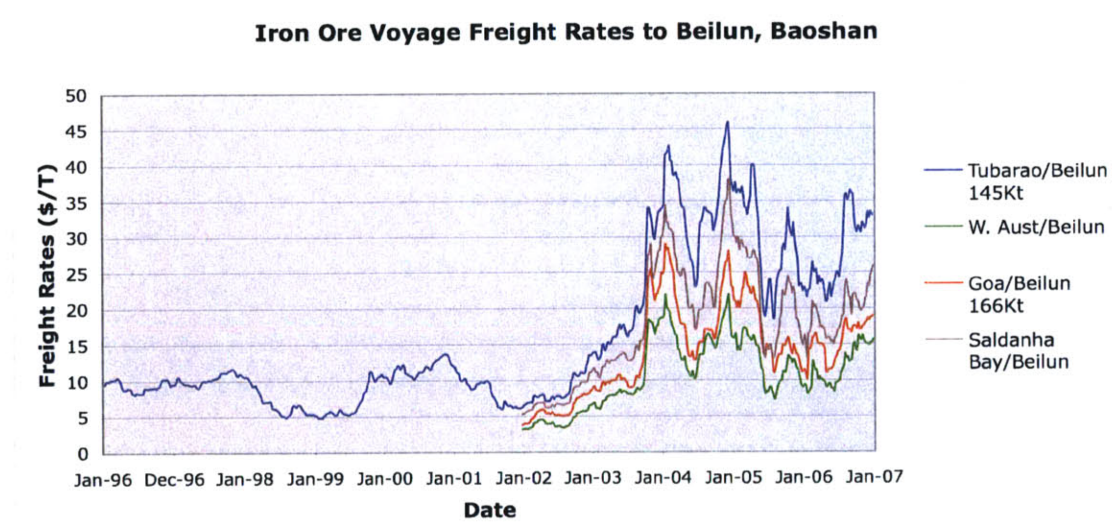

Fig 68: Iron Ore Freight Rates along the Main Routes to China - Beilun [Clarksons 2007a]

The highest iron ore freight rates appear to be from Brazil (Tubarao) to China and the cheapest route is from Australia to China. One however should consider the fact that a shorter distance corresponds to higher ship earnings per day (time charter equivalent) which is the effective price seen by suppliers (shipowners). This ought to be more balanced across the various routes.

The Baltic Exchange keeps track of the average freight rates (average of coal and iron ore) along the main routes to China and Rotterdam for capesize bulk carriers. These are shown in Fig 69.

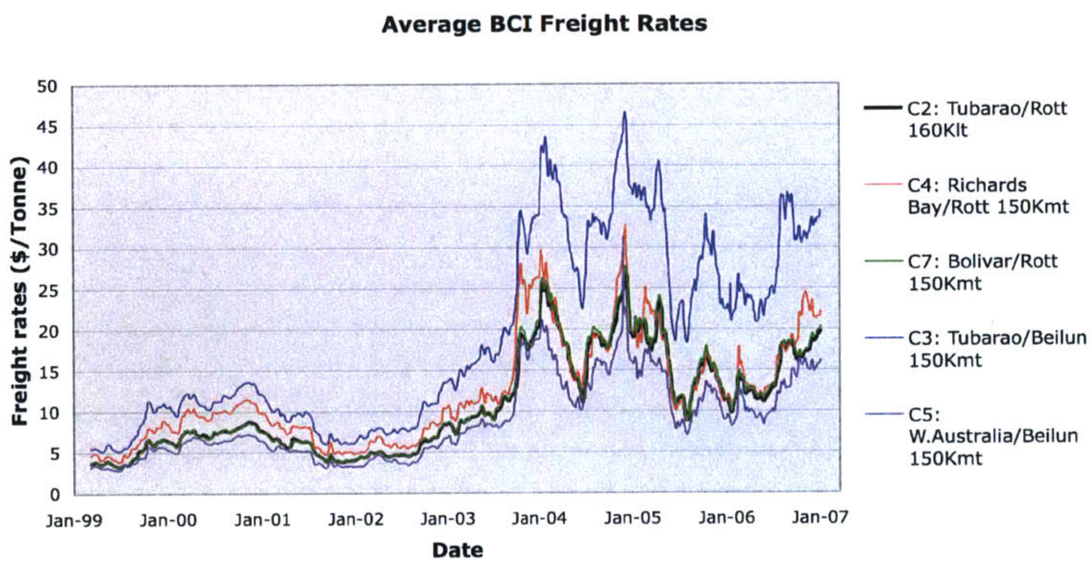

Fig 69: Average Baltic Cape Index Freight Rates Along the main Routes – using data from [Baltic Exchange 2007]

It can be seen that these are not very different than the iron ore freight rates along the corresponding routes. That is because the iron ore and coal are close substitutes for the shipowner and both are usually available on these routes.

The typical ways in which a vessel is employed are on voyage charter, time charter, which can be for a single voyage or up to 10 years, and bareboat charter, which is typically for longer term and may conclude with delivery of the vessel to the charterer (bareboat lease). Besides period length, the main difference between those is in the costs paid by the charterer and the shipowner.

Crudely speaking, costs can be divided into CAPEX (Capital costs/expenses including asset cost and repairs), OPEX (operating expenses including manning, insurance, maintenance, stores and equipment etc.) and VOYAGE costs (fuel, port expenses, canal fees etc.). CAPEX are fixed costs, OPEX are only time dependent and VOYAGE costs are route dependent. In a bareboat charter, the shipowner only pays CAPEX. In time charter, the owner also pays OPEX and in voyage charters (spot charter), the owner incurs all costs including VOYAGE.

Since there is high variation in the costs incurred by the shipowner, the time-charter equivalent is calculated for each employment option in order to enable direct comparisons. Fig 70 shows the freight rate, the voyage costs and the resulting daily earnings for a typical cape along the Brazil/Rotterdam route and how these have varied since 1980.

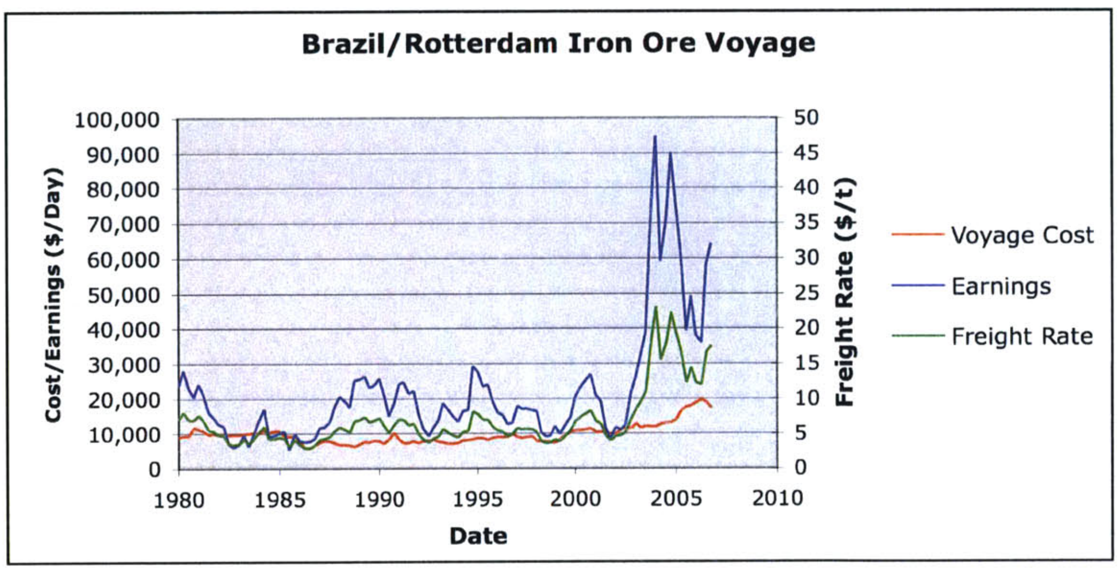

Fig 70: Freight Rates, Voyage Costs and Resulting Cape Earnings – using data from [Marsoft 2007a]

Fig 71 shows how the resulting daily earnings along that route compare with average earnings and 1-year time charter rates.

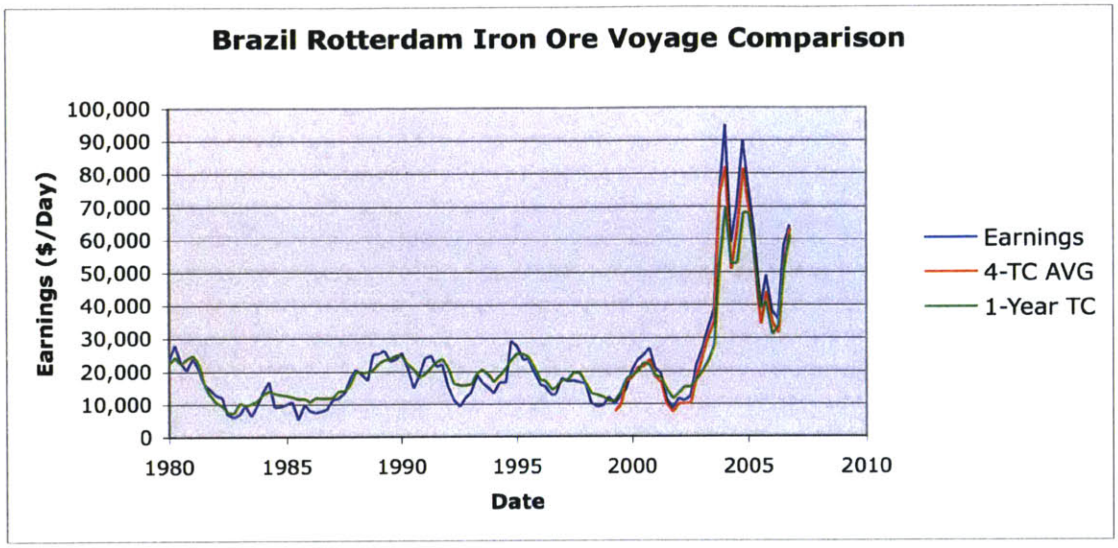

Fig 71: TC Equivalent Earnings Compared with 1-Year TC Earnings – using data from [Marsoft 2007a]

It is clear from the graph how the equivalent earnings from a voyage charter are aligned with the earnings from time charters.

The daily cape earnings on the main coal voyages to Rotterdam and China are shown in Fig 72 and Fig 73.

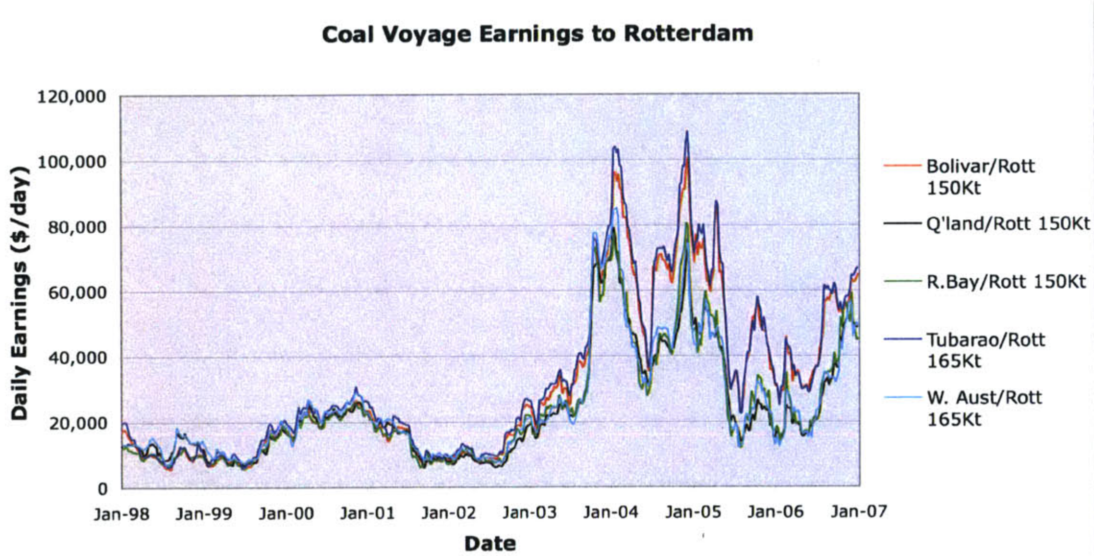

Fig 72: Coal Freight Rates along the Main Routes to Rotterdam [Clarksons 2007a]

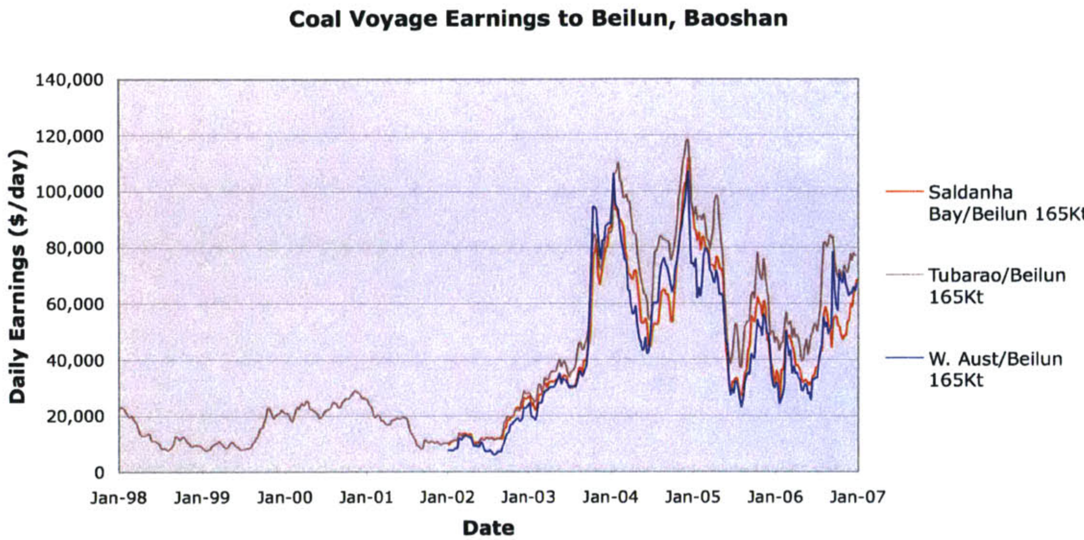

Fig 73: Iron Ore Freight Rates along the Main Routes to China - Beilun [Clarksons 2007a]

As can be observed, the freight rates along the various routes are closely related and run parallel to each other. This is because they constitute very close substitutes (for shipowners). An increase in freight rates along a particular route leads to a corresponding increase in quantity along that route and a decrease in supply along the remaining options. This forces freight rates along other routes to follow the trend. Differences in rates exist because substitutability between routes is limited by the need to ballast from one region to another. Iron ore and coal cargos along the same route however constitute closer substitutes and therefore rate differences between them are small.

4.4 Spot Charter Rates

China's demand for iron ore, which is currently driving the market, has created flow irregularities. Capesize earnings are therefore significantly higher along front hauls (Atlantic to Pacific) compared to backhauls (Pacific to Atlantic). The gap between them however has narrowed lately as a result of America's increasing demand. This is demonstrated in Fig 74, which shows the daily earnings for transatlantic and transpacific rounds and front-haul and backhaul voyages.

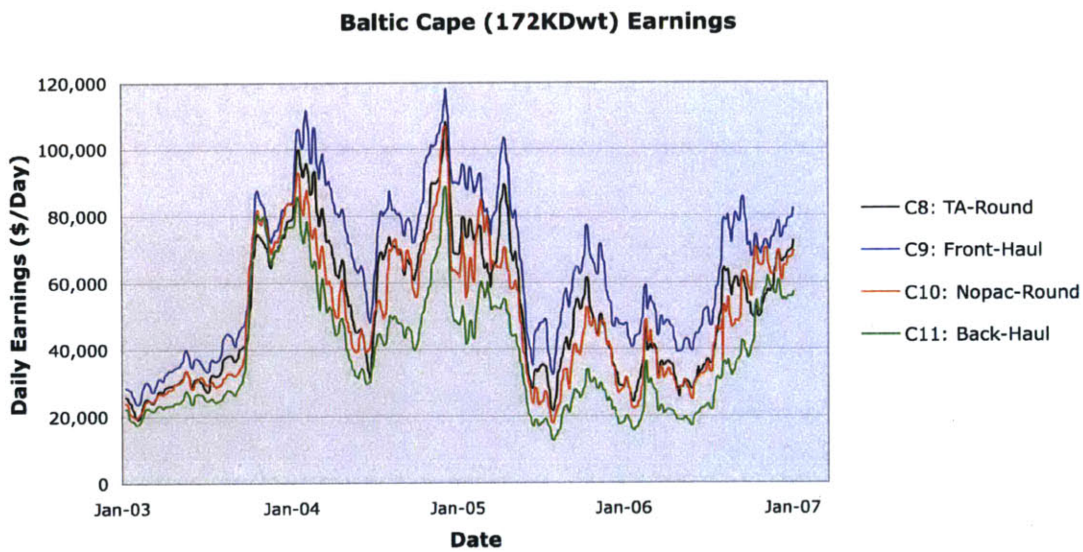

Fig 74: Earnings along the 4 TC Routes – using data from [Baltic Exchange 2007 & Clarksons 2007a]

Besides the Baltic Dry Index (BDI), today the Baltic Exchange also produces indices for the various size groups of bulk carriers such as the Baltic Cape Index (BCI) and the BPI (Baltic Panamax Index). These are composed daily using the input of several panelists and they reflect the daily freight market. Fig 75 shows the BCI since its introduction in 1999 along with the BCI and average earnings. "Average earnings" is simply the average of the 4 TC routes shown in Fig 74.

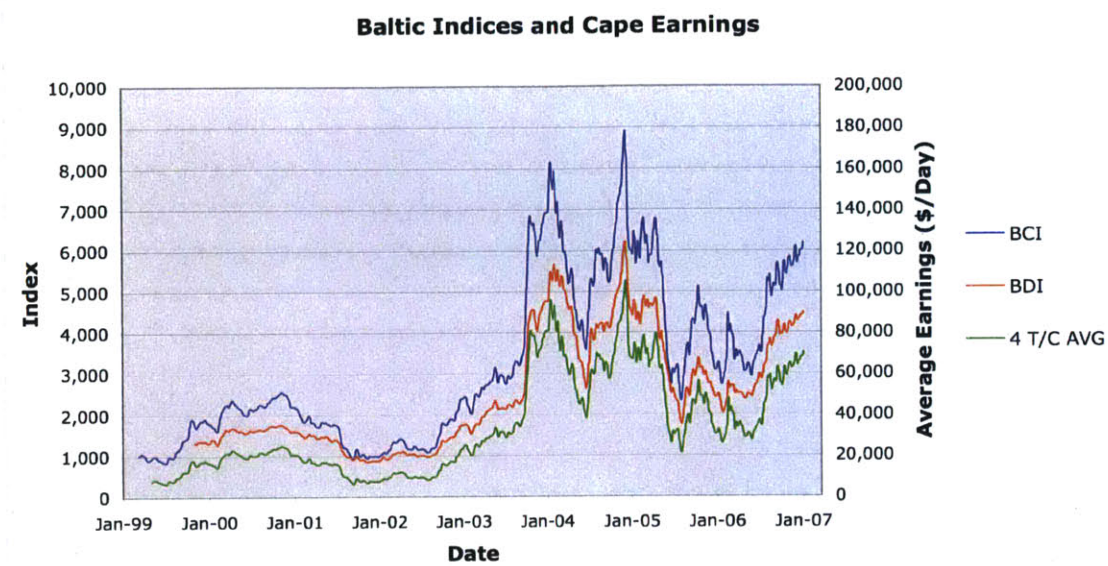

Fig 75: BCI, BDI and Average of the 4 TC Routes 2001 - using data from [Baltic Exchange 2007 & Clarksons 2007a]

The close alignment of BCI with the average earnings of the 4 TC routes shows that it is an accurate measure of the market. Again comparing BCI with BDI shows how cape earnings have followed the dry bulk market while being affected slightly more by the current boom since 2003.

4.5 Period Charter Rates

Period charter rates tend to be slightly less volatile than spot rates depending on the period length. In other words, 1-year charter rate peaks are lower than those of spot rates and higher than those of 3-year charters. The highest 1-year fixture ever reported was that of the 2004-built *"Cyclades"* earlier this month at $92,500/day [Lewis 2007]. The highest spot charter ever fixed was last week (May 2007) at $145,000/day. Average spot earnings are currently about $15,000/day higher than this value and on an upward trend. This conclusion is also clear in Fig 76, which shows 170Kdwt cape spot and time charter earnings for various period lengths.

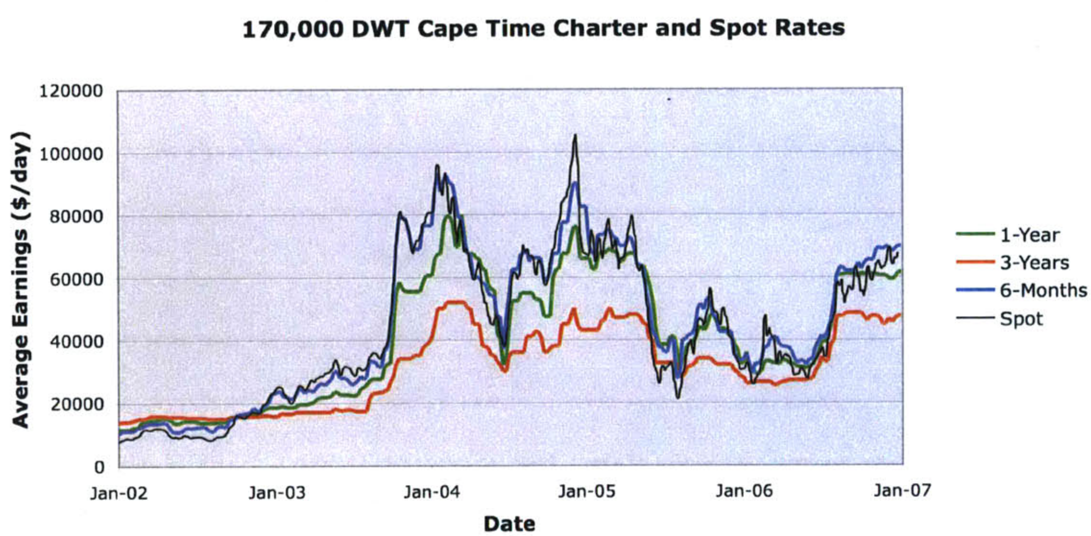

Fig 76: Spot and Time Charter Earninigs for 170KDwt Capes – using data from [Baltic Exchange 2007, Braemar 2007a & Clarksons 2007a]

The reason is that one would be more likely to charter at a rate closer to the average spot market when chartering for a longer time. Fluctuations about an average value are therefore smaller for longer period charters. It should be noted that the "average" is not necessarily a historical average. It is what the people in the current market believe to be an average market and this can change significantly after a big crisis as in 1986 or after a big boom as in 2003. 10-year charter rates today for example are about $40,000/day, which is remarkably high compared not only to the 15 or 20-year average but also to the pre-2003 record high spot market rates.

It can also be seen in Fig 76 that average time charter rates are lower than those of the spot market and decrease with t/c length. This is because they provide a steady, long term and secure income, which is valued by many owners, particularly IPOs. Note that the 6-month time charter is almost equivalent to spot chartering since a typical voyage charter lasts for a few months.

For a given charter period length in a given market, the rate depends on the reliability of the charterer and the number and quality of assets that they own. When chartering a vessel on period in a high market, one relies on the fact that the charterer will continue to pay the agreed rate if the market goes down. The risk of having to renegotiate varies depending on the integrity of the charterer and the probability of the market declining. Each individual owner may also interpret it differently. More importantly, time charter rates depend on market expectations.

Time charter rates today are substantially below spot rates and decrease significantly with period length. This is because many people believe that the current market, which is very strong compared to historical averages, will not last for very long. The opposite was true in the 1983 crisis when people were very optimistic about the future and period rates were thus higher than the spot market. During a shipping crisis, time charter rates usually increase with period length and the opposite is true in a shipping boom. This can be seen in Fig 77 and Fig 78, which show historical 6-month, 1-year and 3-year charter rates for 150Kdwt and 127.5Kdwt capes respectively.

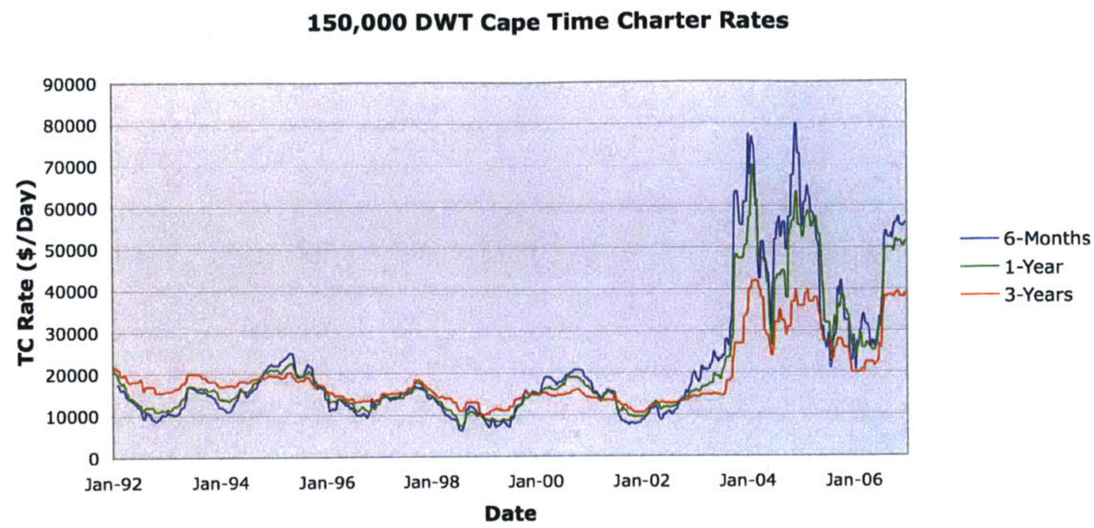

Fig 77: Spot and Time Charter Earninigs for 150KDwt Capes – using data from [Baltic Exchange 2007 & Clarksons 2007a]

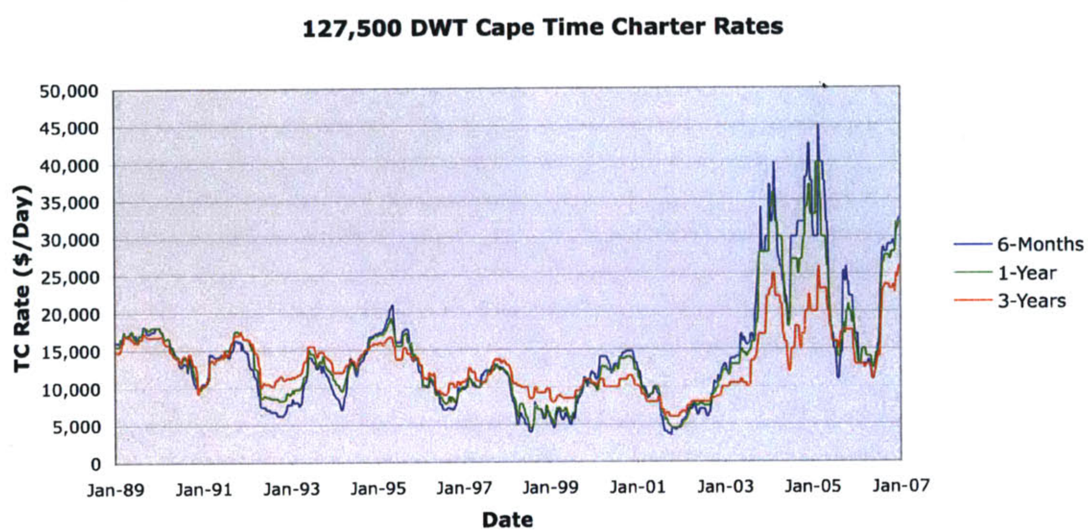

Fig 78: Spot and Time Charter Earninigs for 127.5KDwt Capes – using data from [Baltic Exchange 2007 & Clarksons 2007a]

One can also see that there is a time lag or a phase difference between the charter rates of various lengths. 3-year charter rates for example increase and decline later than 1-year charter rates. The 3-year charter rate curve therefore appears to be slightly shifted to the right (forward in time) compared to the 1-year time charter rate curve.

The time lag is analogous to the period length. This is because the period length corresponds to the level of commitment involved in chartering. After a market change, new rates are often perceived as temporary. People therefore often wait until the new market level is somewhat established before chartering for a long period, as this takes a more sophisticated decision than a short charter.

It is also observed by comparing Fig 76, Fig 77 and Fig 78 that charter rates for similar periods are significantly higher for larger vessels. This is more clear in Fig 79, which shows 1-year and 3-year time charter rates for 170Kdwt and 150Kdwt capes.

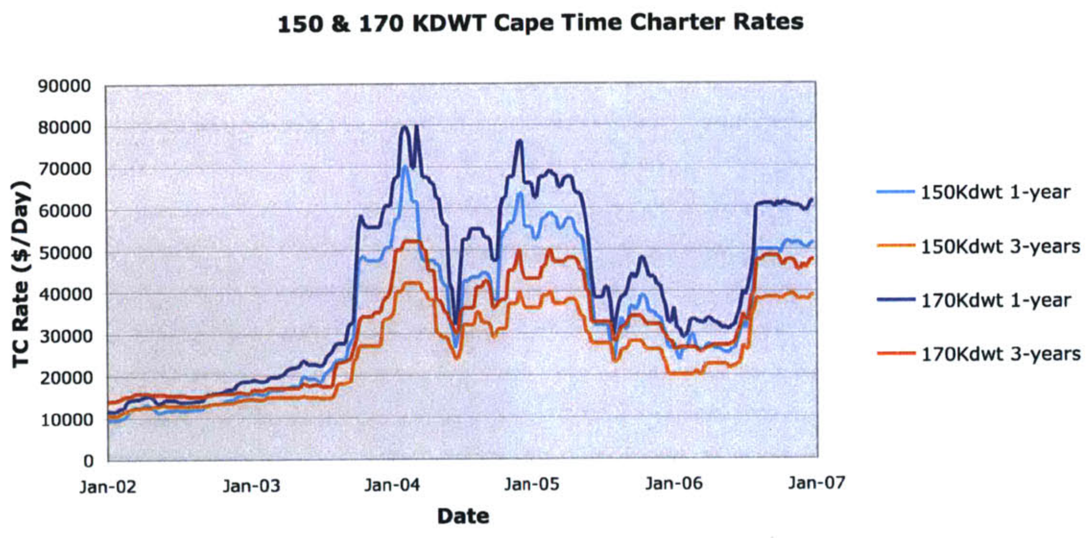

Fig 79: 1-year and 3-year Time Charter Rates for 170KDwt a nd 150KDwt Capes – using data from [Baltic Exchange 2007, Braemar 2007a & Clarksons 2007a]

Fig 79 clearly shows the decrease in rates with period length and the decrease in rates with ship size. It is also clearly shown that the time lag is consistently dependent on period length for the two ship sizes, and independent of ship size.

4.6 Conclusions

- Freight rates depend on the fleet utilization and their direction is driven by changes in global supply and demand

- There will be a tight balance between supply and demand until 2010 but the increasing scrapping pool will allow supply to decrease if demand drops and this will prevent freight rates from dropping significantly

- The Capesize market follows the dry bulk market due to the knock-on effect between the various bulk carrier size groups. The current shipping boom however has had a bigger impact on capes

- The market is very volatile with huge percentage changes in freight rates over relatively short periods of time, particularly for capes

- TC-Equivalent voyage earnings and TC earnings along various routes move in parallel, as they constitute substitutes. Substitutability however is limited by the need to ballast from one port to another

- Coal and iron ore freight rates along the same routes are very close substitutes and therefore yield similar earnings

- China's demand for iron ore has resulted in flow irregularities resulting in much higher front haul than back haul rates. This however is counteracted by America's increasing demand

- Time charter rates are less volatile for longer time charter periods meaning that shorter period rates are higher in a strong market and lower in a weak market

- Time charter rates are less volatile and on average lower than spot rates

- The time lag between TC rates and spot rates and between TC rates of various lengths, is dependent on the TC period length and independent of ship size

5. Ship Values and the S&P Market

5.1 Introduction

Ship values are dictated by their earning capacity, their age, the newbuilding price and the scrap value. The drastic changes that have taken place since the fall of 2003 however, has had a big impact on the sale and purchase (S&P) market, and has made ship valuations a complicated task. Some remarkable phenomena have been observed making this a very interesting topic to explore. As commented by Mr. Sydney Levine for example, the ratio of prices between a 20-year-old and a 5-year-old vessel increased steeply in 2003 after being steady for decades. Furthermore, the newbuilding has not only become cheaper than the secondhand, but is now also cheaper than the 10-year old vessel.

5.2 Database

Mr. Sydney Levine provided a large database of capesize S&P transactions that have taken place between December 1987 and December 2006 [Levine 2006]. This S&P database was completed by adding data that was collected from reports by Harry Vafias [Vafias 2007], Braemar Seascope Ltd. [Braemar 2007b], and transactions reported in Tradewinds [Tradewinds 2007]. The complete S&P database consists of 285 secondhand dry bulk cape transactions between December 1987 and March 2007. This does not include newbuilding orders and newbuilding resales, which were kept separately. The details of the S&P database are summarized in Table 6.

DATABASE DETAILS	
Period	Dec'87 – Mar'07
Number of Ships	285
Average Size	163,373 dwt
Average Price	$30.9 m
Average Age	11.3 years

Table 6: S&P Database Information

5.3 Time Distribution of S&P Transactions

While bearing in mind that year 1987 only includes December and year 2007 only includes the first quarter, it is safe to assume that the S&P database is fairly complete meaning that it includes most reported deals. Fig 80 shows how the 285 capesize vessel transactions that took place in the investigated period, were distributed over time.

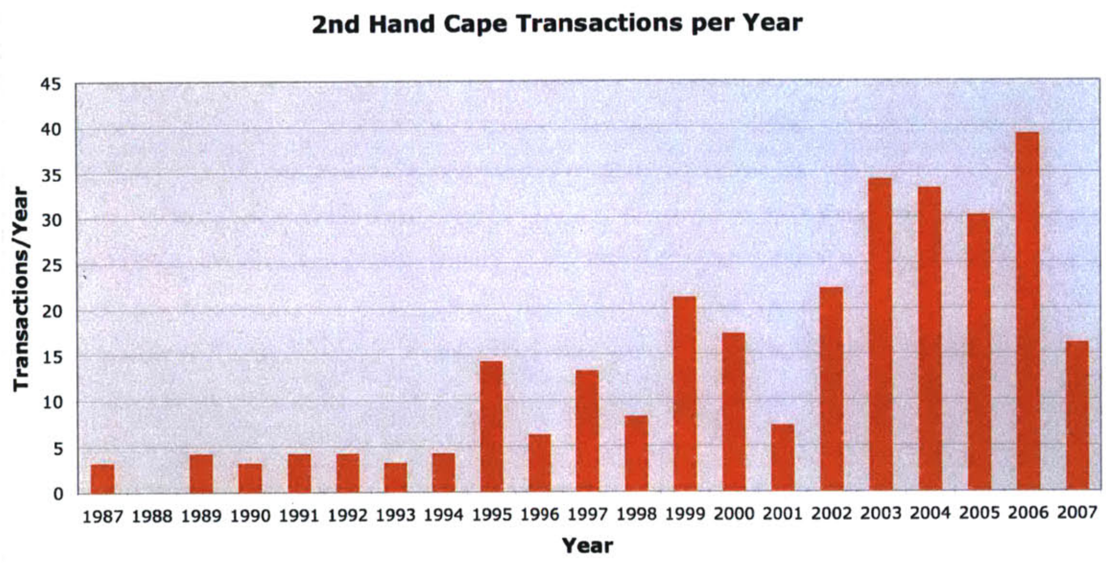

Fig 80: Number of Transactions Recorded from the Database for Each Year

Interestingly, it is observed that the frequency of transactions was higher during the years when the market was high (e.g. 1995 and 2003 until today). Fig 81 shows the number of transactions per quarter along with the 1-year time charter rates for a 150Kdwt cape to illustrate this. The historical values of time charter rates were obtained from [Clarksons 2006a] and completed by considering relevant fixtures in the charter market.

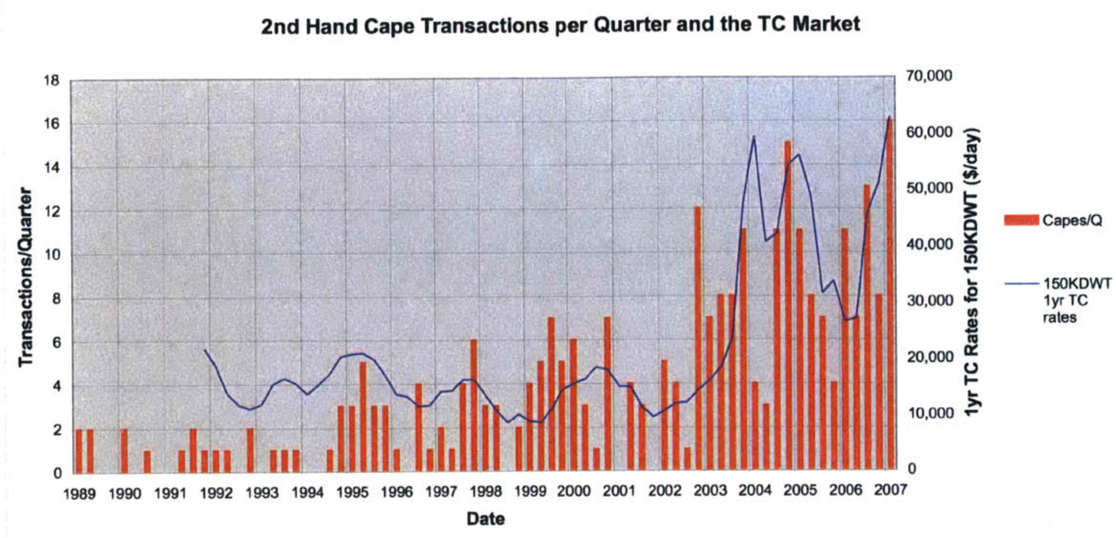

Fig 81: Number of S&P Transactions per Quarter along with 1-year TC Rates

How to Read Fig 81		
Consider 2007 Q1 (far right)		
Legend	Meaning	Value
Capes/Q	Number of cape deals between 1-Jan-07 and 31-Mar-07	16
150KDWT 1yr TC rates	Average 1-year time charter rates between 1-Jan-07 and 31-Mar-07 for a 150,000dwt cape	$62,900/day

Table 7: How to read Fig 81

Clearly, activity in the S&P market is closely correlated to freight rates. Since earnings affect prices, the same can be also said about activity in the S&P market and prices. Fig 82 shows the frequency of transactions along with the price of a 10-year-old typical cape.

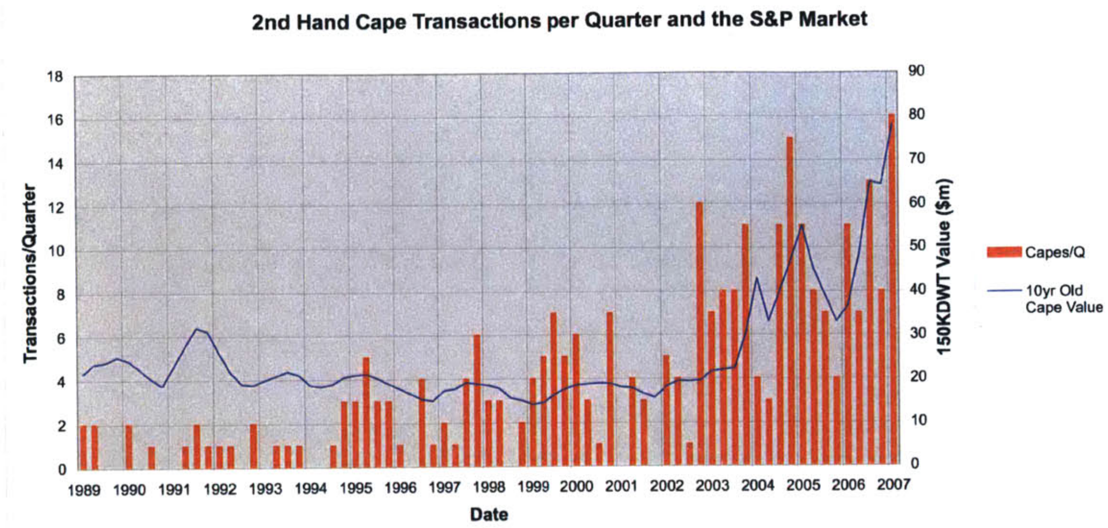

Fig 82 Number of Transactions per Quarter and Typical Cape Prices

How to Read Fig 82		
Consider 2007 Q1 (far right)		
Legend	Meaning	Value
Capes/Q	Number of cape deals between 1-Jan-07 and 31-Mar-07	16
10yr Old Cape Value	Average value of a 10-year old cape between 1-Jan-07 and 31-Mar-07	$78.2m

Table 8: How to read Fig 82

As shown on the diagram, it appears that when the S&P market is strong, meaning that prices are high, there is more activity going on which is obviously to the benefit of the sellers.

5.4 Determinants of Ship Values (Size, Age, Capacity & Time)

The data was analyzed in order to examine the factors that determine ship values. Due to the size of the database, it is feasible for qualitative purposes to examine the independent effect of each parameter while ignoring all others and assuming that they average out. A graph of price against ship size for example was constructed using the whole database as shown in Fig 83. Each point on the graph represents a single transaction while the black line is a linear regression through these points. As shown by its gradient, price generally increases with size but the low value of R^2 (0.011) indicates that other factors have a big impact.

The model indicates that on average, one would pay an extra $30,000 for each additional 1,000dwt on size. This is significantly lower than the real value for the size range that we are concerned with. The price difference between a 150Kdwt and a 175Kdwt vessel for example is usually higher than $750,000, perhaps by an order of magnitude. It is a small number of large and old (cheap) ore carriers in the 200Kdwt+ range that can be identified at the right end of the graph, leading to this result.

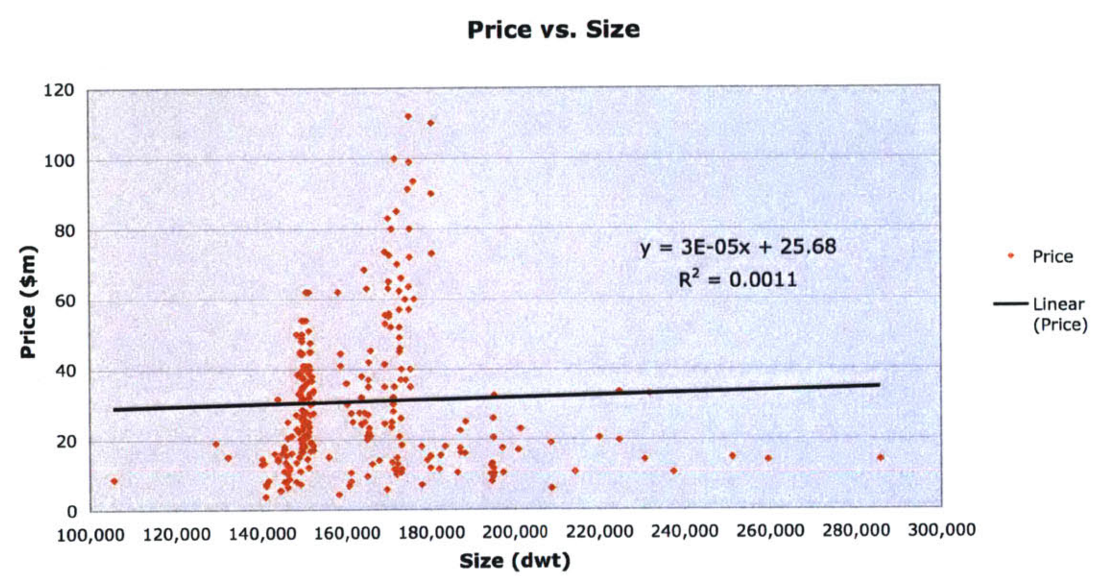

Fig 83: Impact of Size on Ship Value

How to Read Fig 83		
Consider 259,587dwt		
Legend	Meaning	Value
Price	The price of a transaction involving a ship of 259,587dwt	$14m
Linear (Price)	Linear Regression model prediction for the price of an average 259,587dwt vessel	$33.5m

Table 9: How to read Fig 83

A similar graph was produced to evaluate the effect of age on vessel price. This is presented in Fig 84. Again a linear regression model has been used representing a straight-line depreciation.

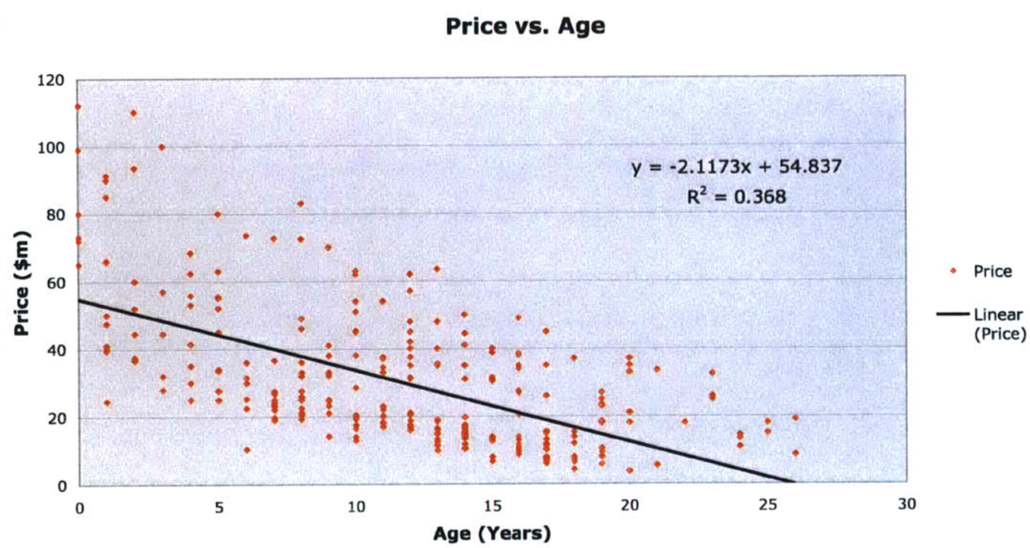

Fig 84 Impact of Age on Ship Value

How to Read Fig 84		
Consider 22 years of Age		
Legend	Meaning	Value
Price	The price of a transaction involving a 22-year old vessel	$18m
Linear (Price)	Linear Regression model prediction for the price of an average 22-year old vessel	$8.3m

Table 10: How to read Fig 84

The y-intercept of the regression model is \$55m while the gradient is -\$2m/year. This means that based on the collected data, the model values a new ship at about \$55m, and the vessel is depreciated by an average of \$2m per year. One can see on the y-axis of the graph (x=0), that all the points lie above the y-intercept. The reason for this is that all new vessel transactions took place in the period between 2004 and today, during which prices were significantly above average.

The x-intercept of the graph is 26 years meaning that model predicts the value of an average ship to drop to 0 at that age. If one however assumes an average scrap value of \$5m, the model predicts the scrapping age at 23.5 years, which is about right. The values predicted by this model are all reasonable while the R^2 value (0.368) is much higher than that of the previous model. This indicates that age has a greater impact on price than ship size.

Since it has been established that price increases with size and decreases with age, an attempt is made to combine the two parameters on one graph. Price was therefore first divided by capacity to produce \$/dwt, and then plotted against age as shown in Fig 85.

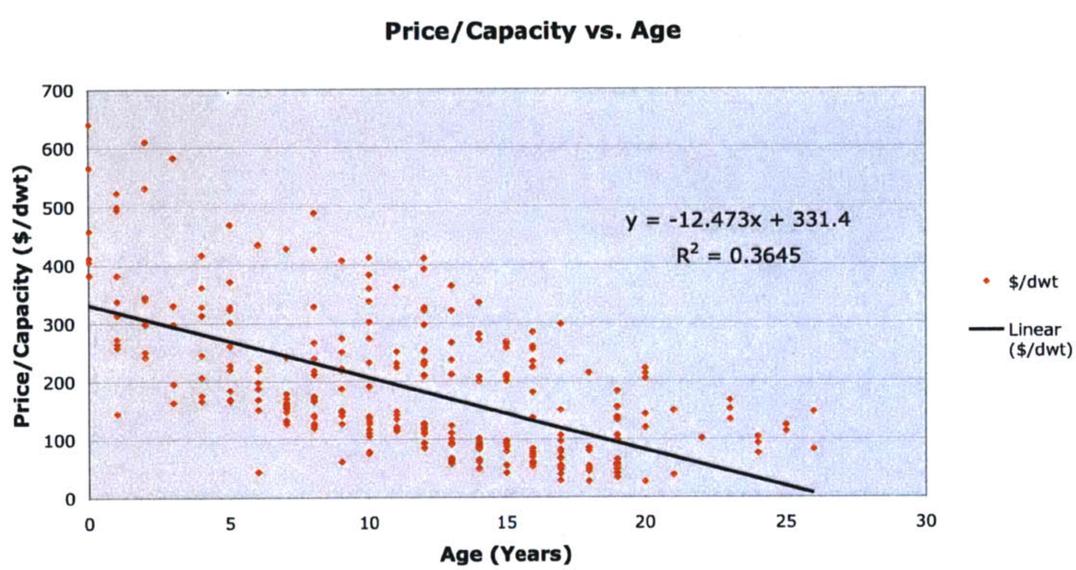

Fig 85: Impact of Age on Ship Price/dwt

How to Read Fig 85		
Consider 22 years of Age		
Legend	Meaning	Value
$/dwt	The price/capacity of a transaction involving a 22-year old vessel	101$/dwt
Linear ($/dwt)	Linear Regression model prediction for the price/capacity of an average 22-year old vessel	57$/dwt

Table 11: How to read Fig 85

Fig 85 looks like Fig 84 with a similar level of scatter. The regression model of this graph values a new 175,000dwt at $58m and predicts its rate of depreciation at $2.2m per year. If one assumes a scrapping price of $6m, the scrapping age is predicted to be 23.8 years, which again is about right. The value of R^2 (0.365) is about the same and shows no increase from that of Fig 84 (0.368). This shows that dividing price by capacity (to account for the effect of size) does not improve the scatter or accuracy of the model.

The above analysis provides an insight on the effect of the examined parameters on price. The data however was very scattered and the accuracy of the regression models was low with R^2 always less than 0.4. This is because the most important parameter has been ignored. That is the market, or in other words, time. Ship values are very closely related to ship earnings so when the market is high, prices are up and vice versa. To account for this, a graph of price vs. time and a graph of price/capacity vs. time were plotted as shown in Fig 86 and Fig 87 respectively. As shown earlier, age has a big impact on prices so the data was divided in age groups of 5 years span.

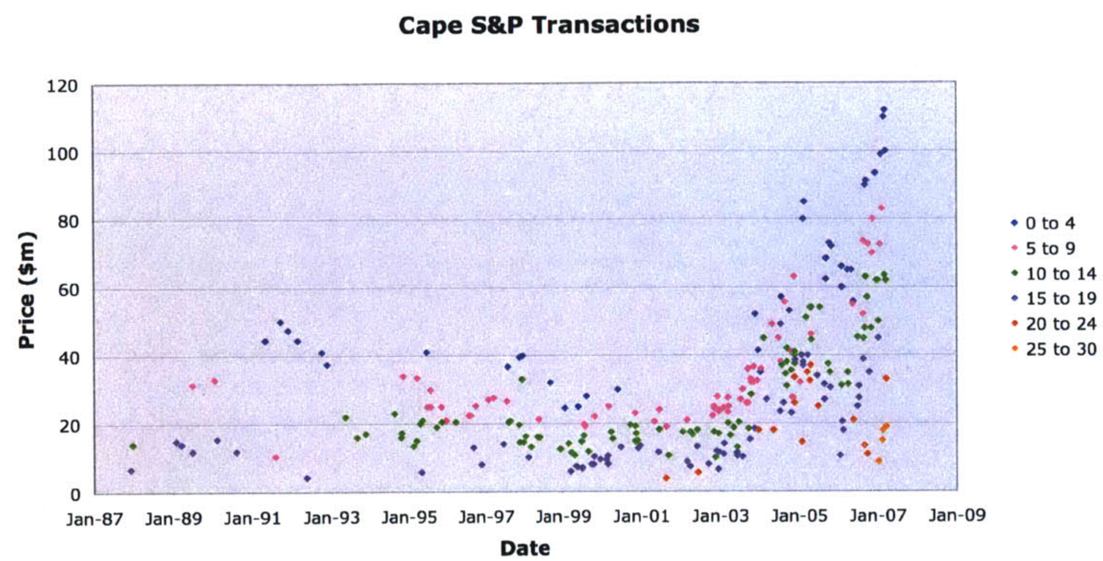

Fig 86: Price vs. Time for the various Age Groups

How to Read Fig 86		
Consider March 2007		
Legend	Meaning	Value
0 to 4	Price of a 0-4 year old cape deal on 03/12/07	$112m
10 to 14	Price of a 10-14 year old cape deal on 03/20/07	$62m
20 to 24	Price of a 20-24 year old cape deal on 03/24/07	$33m
25 to 30	Price of a 25-30 year old cape deal on 03/24/07	$19m

Table 12: How to read Fig 86

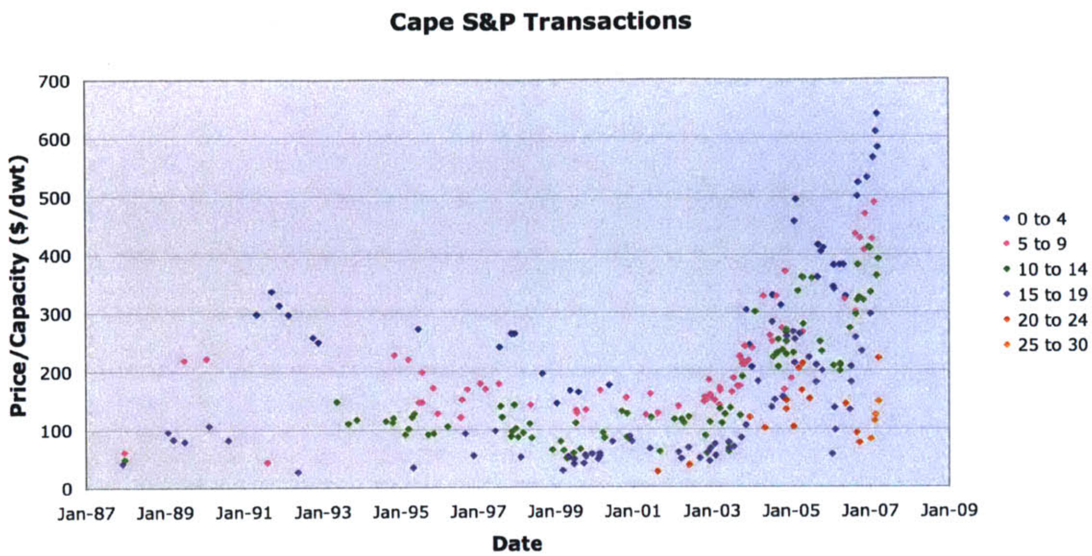

Fig 87: Price/Capacity vs. Time for the various Age Groups

How to Read Fig 87		
Consider March 2007		
Legend	Meaning	Value
0 to 4	Price/Capacity of a 0-4 year old cape deal on 03/12/07	640$/dwt
10 to 14	Price/Capacity of a 10-14 year old cape deal on 03/20/07	392$/dwt
20 to 24	Price/Capacity of a 20-24 year old cape deal on 03/24/07	222$/dwt
25 to 30	Price/Capacity of a 25-30 year old cape deal on 03/24/07	147$/dwt

Table 13: How to read Fig 87

As shown on the graphs, dividing into age groups greatly reduced the data scatter. Prices or prices per capacity of the age groups move parallel to each other along with the fluctuating market. The market affects all age groups while the newest ones are higher. There are some exceptions to this because of data scatter, which is explained by the age range of the groups. To overcome this, another graph was produced, shown in Fig 88, which shows price vs. time for vessels of 0, 5, 10, 15, 20 and 25 years old.

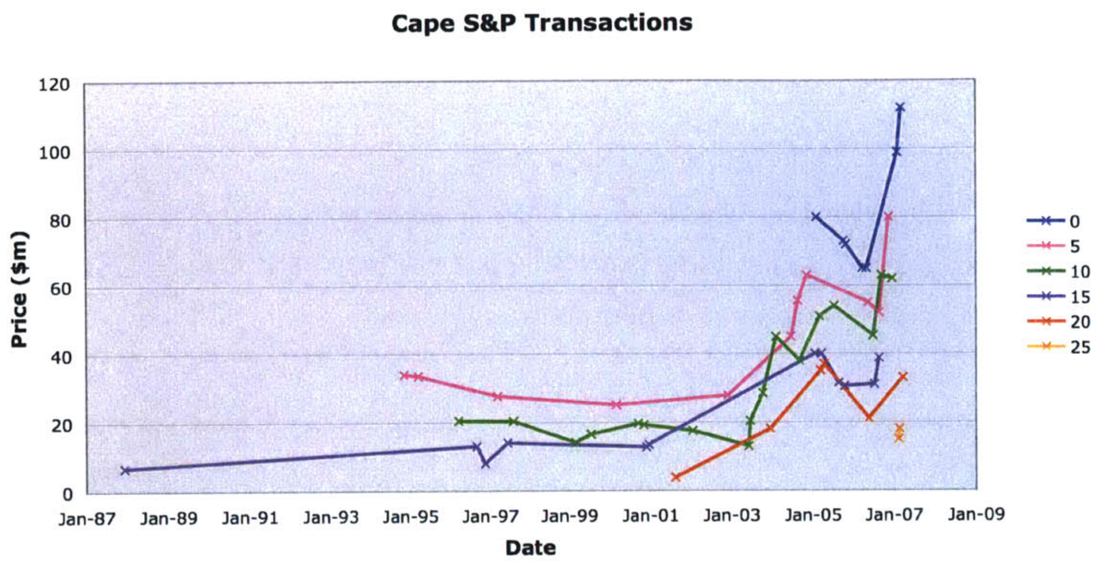

Fig 88: Price vs. Time for Multiples of 5 Age Vessels

How to Read Fig 88		
Consider March 2007		
Legend	Meaning	Value
0	Price of a 0 year old cape deal on 03/12/07	$112m
20	Price of a 20 year old cape deal on 03/24/07	$33m

Table 14: How to read Fig 88

The scatter in this graph has greatly been reduced to the extent that it is sensible to connect the data points as shown in Fig 88. The lines connecting the data points move relatively parallel with the newest ones being on top. Overlapping only occurs when there is lack of data for a specific point in time.

5.5 Critical Age Discounts

As we have seen, ship values fluctuate with the market and are highly dependent on age. Besides the decrease of price with age however, there are also known to be discontinuities in the age/price relationship. These typically occur at ages that are multiples of 5 after the age of 10 years for a variety of reasons.

US investors or IPO's for example, do not approve for vessels older than 10 years old. Furthermore, there are many Japanese companies whose policy is to operate vessels until the age of 10 and then sell them. They also construct them accordingly with a high percentage of high tensile steel, which provides some benefits but also has many drawbacks, which become more important during the later stages of a ship's life. Since these owners and IPO's constitute a significant portion of the market, this creates an abrupt decrease in ship values at the age of 10 years.

Most banks do not finance vessels over 15 years old while it is almost impossible to get finance for vessels over 20 years old. This creates a similar effect in the age/price relationship at the age of 15 and 20 years. Furthermore, there is an age limit of 25 years for all vessels carrying iron ore. Since iron ore is the main commodity transported by capes, this also has a big impact.

In addition to these factors there are also various age limitations of cargo contracts, which also contribute to the discontinuities in the age price relationship. In order to investigate these discontinuities, the database was used to create graphs of Price vs. Time for transactions of vessels of the critical age (e.g. 10 years old), one and two years younger, and one year older. The purpose is to show the relatively larger decrease in price at the critical age (e.g. between 9 and 10) compared to one year younger (between 8 and 9) and one year older (between 10 and 11). This was carried out for the age of 10, 15, 20 and 25 years and the graphs are shown in Figs 89, 90, 91 & 92 respectively. Graphs of Price/Capacity vs. Time were also plotted for the same ages and can be found in Appendix B.

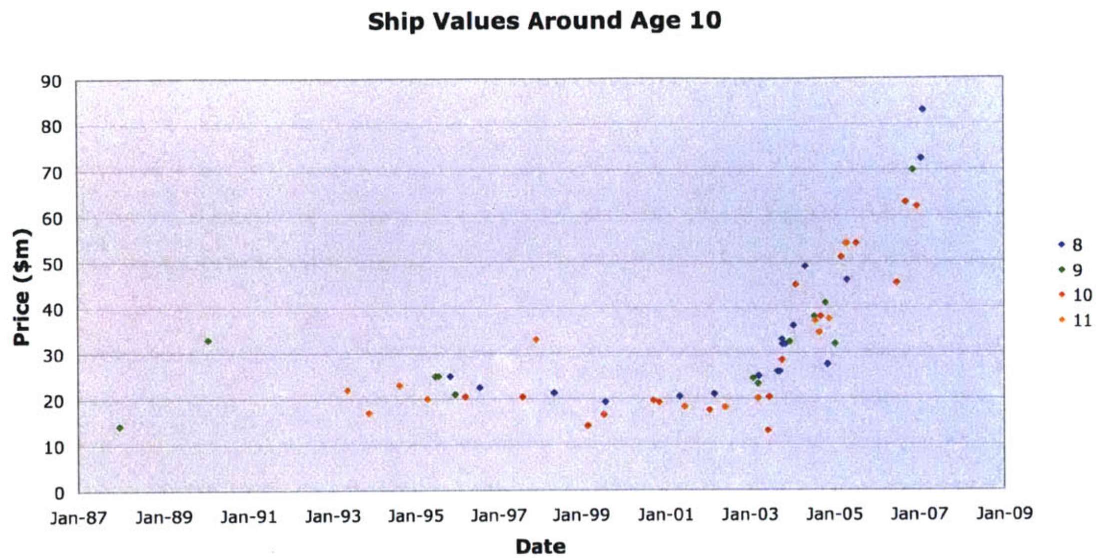

Fig 89: Vessel Price vs. Time to Show the Discount at 10 Years Old

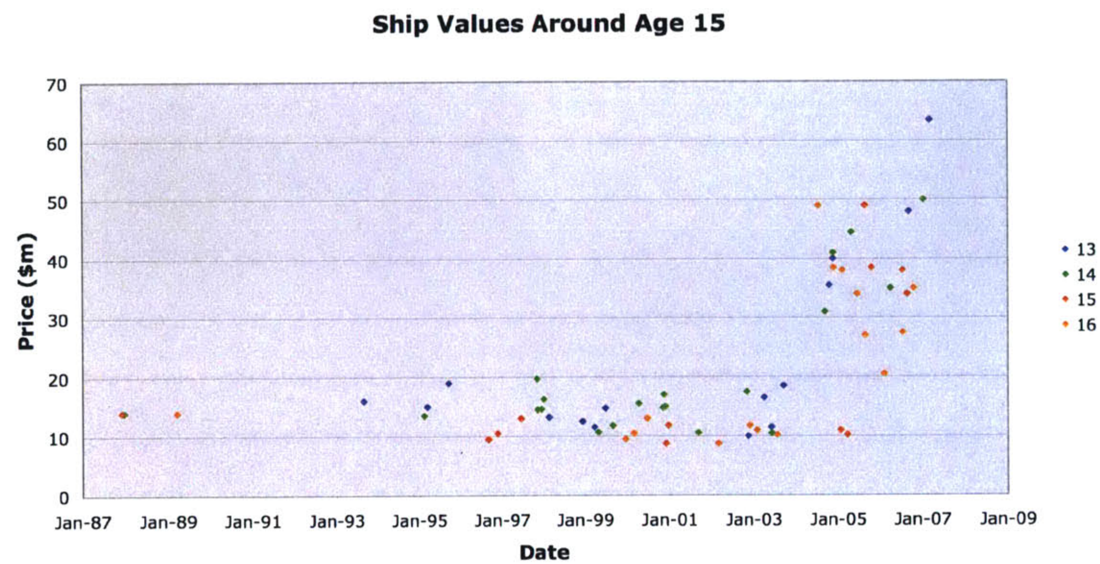

Fig 90: Vessel Price vs. Time to Show the Discount at 15 Years Old

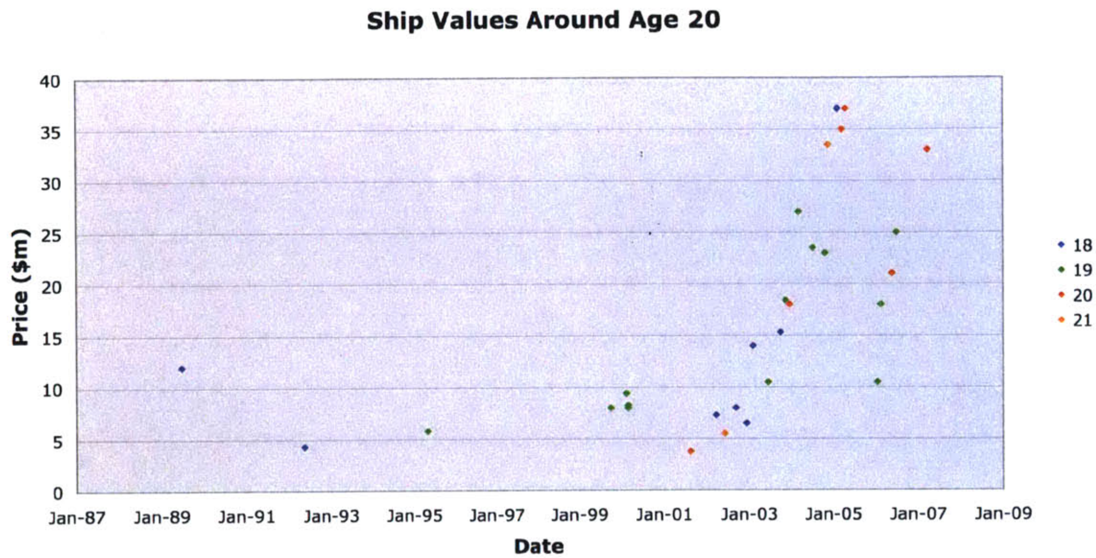

Fig 91: Vessel Price vs. Time to Show the Discount at 20 Years Old

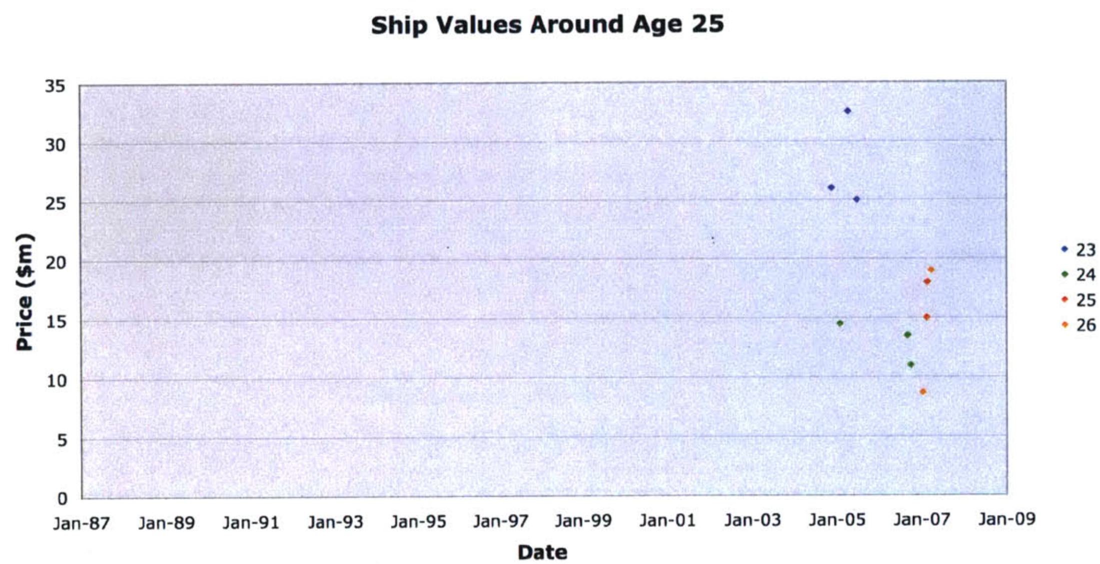

Fig 92: Vessel Price vs. Time to Show the Discount at 25 Years Old

Unfortunately, the discontinuity in the age-price relationship is not clear in the diagrams. There could be many reasons for this but the most important one is insufficient data. Due to the small size of the capesize fleet and the small number of transactions each month, it is almost never the case that a buyer will be given the choice between say a 9-

year old vessel and a 10-year old vessel at a specific point in time. Buyers are therefore forced to go with what is available and their preferences therefore do not show up in the results. Furthermore, it is unknown whether the 10, 15, 20 and 25 year old vessels have passed their special survey, which is due every 5 years. One should note that passing a special survey not only involves the actual cost of the repairs and fees (which is usually in the millions for old vessels), but also the loss of earnings when pulling the ship out of the market for several weeks which can be very high in a strong market.

5.6 Other Determinants of Ship Values

So far, the effect of the market (time), ship age and ship size on prices has been studied. There are other factors that also play a significant role. These can be examined by considering a sample of transactions from the S&P database. The list of the reported capesize deals from January 1st 2007 to March 30th 2007 is presented in Table 15 Please note that the market (freight rates and prices) has had an upward trend during this period.

Date	Name	Built	Size	Notes	Price
02/Jan	SPRING BRAVE	1995	151,066	Delivery in May	62
08/Jan	MONTEGO II	1993	149,391	TC: 30k/d – Dec'08	50
08/Jan	CHS MOON	1990	151,227	-	45
10/Jan	BRILLIANT CORNERS	1981	105,496	-	8.7
26/Jan	LOWLANDS BEILUN	1999	170,162	TC: 37.4k/d-Mar/Jun'10	72.5
05/Feb	YUE MAY	2007	175,000	-	99
14/Feb	DYNASTY	1982	132,082	-	15
14/Feb	PANTELIS SP	1999	169,883	TC: 47.5k/d – Feb'08	83
22/Feb	THIOS COSTAS	1982	145,229	Delivery in May	18
02/Mar	CAPE PELICAN	2005	180,235	-	110
05/Mar	JOHNNY K	1994	174,770	POLAND BLT	63
12/Mar	ANANGEL WISDOM	2007	175,000	-	112
19/Mar	CAPE KASSOS	2004	171,480	Delivery in Sept	100
20/Mar	MARTHA VERITY	1995	157,991	-	62
Mar	AMERICANA	1987	148,982	-	33
Mar	IKARIA	1981	129,237	-	19

Table 15: Reported Capesize Deals from January 1st 2007 to March 30th 2007

[Vafias 2007, Braemar 2007b, Tradewinds 2007]

5.6.1 Ship Builder

The shipyard, or more generally the country where the ship was built, can have a significant effect on the price. Rumanian, Polish or Brazilian ships for example have always been discounted compared to similar Japanese or Korean vessels. To illustrate this, one can compare the JOHNNY K, which was built in Poland, with the MARTHA VERITY. The JOHNNY, being one year older and 10.6% (17,000dwt) larger, was sold for only 1.6% ($1m) more during the same month (two weeks difference).

5.6.2 TC Attachment

A t/c attachment may increase or decrease a ship's value depending on the t/c rate compared to the current market, the length of the t/c contract and the risk involved. The risk depends on the trustworthiness of the charterers and the number and kind of assets that they have. The value of a time charter attachment is equivalent to the net present value of the difference between the earnings of the attached charter and the earnings of a charter of the same period length at the current market rate. If the charter attachment is of low risk, the value of the time charter is superimposed on the vessel's charter-free price.

This can be illustrated by comparing the LOWLANDS BEILUN and the PANTELIS SP. These are very similar vessels that were sold within a few days from each other, allowing for only a small market increase. They had different t/c attachments, which explain the difference in their price. Table 16 shows some crude calculations in order to approximate the charter-free value of the two vessels.

	LOWLANDS BEILUN	*PANDELIS SP*
Deal Date	26-Jan-07	14-Feb-07
Approx. TC Period	3 years	1 year
TC Rate	$37,400/day	$47,500/day
Market Rate at Deal Date for TC Period	$53,000/day	$65,000/day

Rate Difference	-$15,600/day	-$17,500/day
Assumed days per year	355	355
Approximate TC Value	-$16.6m	-$6.2m
Price	$72.5m	$83m
Approx. Charter-Free Price	**$89.1m**	**$89.2m**

Table 16: Comparison of Capesize Deals to Illustrate the Value of TC Attachments

The charter-free value of the two vessels is very close which shows that the difference in the prices is due to the time charter. A 10-year old, charter-free, 170Kdwt vessel during the same month was worth about $83m while a 5-year old was worth $98m. It can therefore be seen that the estimated value of $89m for the 8-year old vessels is very reasonable. In fact it is the exact value one obtains through linear interpolation.

One should note however that the above are only crude approximations for illustrative purposes. Net present value calculations were not performed. Furthermore, one important factor that was not considered is the vessel's age after the charter. This will affect its residual value but in this example, and more generally in the current market, this is of relatively low importance as the later years are discounted at a much lower rate.

5.6.3 Delivery Time

Another factor whose importance has been highlighted over the past few years is the time of delivery of a vessel. When the market is at high levels, the earnings projected over the period that the market is expected to last affect ship prices significantly. 25 and 26-year-old small capes such as the THIOS COSTAS and IKARIA for example will be scrapped immediately if a market crisis finds them in the spot market. They are only selling at circa $20m because of their high earnings in today's market. It is therefore understandable that a later delivery time costs money and therefore reduces the value of the ship in a good market.

Consider the CAPE PELICAN that was sold for $110m, the CAPE KASSOS that went for $100m and the ANANGEL WISDOM that went for $112. The CAPE PELICAN is slightly more modern than the CAPE KASSOS, which has a delivery date in September. The 1-year age difference however does not explain the $10m difference in price since the ANANGEL WISDOM, which is 2 years younger than the CAPE PELICAN, only went for $2m higher.

Six-month charter rates in March on the other hand (until September) were about $72,000/day, so if one assumes running costs of about $5,500/day, this corresponds to earnings of about $12m. Similarly, this explains why a typical newbuilding with delivery in 2010 only costs about $80m even though it will be more modern and larger than the above vessels.

As discussed earlier, if a ship is SS-due or DD-due, meaning that it has to pass its special survey or intermediate survey (Dry Docking), this also involves having to wait for several weeks. The special survey is due every 5 years and there is an intermediate between every two consecutive special surveys. The special survey itself and all the repairs may cost about $1m for a 15-year old cape. Today, the loss of earnings at the daily rate of over $100,000/day for say a duration of 40 days deviation to the yard and repair time is about four times as much.

5.7 Historical Cape Prices and Price Ratios

Ship brokers and other companies such as Marsoft who carry out research for the maritime industry, try among other things to keep track of ship prices. These are primarily based on actual deals like the ones in the current database. In order to be consistent however, one must keep track of a specific vessel type, age and size.

As shown earlier, ship values are affected by several factors while the few cape transactions taking place each month involve ships that differ in many aspects. As such, experience and perhaps some empirical formulae are required to convert the prices of the actual deals to those matching the chosen vessel type, age and size.

To account for age differences, one needs to use some sort of depreciation curve along with newbuilding prices for relatively new ships or scrap values for older vessels. To account for size, one needs to use their experience and historical data. Consider a 5-year old 170Kdwt vessel and a 5-year old 150Kdwt vessel for example. Fig 93 shows the values for these ships since the beginning of 1990 until today based on data from [Carksons 2006c] and actual transactions from the database.

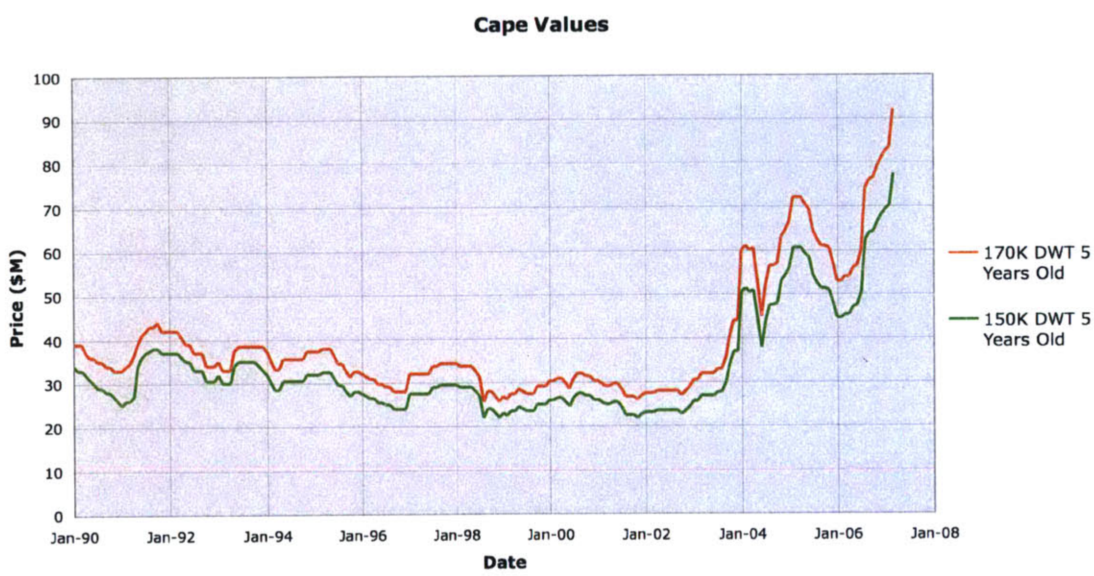

Fig 93: Track Record of 5-Year Old 170Kdwt and 150Kdwt Cape Values since January 1990 – Using data from [Clarksons 2006c, Levine 2006, Vafias 2007, Braemar 2007b, Tradewinds 2007]

As it can be seen, the values have been relatively parallel. The price ratio of the 170Kdwt vessel to the 150Kdwt vessel has been fairly constant with an average value of 1.2. By noting the deadweight ratio of 1.13, one can see the economies of scale, which explain the steady increase in the typical size of capes over the years.

Besides converting prices from actual deals to account for factors such as size, age, shipyard, engine size etc., when there is lack of deals in the market, freight rates may also be used to predict what the prices would have been had there been a transaction. These records are therefore not exact but they are nonetheless very useful in following and trying to understand the behavior of the market.

Fig 94 shows the historical prices of 170,000dwt capes of various ages and their scrap value. The graph was compiled using data from [Marsoft 2007a] and actual fixtures and S&P transactions from the database.

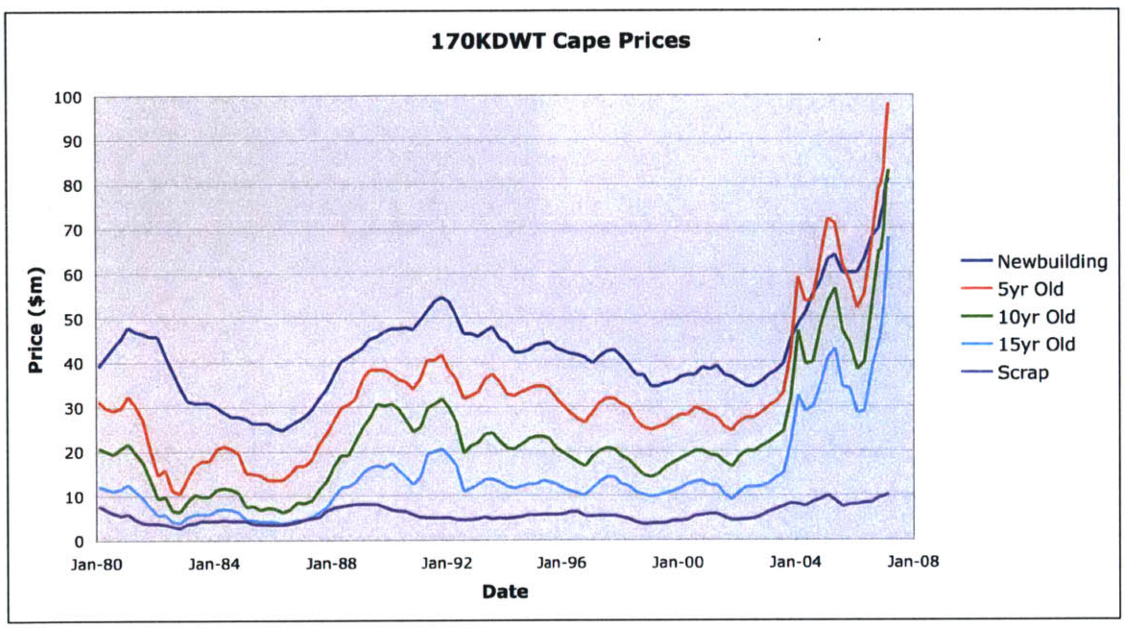

Fig 94: Historical Track of 170Kdwt Cape Values along with Scrap Values – Using data from [Marsoft 2007a, Levine 2006, Vafias 2007, Braemar 2007b, Tradewinds 2007]

How to Read Fig 94		
Consider February 2001		
Legend	Meaning	Value
Newbuilding	Average price of a 170,000dwt newbuilding cape	$38.3m
5yr Old	Average price of a 170,000dwt 5 year old cape	$28.1m
10yr Old	Average price of a 170,000dwt 10 year old cape	$19.1m
15yr Old	Average price of a 170,000dwt 15 year old cape	$12.3m
Scrap	Scrap value of a 170,000dwt cape	$5.8m

Table 17: How to read Fig 94

Prior to the market boom, which began in 2003, ships used to be valued to a crude approximation using a straight-line depreciation curve with a lifetime of 20 years. The scrap value was neglected for relatively young ships in order to account for increasing operating costs with age. The price of a newbuilding was therefore about 2 times that of the 10-year old vessel while that of a 5-year old vessel was half way between. In February 2001 for example, a 170Kdwt newbuilding was worth about $38m while a 5-year old was worth about $28m and a 10-year old was worth about $19m. Assuming a straight-line depreciation, using a 20-year lifetime and neglecting scrap value yields a gradient of $2m/year. Charter rates were about $15,000/day for 170Kdwt ships and average running costs were about $5000/day resulting in operating profits of about $3.5m/year, which is reasonable.

As shown on the graph, ships values were always capped by the NB price. Ship values therefore lied between the newbuilding price and the scrap value (minus the cost of transporting and scrapping the ship). Things obviously changed after the market boom. Spot rates went up until they exceeded $100,000/day but there was no confidence that this will last. A straight-line depreciation curve was therefore no longer appropriate.

If a straight-line depreciation curve applied, one would expect values of ships of different ages to diverge as they increase while the price ratios remain relatively constant. Instead, we see that ship prices move in parallel meaning that they increase by the same amount. This shows that the period for which the market is expected to last is valued much higher than the remaining ship's life. It is also valued approximately the same for all capes regardless of their age. Consequently, as the market stays strong, very few vessels are scrapped. This combined with the high demand for steel causes scrap values to reach record high levels.

Fig 95 shows the historical prices of 150,000dwt capes of various ages along with 6-month charter rates for vessels of that size. The graph was compiled using data from [Clarksons 2007a] and actual fixtures and S&P transactions.

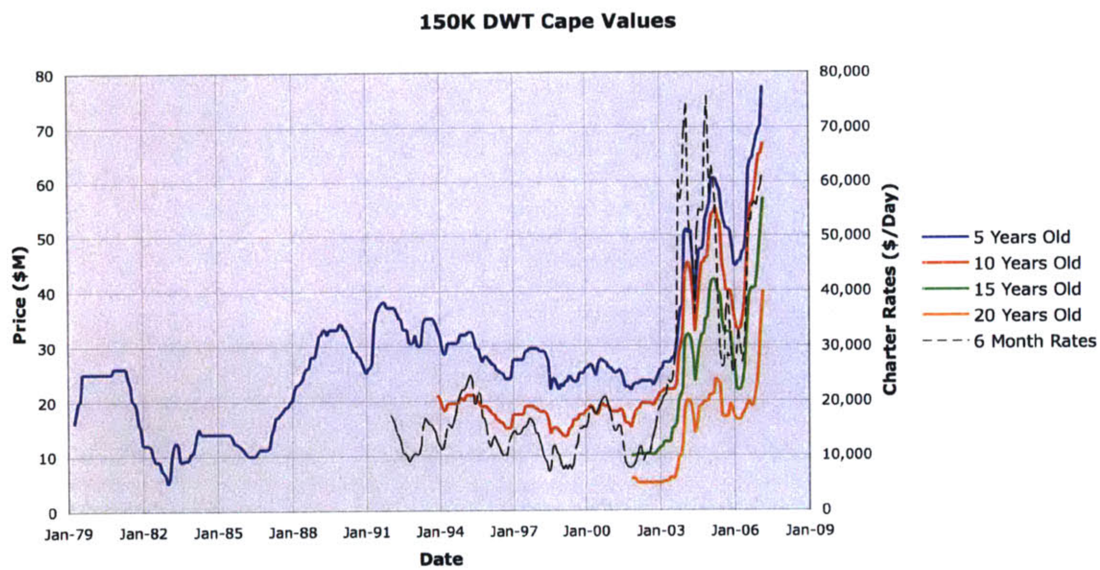

Fig 95: Historical Track of 150Kdwt Cape Values along with 6-Month Carter Rates - Using data from [Clarksons 2007a, Levine 2006, Vafias 2007, Braemar 2007b, Tradewinds 2007]

How to Read Fig 95		
Consider February 2001		
Legend	Meaning	Value
5 Years Old	Price of 150Kdwt 5-year old capes in March 2007	$77.38m
10 Years Old	Price of 150Kdwt 10-year old capes in March 2007	$67m
15 Years Old	Price of 150Kdwt 15-year old capes in March 2007	$57m
20 Years Old	Price of 150Kdwt 20-year old capes in March 2007	$40m
6 Month Rates	6-month charter rates for 150Kdwt capes in March 2007	$62K/day

Table 18: How to read Fig 95

As the freight market stayed at high levels, cash reserves were built up and confidence improved. This increased buying interest so prices kept rising. One can see that even though charter rates in March 2007 were significantly lower than the peaks of February 2004 and December 2004, ship values were much higher due to the better confidence in sustainable high levels. That is why a 20year old 150Kdwt vessel today is worth about $40m whereas in a bad market it would be of scrap value.

Since the good market is experienced by vessels of all ages, while spot rates are relatively independent of age, prices remain parallel. Fig 96 explores this phenomenon and its impact on price ratios. It shows the ratio of prices of 150Kdwt vessels of various ages with respect to time, along with 6-month charter rates for 150Kdwt vessels, which are indicative of their earnings. The graph was compiled using data from [Clarksons 2007a] and actual fixtures and S&P transactions from the database.

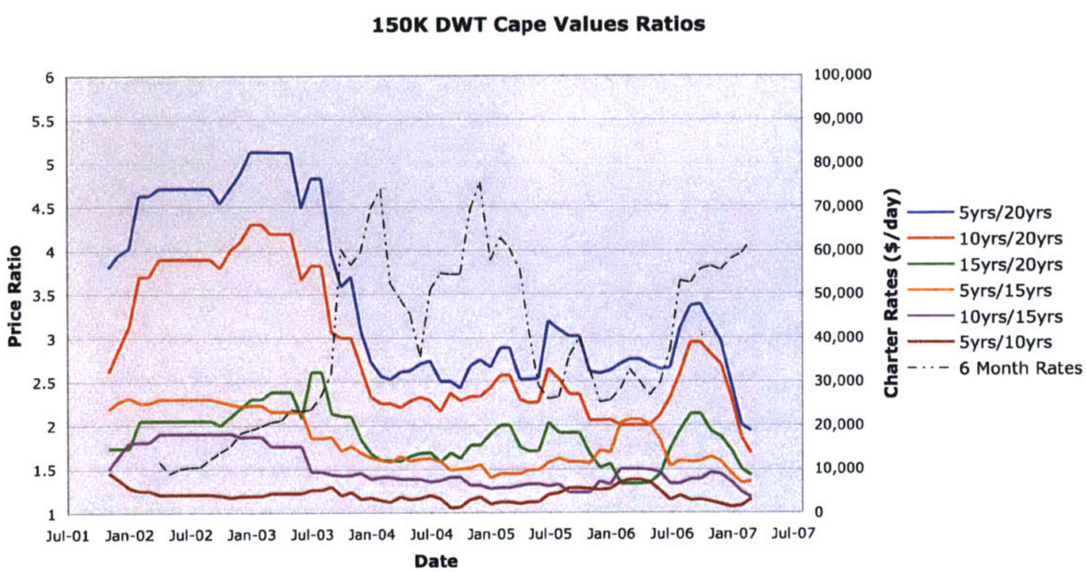

Fig 96 Historical Track of 150Kdwt Cape Value Ratios along with 6-Month Carter Rates - Using data from [Clarksons 2007a, Levine 2006, Vafias 2007, Braemar 2007b, Tradewinds 2007]

How to Read Fig 96		
Consider March 2007		
Legend	Meaning	Value
5yrs/20yrs	Price(5yr-old) / Price(20yr-old) for 150Kdwt in Mar-07	1.935
10yrs/20yrs	Price(10yr-old) / Price(20yr-old) for 150Kdwt in Mar-07	1.675
15yrs/20yrs	Price(15yr-old) / Price(20yr-old) for 150Kdwt in Mar-07	1.425
5yrs/15yrs	Price(5yr-old) / Price(15yr-old) for 150Kdwt in Mar-07	1.358
10yrs/15yrs	Price(10yr-old) / Price(15yr-old) for 150Kdwt in Mar-07	1.175
5yrs/10yrs	Price(5yr-old) / Price(10yr-old) for 150Kdwt in Mar-07	1.155
6 Month Rates	6-month charter rates for 150Kdwt capes in Mar-07	$62K/day

Table 19: How to read Fig 96

When the market is low compared to previous levels, the price ratio of new to old vessels is high. New vessel prices are related to the new building cost while old vessels are related to their scrap value. In a good market however, people discount the projected earnings over the period for which they expect the good market to last (e.g. 2 years). Both new and old vessels feel the good market. The t/c rates and particularly spot rates increase disproportionately for old vessels compared to new ones. Spot rates in a good market are about the same for all vessels regardless of their age. The added value of the good market is therefore similar for all vessels. Consequently, the ratio of prices for new to old vessels decreases substantially in a good market. This is particularly evident when comparing vessels up to 10 years old that were previously valued close to newbuilding price with vessels 20 years old and over that are priced near scrap value in a bad market.

Fig 97 and Fig 98 show the historical prices of typical capes of various ages along with spot rates and 3-year charter rates. Typical cape refers to the predominant size of vessels at each point in time. That for example would be about 140-145Kdwt in the 1980s, 150Kdwt in the early 1990s, 170Kdwt in the late 1990s, 175Kdwt today, while the vessels that are being ordered today for delivery in 2010 are about 180Kdwt. The graph was compiled using data from [Braemar 2007a] and the S&P database for the ship values, [Baltic Exchange 2007] for the spot rates and [Clarksons 2007a] and actual fixtures for the 3-year charter rates.

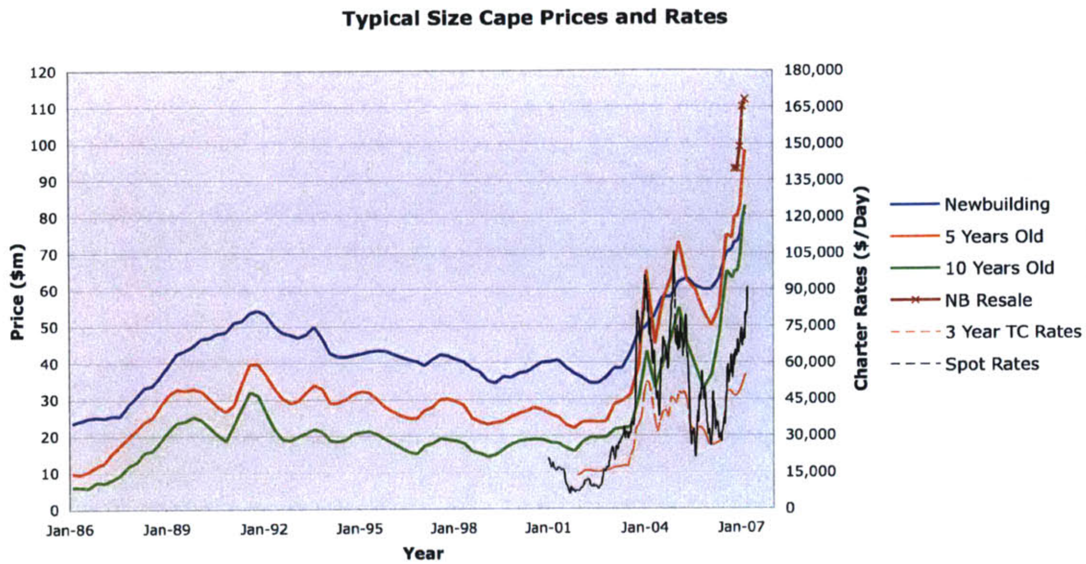

Fig 97: Historical Track of Typical Cape Values along with spot and 3-Year Carter Rates – using data from [Braemar 2007a, Levine 2006, Vafias 2007, Tradewinds 2007, Baltic Exchange 2007, Clarksons 2007a]

How to Read Fig 97 & Fig 98		
Consider March 2007		
Legend	Meaning	Value
Newbuilding	Price of newbuilding typical size cape in March 2007	$112m
5 Years Old	Price of 5-year old typical size cape in March 2007	$81m
10 Years Old	Price of 10-year old typical size cape in March 2007	$98m
NB Resale	Price of new typical size cape in March 2007	$83m
3 Year tc Rates	3-year time charter rates for 170Kdwt in March 2007	$55,000/day
Spot Rates	Average spot rates for 172Kdwt cape in March 2007	$90,906/day

Table 20: How to read Fig 97 and Fig 98

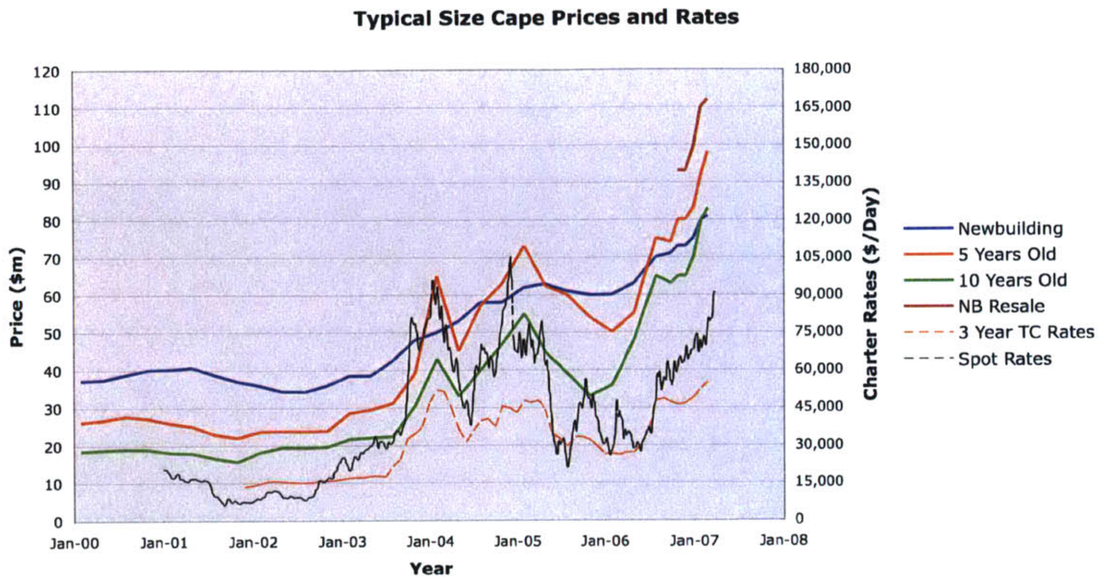

Fig 98: Historical Track of Typical Cape Values along with spot and 3-Year Carter Rates – using data from [Braemar 2007a, Levine 2006, Vafias 2007, Tradewinds 2007, Baltic Exchange 2007, Clarksons 2007a]

The year 2003 was the first time that current months were valued so high compared to the rest of the ship's life making secondhand prices higher than that of newbuildings that have a late delivery. Today, the difference between a resale and a newbuilding is at a record high and while a 10-year old vessel is now worth more than a newbuilding.

People started valuing the next few months much higher than the remaining ship life began when the market boom started. That is also why t/c rates were higher than the spot market and decreased with period length. The number of months that were valued higher gradually increased as the market remained at high levels and confidence built up. The following Chinese-build cape deals that took place in October 2006 illustrate this.

- Diana paid $91m for an SWS Cape resale to be delivered in Dec. 2006
- Transmed sold its last Bohai Cape newbuilding (Delivery in Nov. 2007) for $81.5m
- Golden Union ordered a 177Kdwt Cape in Waigaoqiao for $61m (delivery in 2010)

Looking at these prices, each year until 2010 was valued at around $10m. This is reasonable as one could charter a cape in October for the next three years to earn significantly more than that also to account for ageing. What is most remarkable is that the following years of the ship's lifetime were discounted at a rate of only around $3m per year (Golden Union order), which is similar to pre-2003 valuations.

A newbuilding resale today is worth about $112m while a newbuilding for delivery in 2010 is worth about $80m. Again this puts a value of about $10m per year. When ordering a vessel, it is common practice to pay 20% upon signing, 25% on steel cutting, 20% on keel-laying (about 3 months before delivery), and 30% on delivery. Table 21 shows the amount of each payment for a $80m newbuilding order, and its present value using a discount rate of 5%

Net Present Value of a Newbuilding Order				
	Time (years)	**% of Price**	**Amount**	**PV (i = 5%)**
Signing	0	20%	$16m	$16.0m
Steel Cutting	2	25%	$20m	$18.1m
Keel Laying	2.75	20%	$16m	$14.0m
Delivery	3	35%	$28m	$20.7m
Total		100%	$80m	**$68.9m**

Table 21: Net Present Value of a Newbuilding Order using a Discount rate of I = 5%

If one uses a linear depreciation curve after 2010, with a 20-year lifetime and zero scrap, today's value of a 3-year old vessel in 2010 is worth 17/20 times the NPV of the newbuilding. Table 22 shows the NPV of a newbuilding for a discount rate of 5%, 8% and 10% along with the corresponding today's value of a 3-year old vessel in 2010.

NPV of an Order and Equivalent PV of a 3-yr old Vessel in 2010		
	NPV for new vessel in 2010	**NPV for 3yr-old in 2010**
I = 5%	$68.9m	$58.5m
I = 8%	$65.1m	$55.4m
I = 10%	$62.9m	$53.4m

Table 22 NPV of a NB Order and the Equivalent PV of a 3-yr Old Vessel with Delivery in 2010

If one charters the resale from March 2007 until 2010 (3 years), rates are about \$55,000/day. One can also assume 355 days per year and average running costs of about \$6,000/day over the next 3 years for a new vessel. If the NPV of the operating profits over the three years are subtracted from its current value of \$112m, this yields the effective cost of buying a 3-year old vessel for delivery in 2010. This calculation is again performed using a discount rate of 5%, 8% and 10% in Table 23

NPV of Resale's Profits and Equivalent PV of a 3-yr Old Vessel in 2010		
	NPV of Earnings	**NPV for 3yrold in 2010**
I = 5%	\$47.0m	\$65.0m
I = 8%	\$45.1m	\$66.9m
I = 10%	\$43.9m	\$68.1m

Table 23: NPV of Resale's Profits and the Equivalent PV of a 3-yr Old Vessel with Delivery in 2010

By comparing Table 21 and Table 22, one can see that it does not make sense to buy a resale and charter it for 3 years at \$55,000/day. Using a discount rate of 5%, this is equivalent to paying only \$3.9m less for a 3-year old vessel in 2010 instead of a new vessel whereas by assuming linear depreciation, it should be worth about \$10.4m less. If a higher discount rate is assumed, it is equivalent to paying even more for a 3-year old vessel than a new vessel. If one chooses the resale over the newbuilding therefore, one has to assume higher earnings during the next 3 years than can be obtained through a 3 year charter. In other words, one has to be speculative about the market. If one takes this view however, it is simpler to charter in a vessel on a 3-year time charter and then charter it out on the spot market.

The numbers show that ordering at \$80 for delivery in 2010 makes far more sense than buying a resale today at \$112m. Many IPO's however are concerned about other issues such as the numbers that show up on their accounts. Paying for an asset that will not be delivered and make any money for the next three years does not seem to impress investors for example.

By comparing the spot rates to the 3-year time charter rates, one can see that spot rates are usually more volatile with higher peaks and lower bottoms. They are also first to go up or down and are then followed by the 3-year time charter rates after a short time lag. In general, the shorter the charter period, the higher the peak rates, the lower the bottom rates, and the shorter the time lag from spot rates. This is primarily because they represent a bigger commitment. Similarly, there is a time lag between freight rates and ship values. The fact that it takes longer to sell a ship than to charter it has little relevance. People usually wait after a market change and often perceive new levels as temporary. It takes a far more sophisticated decision to sell a vessel than to charter it. That is also why the time lag is smaller between prices and long time charter rates. Spot rates for example began rising significantly in December 2002, 3-year charter rates picked up in July 2003, and ship values started increasing steeply in October 2003.

Optimism or pessimism about the future of the market and the owners' position regarding ships and capital is what drives ship prices. The good market helps build up healthy cash reserves and shipowners' optimism so it may take a considerable time of a bad market to depress expectations and for prices to drop. In other words, there is a very low short-term price elasticity of supply for second hand vessels as there is for newbuildings.

Fig 99 shows the percentage by which 150Kdwt cape prices increased from October 2002 until the two subsequent price peaks in February 2004 and April 2005, and until today. The chart was compiled using data from [Clarksons 2007a] and actual S&P transactions from the S&P database.

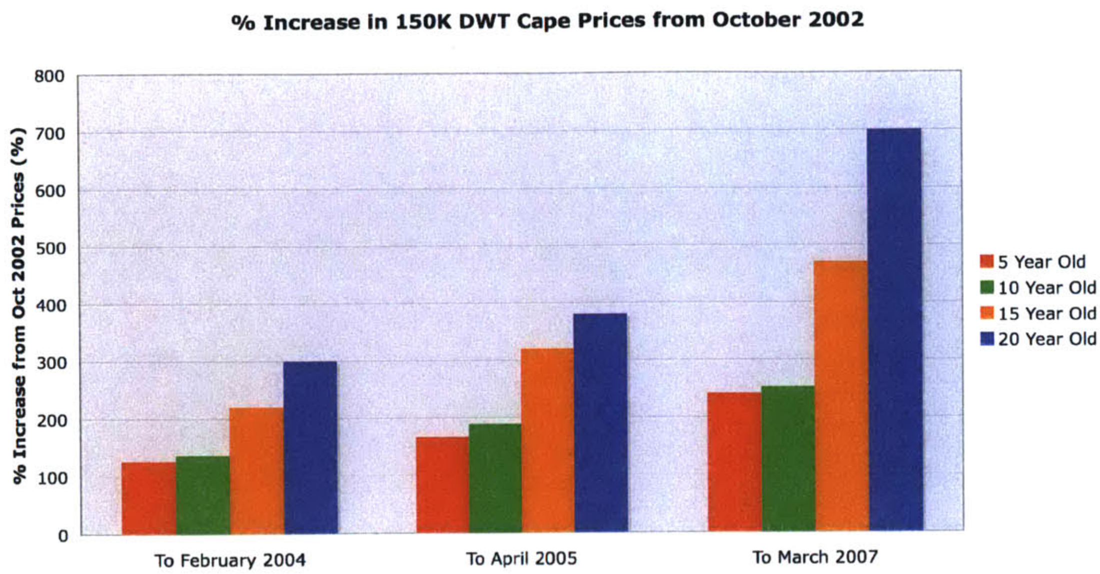

Fig 99: 150Kdwt Cape Price Increase from Oct.2002 until the 2004 and 2005 Price Peaks and until Today – Using data from [Clarksons 2007a, Levine 2006, Vafias 2007, Braemar 2007b, Tradewinds 2007]

How to Read Fig 99		
Consider "To March 2007"		
Legend	Meaning	Value
5 Year Old	Increase in price of 5yr old 150Kdwt from Oct'02 to Mar'07	241%
10 Year Old	Increase in price of 10yr old 150Kdwt from Oct'02 to Mar'07	253%
15 Year Old	Increase in price of 15yr old 150Kdwt from Oct'02 to Mar'07	470%
20 Year Old	Increase in price of 20yr old 150Kdwt from Oct'02 to Mar'07	700%

Table 24: How to read Fig 99

As shown, the values of older vessels increased more than newer ones while each subsequent peak in prices since October 2002 was higher. This chart also highlights the critical age of 15 and 20 years that was discussed earlier. In a low market, vessels over 15 years old are less likely to survive to the next market boom and are therefore less preferred. Hence they are relatively cheaper. As the market picks up, people become less picky and these vessels therefore gain relatively more on prices.

Fig 100 shows the percentage by which 150Kdwt and 170Kdwt cape prices increased from October 2002 until today, but now also accounting for ageing. This means that we are considering a specific 5, 10, 15 and 20-year old vessel in 2002, which is 5 years older in 2007. Again the chart was compiled using data from [Clarksons 2007a] and actual S&P transactions from the S&P database.

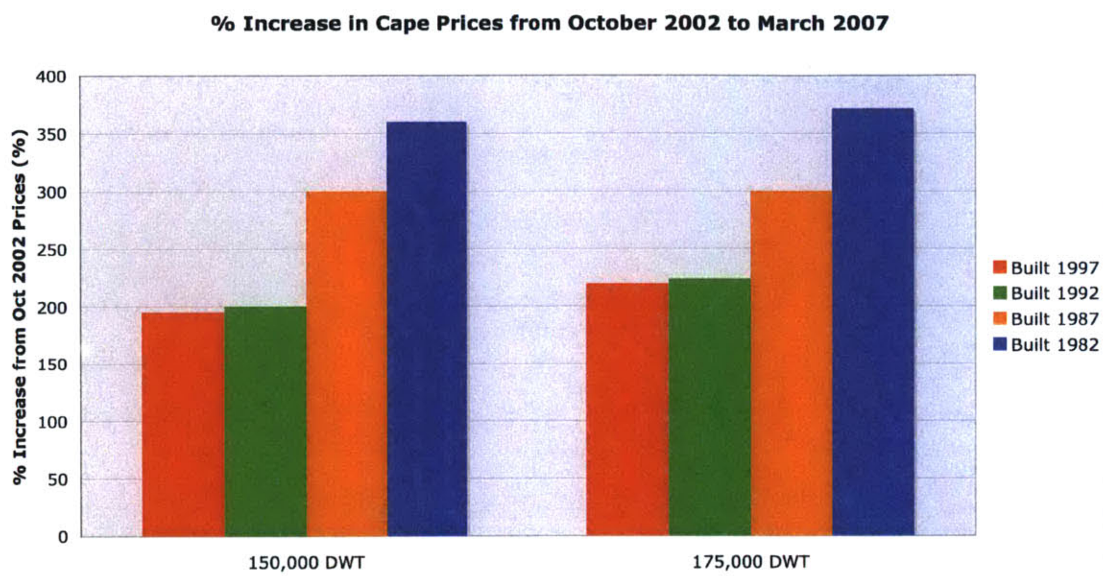

Fig 100: 150Kdwt and 170Kdwt Specific Cape Price Increase from Oct.2002 until Today [Clarksons 2007a, Levine 2006, Vafias 2007, Braemar 2007b, Tradewinds 2007]

How to Read Fig 100		
Consider 175,000 DWT		
Legend	Meaning	Value
Built 1997	Price increase of a 1997-built 175Kdwt from Oct'02 to Mar'07	219%
Built 1992	Price increase of a 1992-built 175Kdwt from Oct'02 to Mar'07	224%
Built 1987	Price increase of a 1987-built 175Kdwt from Oct'02 to Mar'07	300%
Built 1982	Price increase of a 1982-built 175Kdwt from Oct'02 to Mar'07	371%

Table 25 How to read Fig 100

Again this chart shows that the older the vessel, the higher the percentage increase in its price. Furthermore, the prices of 175Kdwt vessels increased slightly more than those of 150Kdwt vessels. This chart also accounts for the five years of ageing between October 2002 and March 2007 and that is why the percentage increase in price is lower compared to the previous chart. However, we have not considered the earnings of the vessels over these 5 years.

Average spot rates (average of the 5 routes) between October 1st 2002 and March 29th 2007 for a Baltic Cape (172Kdwt) were $50,750/day [Baltic Exchange 2007]. Assuming 355 days per year (for earnings) and average running costs of $5,500/day results in annual profits of $16m. Assuming cumulative interest of 5%, this amounts to about $78m of profits in March 2002 over the 4.5 years. This is about the same for all the ships considered above since spot rates are relatively nondependent on ship age, running costs only increase marginally, and the number of days in a year would be only as low as 345 for the oldest ship. This means that the increase in the percentage return on investment for older vessels would be much greater that that for newer ships.

Consider the 1982 built 175Kdwt ship, which was worth $7m in October 2002 and $33m in March 2007. To be conservative, assume average earnings of 35,000/day, running costs of 6,500, 340 days in a year and a 5% interest rate over the 4.5 years. The value of the total profits is worth about $46.5m in March 2007. If this is also included in the price increase, we get a total increase of 1,036% within 4.5 years.

The question of selling or chartering a vessel is a major one in shipping. As shown above, prices are very volatile and there are times when selling seems the best option. Even though charters involve some risk and renegotiations occasionally take place, experience has shown that even before the market boom, selling was rarely the best option. Consider a 1974-built 120Kdwt vessel, which is typical of the first capes. Fig 101 shows how the price of that particular ship varied from July 1980 until scrapping along with 3-year charter rates for 120Kdwt vessels. The graph was created using data from [Clarksons 2006c]

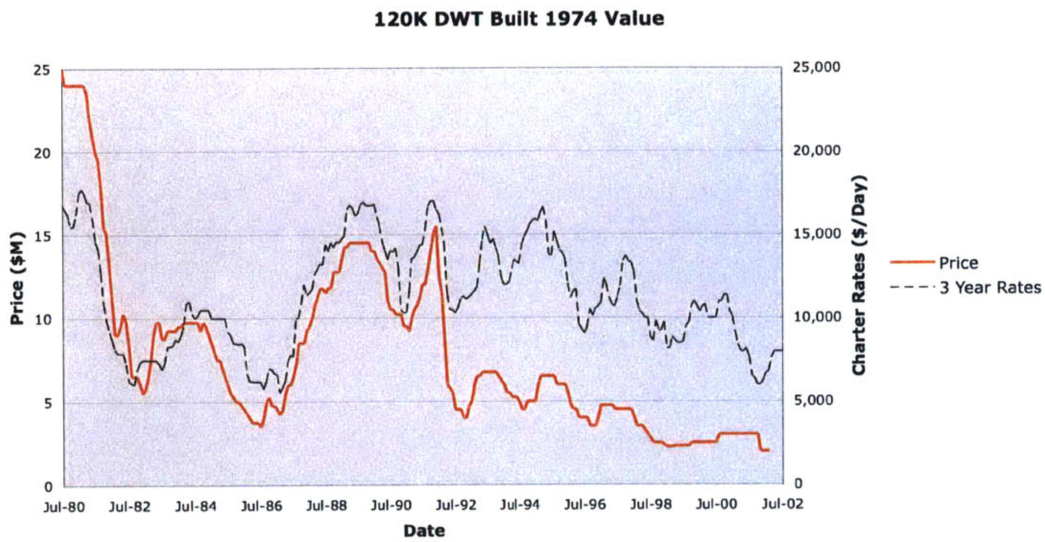

Fig 101 Price of a 1974-built 120Kdwt Cape until Scrapping along with 3-year TC Rates – Using data from [Clarksons 2006c]

How to Read Fig 101		
Consider December 1991		
Legend	Meaning	Value
Price	Price of a 1974-built 120Kdwt cape in December 1991	$15.5m
3 Year Rates	3-year t/c rates for 120Kdwt capes in December 1991	$16,750/day

Table 26: How to read Fig 101

If there were a point in time when it would be worth selling, that would clearly be in December 1991 for $15.5m. Average 3-year charter rates between December 1991 and the scrapping date of February 2002 were $12,562/day. If one conservatively assumes earnings of $12,000/day, running costs of $6,000/day, 345 days per year (only for earnings) for the 10.17 years, and a discount rate of 5%, the net value of the profits in December 1991 would be about $14.8m. The scrap value in February 2002 was $2m, which translates to $1.2m in December 1991 with the same discount rate. The value of keeping the ship was therefore $16m, which exceeds its price of $15.5m. Furthermore, if one chose a 3-year charter as oppose to selling the vessel on December 1991, then they would get a rate of about $16,750/day and average out significantly higher than $12,000/day for the remaining life of the ship

5.8 Conclusions

- Ship values are dictated by their earning capacity, age, newbuilding price, and scrap value. Capacity is less important than age while the current market is the most important factor

- Other parameters include the ship builder, time charter attachments that can have a positive or negative value, delivery time which is very important in a high market, SS/DD survey position, vessel and eng type etc.

- Discontinuities in the age-price curve exist for a number of reasons but are difficult to identify due to the small number of ships available in the market as well as data scatter

- Frequency of S&P transactions closely follows charter rates and ship prices

- Ship valuations have become more complicated after the market boom in 2003. Linear depreciation based on the newbuilding price and the scrap value that was once used is no longer appropriate

- The current market is not expected to last so the next few months/years are valued much higher than the remaining ship life. The period that is valued much higher increases the longer the market remains at high levels and optimism builds up

- All vessels experience the good market with similar earnings irrespective of the ship age. Prices of all ages therefore go up in parallel in a market boom reflecting potential earnings. Hence, the price ratio of newer to older vessels decreases

- There is a time lag between freight rates and ship values. This is explained by the level of commitment and peoples perception of how temporary current rates are

- The price of older vessels fluctuates significantly more percentage-wise than that of newer vessels while 175Kdwt vessel prices fluctuate slightly more than 150Kdwt vessel prices

- It is very rarely a better choice to sell a vessel than to charter it based on an analysis over the period from 1980 until today

- The market boom since 2003 has led to record-high newbuilding and second hand prices along with record-high freight rates and daily earnings

- Despite record-high scrap values, there has been negligible scrapping since autumn 2003 due to the extremely high earnings

- Investing $7m to buy a 1982 175Kdwt vessel in October 2002 and keeping it in the spot market would yield a return of over 1,000% until March 2007 (4.5 years)

- Delivery time has become a very important parameter making the newbuilding (delivery 2010/11) worth about as much as a 13-year old or 150% the price of a modern vessel. This is the opposite extreme of the 1986 crisis when a 9-year old vessels was worth its scrap value

- It currently makes more economic sense to order a vessel at $80m for delivery in 2010 than to buy a resale at $112m but there are also issues such as the numbers that show up in the accounts of IPOs and related cash flow considerations

- The good market helps to build up healthy cash reserves and shipowners' optimism so ship values are unlikely to drop for a relatively long time even if rates go down

6. Newbuildings

6.1 Introduction

As for secondhand capes, a database of cape orders was used in order to examine newbuilding prices. The records of [Braemar 2007a] were used and these were completed by adding data from [SSY 2006c], [Vafias 2007] and subsequent reports from [Braemar 2007b]. The database includes a total of 194 orders from May 2003 until March 2007. May 2003 was chosen in order to capture the last few months before the market boom.

The 194 orders include some large ore carriers but no newbuilding resales or newbuilding options. John Angelicousis for example who sold the *"Anangel Wisdom"* in March 2007 for a record high $112m, ordered 4 capes the same month from Daewoo-Mangalia at $78 each, with an option for another 4 at the same price. Only the original 4 were included.

It has to be noted that some orders are occasionally not reported. Furthermore, shipyards have started building vessels in some cases without having an order and these are therefore not reported either. They do this in order to sell the vessels close to the delivery date and take advantage of the much higher resale prices. As such, a database like the current one can never be complete. Due to the multiple sourcing of data and cross-referencing however, it can be treated as complete in terms of the reported orders. Details regarding the database are summarized in Table 27.

DATABASE DETAILS	
Period	May'03 - Mar'07
Number of Ships	194 Orders
Average Size	181,934 dwt
Average Price	$66.3 m
Average Wait	38 months

Table 27: Newbuilding Database Information

6.2 Time Distribution of Newbuilding Orders

The first part of the analysis was to examine how the newbuilding orders were distributed through time. In order to compare with the S&P market, a graph was constructed showing the time distribution of orders per month along with secondhand transactions per month over the same period. This is shown in Fig 102.

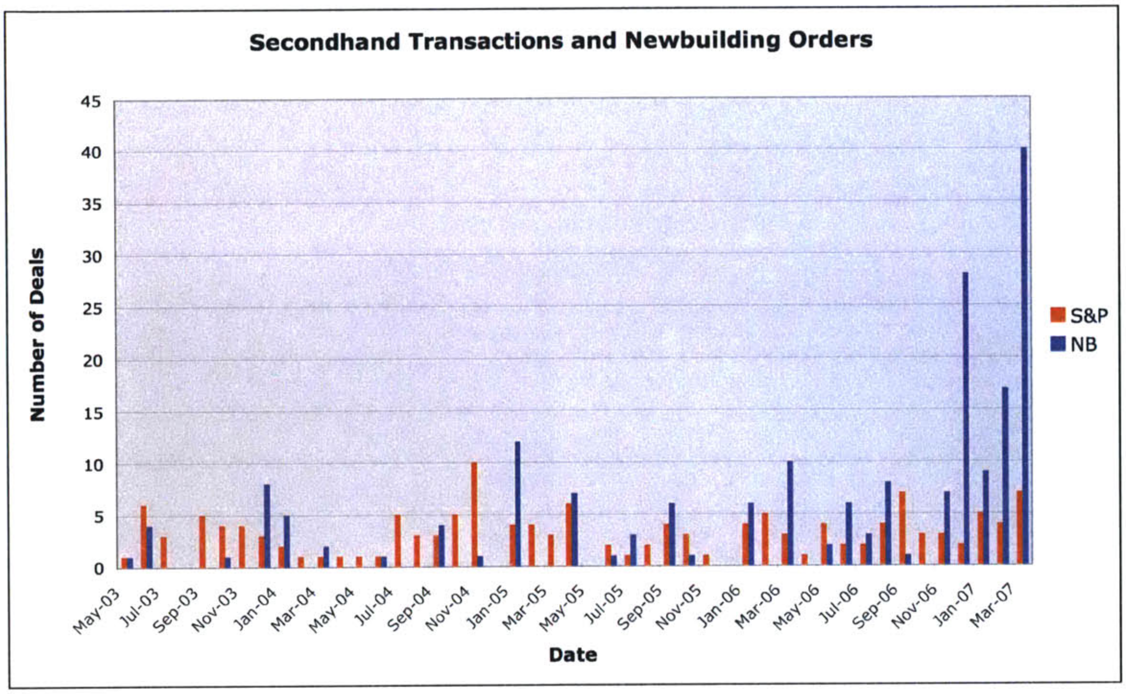

Fig 102: Monthly Orders and S&P Deals using data from the S&P Database and the Newbuilding Database

Between May 2003 and March 2007, 145 secondhand transactions and 194 newbuilding orders were reported. The frequency of newbuilding orders appears to have increased substantially over the past few months while activity in the secondhand market has been relatively constant. Interestingly, it is observed that as for the secondhand transactions, the number of orders per month was higher during the months that the market was strong. Fig 103 shows the number of orders per month over the investigated period along with the average spot rates. The time series of the average of the 4 TC routes for Baltic Capesize Index (BCI) was obtained from [Baltic Exchange 2007].

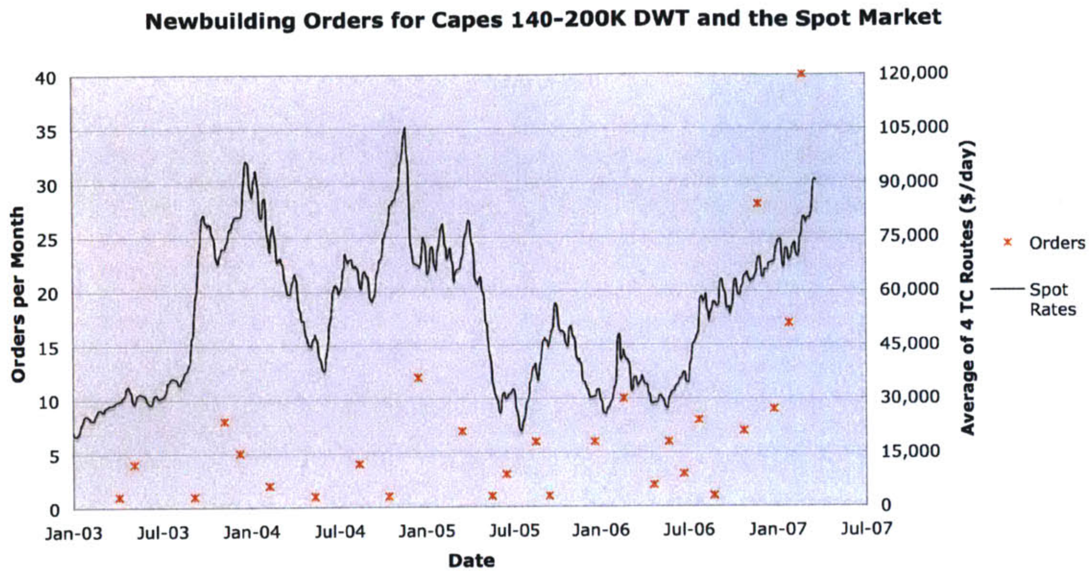

Fig 103: Orders per Month along with Spot Rates -
Using data from the Newbuilding Database and [Baltic Exchange 2007]

How to Read Fig 103		
Consider March 29th 2007		
Legend	Meaning	Value
Spot Rates	Average of the 4 t/c routes for 172Kdwt on Mar-29-2007	$90,906/day
Orders	Number of newbuilding orders placed within March 2007	40

Table 28: How to read Fig 103

There is clearly a strong correlation between ordering and daily earnings. This may at first seem reasonable but if one notes the average delivery time of 38 months along with the fact that it is a highly cyclical market, it is clear that the ships being ordered in the high market will not necessarily be delivered in a high market. Furthermore, a strong market is most likely associated with high newbuilding prices. Fig 104 shows the number of orders per month along with newbuilding prices.

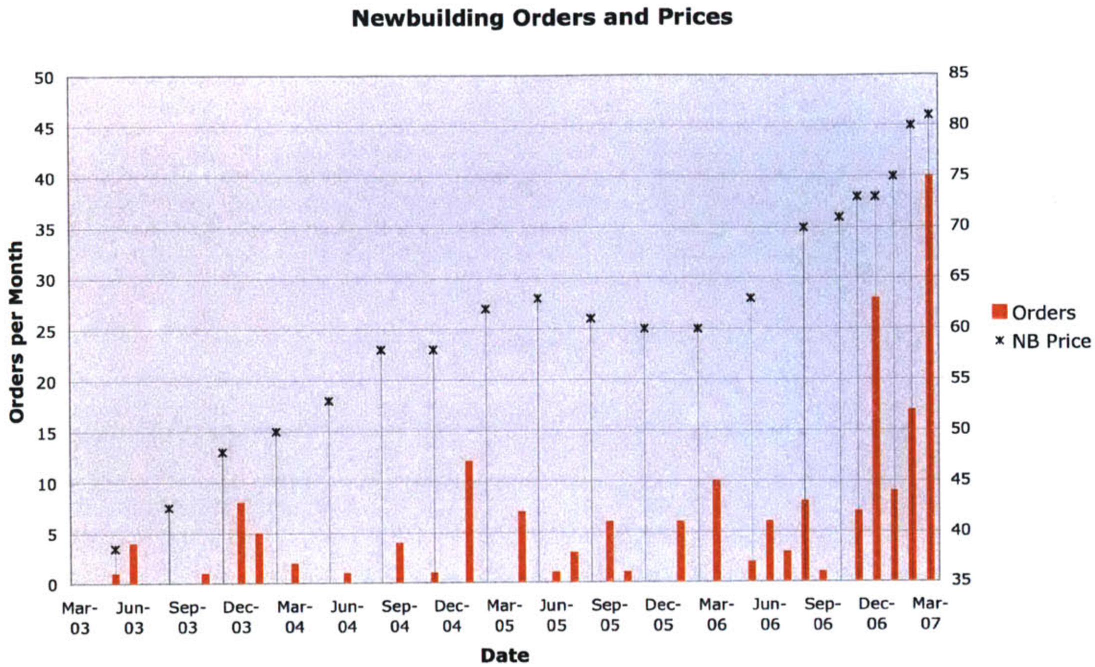

Fig 104: Orders per Month along with Newbuilding Prices – Using data from the Newbuliding Database and [Braemar 2007a]

How to Read Fig 104		
Consider March 2007		
Legend	Meaning	Value
Orders	Number of newbuilding orders placed within March 2007	40
NB Price	Average typical cape newbuilding price in March 2007	$81m

Table 29: How to read Fig 104

It can be seen that indeed more ships are ordered when newbuilding prices are high. One way to view this is that more orders are made when the market is high and therefore newbuilding prices are also high. Another way to look at it is that newbuilding prices increase when many orders are made.

The average price of typical NB Cape between May 2003 and March 2007 was $62m. By taking the average price of all orders in each month, and by interpolating for the months without orders, a price for the Capes of the type that were actually ordered is obtained for each month. The average of this price between May 2003 and March 2007 was \$55.3m. The average price of all orders during the same period was \$66.3m, which is significantly higher than both and verifies the argument that relatively more ships are ordered when newbuilding prices are high.

Fig 105 shows the total amount of money invested in newbuilding capes per month along with the spot rates. Some approximations had to be made to create this graph due to lack of data. When the price an order was unknown, the average price of the other orders within the same month was taken as an approximation. When the prices of all orders in a month were unknown, linear interpolation was used to assign a value.

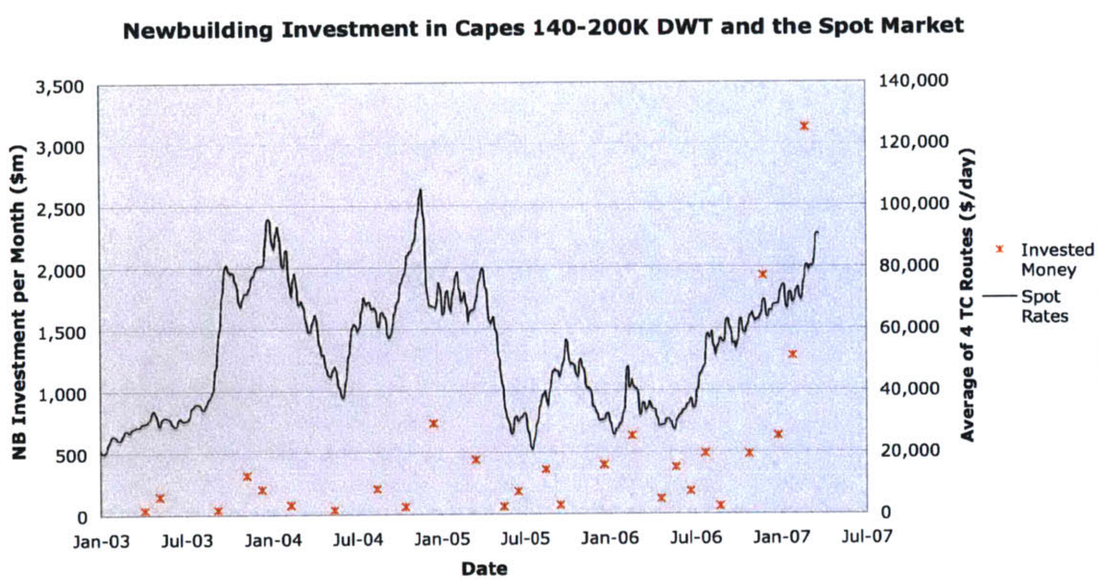

Fig 105: NB Investment per Month along with Spot Rates – Using data from the Newbuilding Database and [Baltic Exchange 2007]

How to Read Fig 105		
Consider March 29th 2007		
Legend	Meaning	Value
Invested Money	Money invested in cape orders within March 2007	\$3.125bn
Spot Rates	Average of the 4 t/c routes for 172Kdwt on 03/29/07	\$90,906/day

Table 30: How to read Fig 105

A total of about $12.9bn was invested in newbuilding capes between May 2003 and March 2007 and about a quarter of that was in March 2007 alone. Again it is clear from the graph that more money is invested in newbuildings when earnings are high even though the market is cyclical and average delivery times exceed 3 years. Fig 106 shows the actual prices and points in time at which the 194 capesize orders were placed since May 2003.

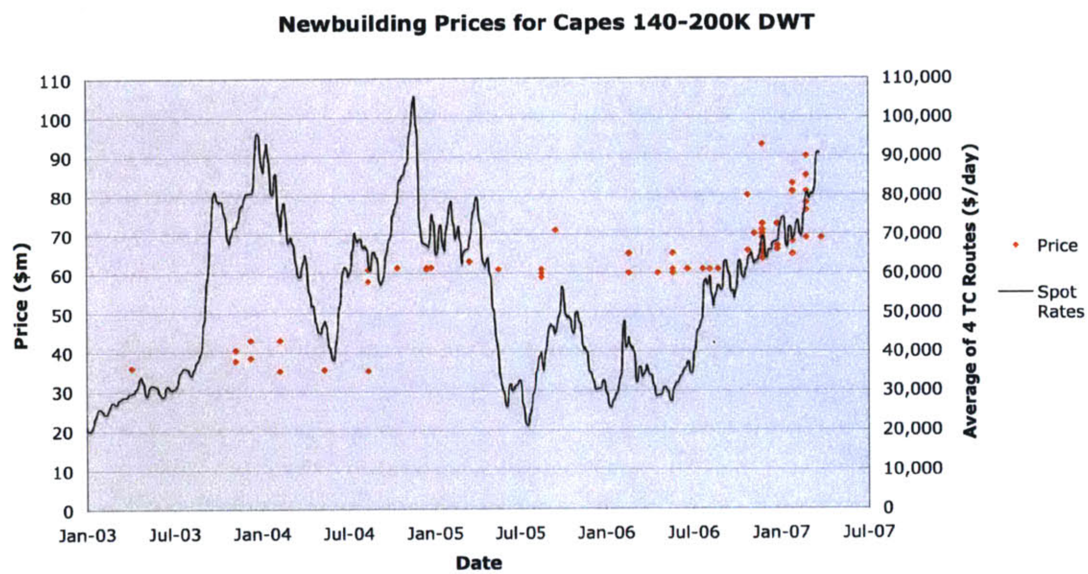

Fig 106: Order Times and Prices for all reported orders since May 2003 along with Spot Rates - Using data from the Newbuilding Database and [Baltic Exchange 2007]

How to Read Fig 106		
Consider June 1st 2005		
Legend	Meaning	Value
Price	Price of an order that was placed in June 2005	$61m
Spot Rates	Average of the 4 t/c routes for 172Kdwt on 06/01/07	$39,070/day

Table 31: How to read Fig 106

It is clearly shown that the majority of orders were made at high prices when spot rates were high. Furthermore, one can see that shipyard prices remained low during the beginning of the boom, which was then only perceived as very temporary, and then sudden increased in early 2004.

There are two vessels that stand out as more expensive towards the end of 2006. The one that was contracted in December 2006 for $93m was a 250Kdwt Ore Carrier. The $80m vessel that was contracted on Nov-2006 was a typical 175Kdwt but it had a delivery time of only 14 months, making it significantly more expensive than the other November orders that had delivery times of 37-62 months.

6.3 Delivery Times

Fig 107 shows the delivery time (in months) along with the time each order was placed for the 194 orders of the database. The vessel that was ordered in Nov-2006 and stood out in Fig 106 as being significantly more expensive, can also be identified in Fig 107 as the one with the lowest delivery time (14 months).

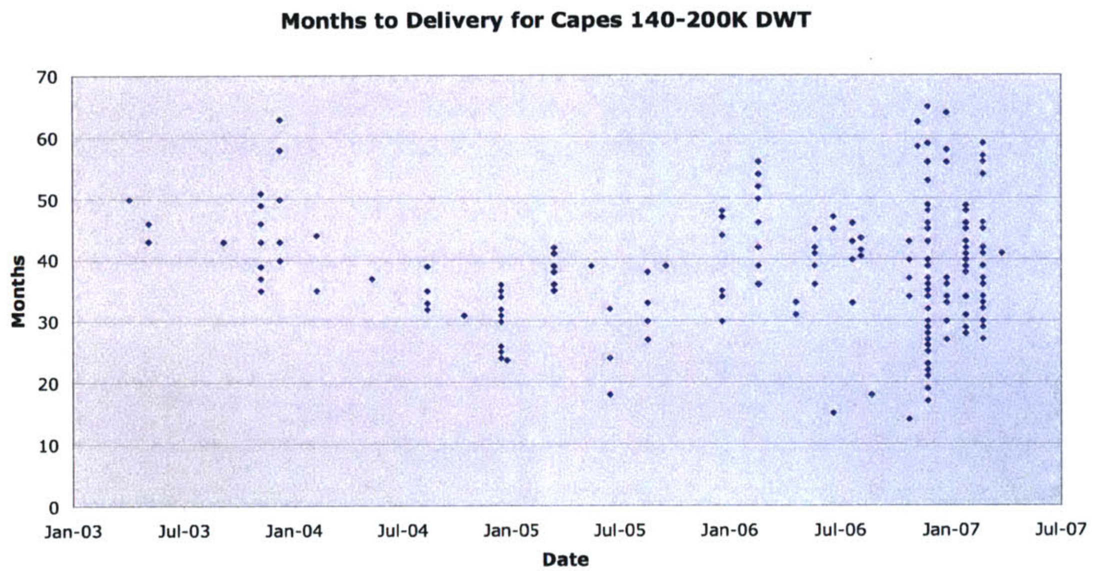

Fig 107: Newbuilding Capesize Delivery Times for all reported orders since May 2003

It can be seen that even though prices were late to catch up, waiting times were high since the beginning of the boom. The average delivery time was 38 months (3.17 years) and the range was 14 to 65 months. Evidently, orders with reasonable delivery times are still available but a high premium is usually paid for this as examined below.

An analysis was carried out to investigate the value of delivery time for newbuilding orders. Ore carriers were ignored for this part of the analysis while only capes of 170 – 181Kdwt for which the price was reported were considered. Graphs of price against time until the delivery date were plotted for each month. This was done for December 2006, January 2007, February 2007 and March 2007 and all orders within the size range for which the price was known, were included. Newbuilding resales with zero delivery time were also used when available in order to obtain the y-intercept of each graph. Regression models (least squares) were added to provide the basis for qualitative discussion. The results are shown in Fig 108 to 111 while Fig 112 shows all the orders considered between December 2006 and March 2007 on one graph.

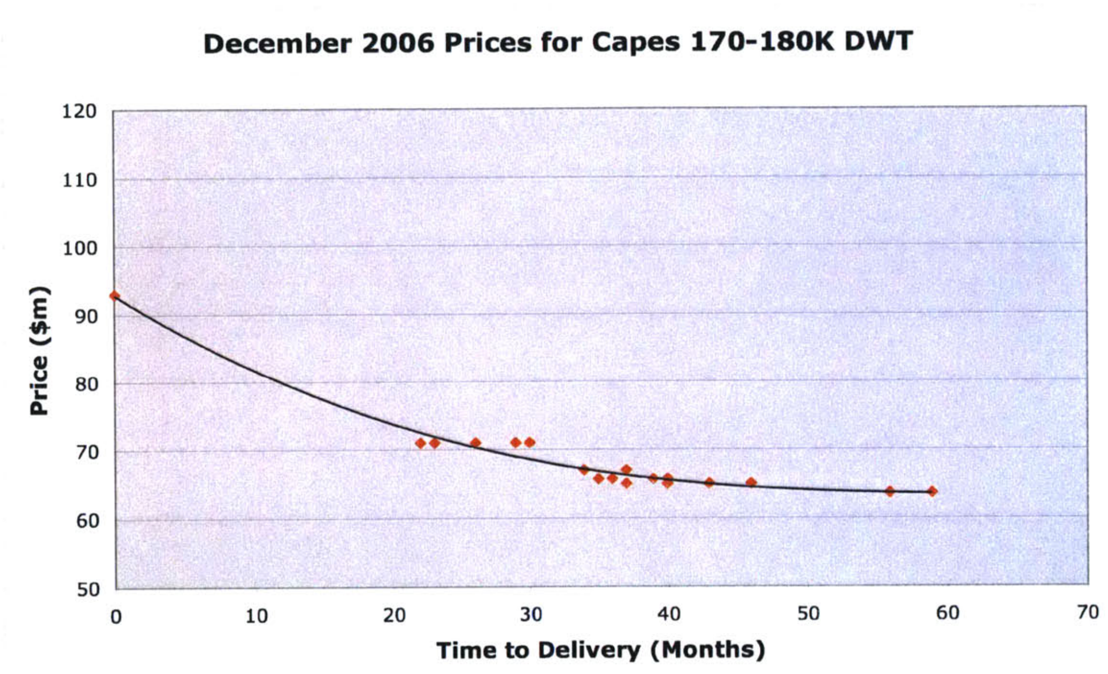

Fig 108: Newbuilding Price against Delivery Time for all Orders Reported in December 2006

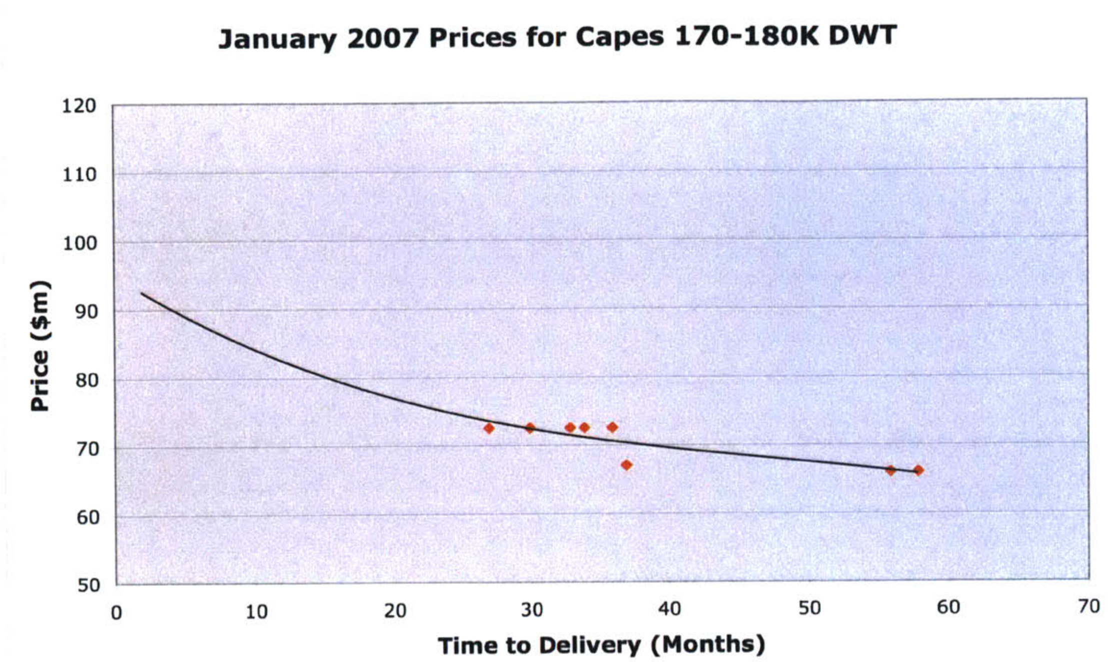

Fig 109: Newbuilding Price against Delivery Time for all Orders Reported in January 2007

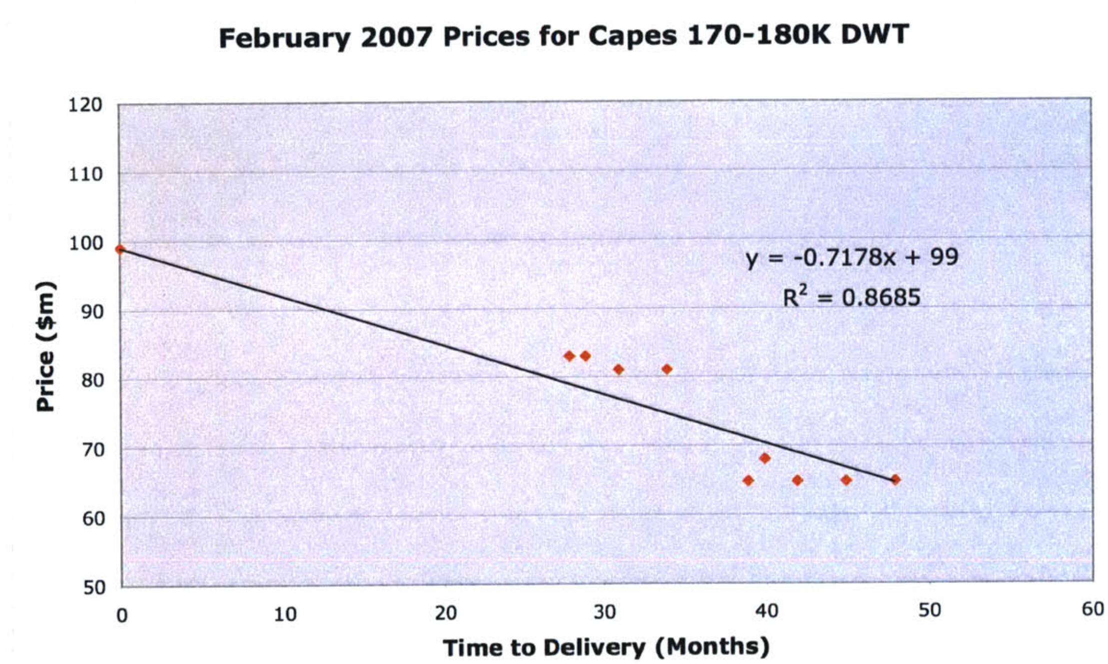

Fig 110: Newbuilding Price against Delivery Time for all Orders Reported in February 2007

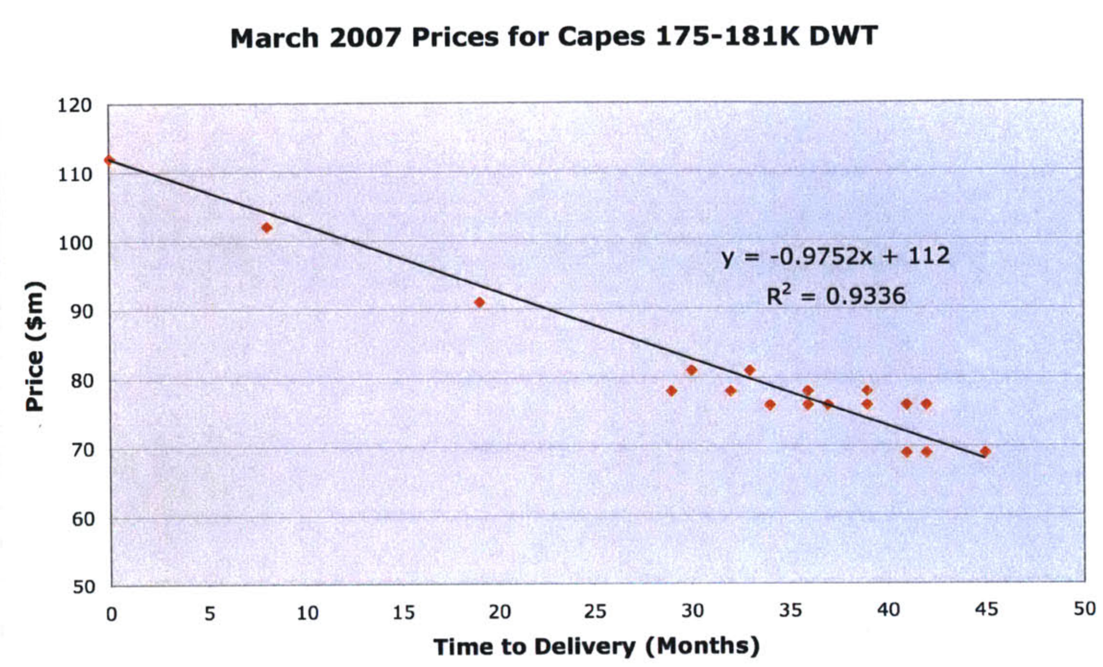

Fig 111: Newbuilding Price against Delivery Time for all Orders Reported in March 2007

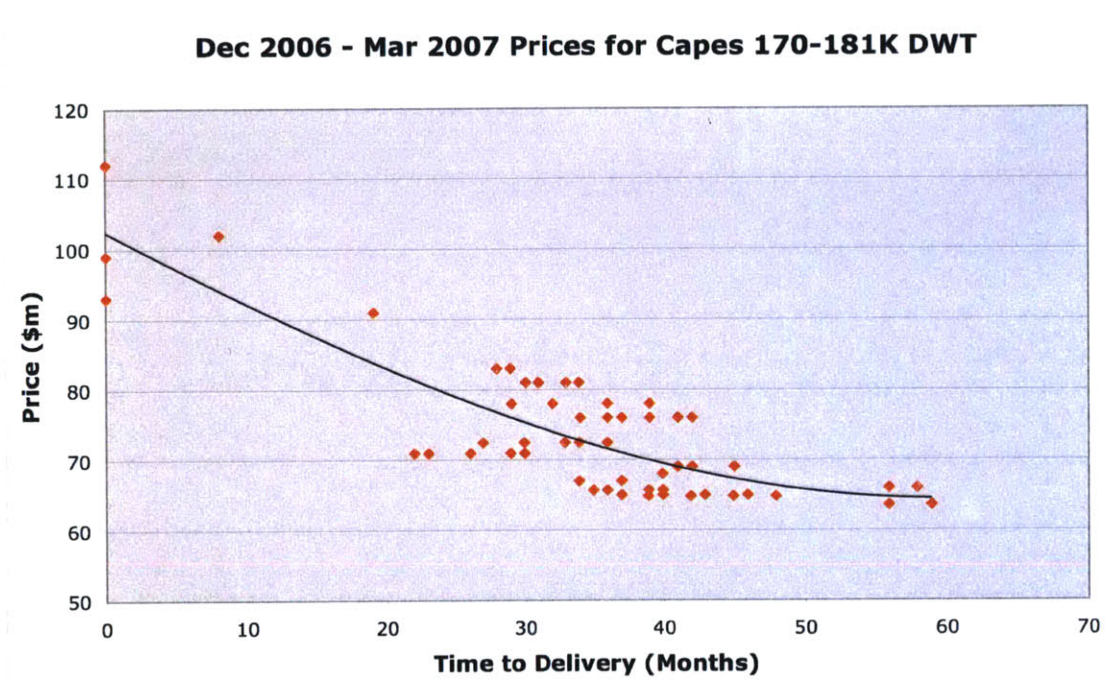

Fig 112: Price against Delivery Time for all Orders Reported between December 2006 and March 2007

The regression models show that price decreases with delivery time towards a plateau. The point at which this plateau is reached is the time after which there is no discount for a later delivery date. However, the relationship for February seems to be linear (perhaps due to lack of data), and the relationship for March can also be approximated as linear without much loss in accuracy (R^2 = 0.9336 as oppose to R^2 = 0.9551 for a third order polynomial regression).

The purpose of using a linear regression is to obtain a constant gradient, which indicates the value of each month in delivery time. This is equal to $718,000/month for February and $975,000/month for March. Intuitively if people are paying about $1m for each month earlier delivery, this means that over the next three or four years (when the plateau is reached), a vessel is expected to earn about $1m per month more than compared to the rest of its life.

The average capesize spot earnings from April 1999 when the Baltic started reporting them, until September 2003 when the market boom started, were $17,157/day. From October 2003 until March 2007, which was the good market, the average was $57,621/day. This difference between the two values corresponds to about $1.2m/month, which is close to the $1m. This shows that people expect the average market in the remaining life of the ship to be almost as low as the period between April 1999 and September 2003 before the market boom.

The y-intercept, which is the price of a new ship with immediate delivery, is $99m for February and $112m for March. We can see that besides the increase in actual ship values, there is also an increase in the value of delivery time. This is more clearly shown in Fig 113, which is a combination of all the above graphs (Fig 108-112).

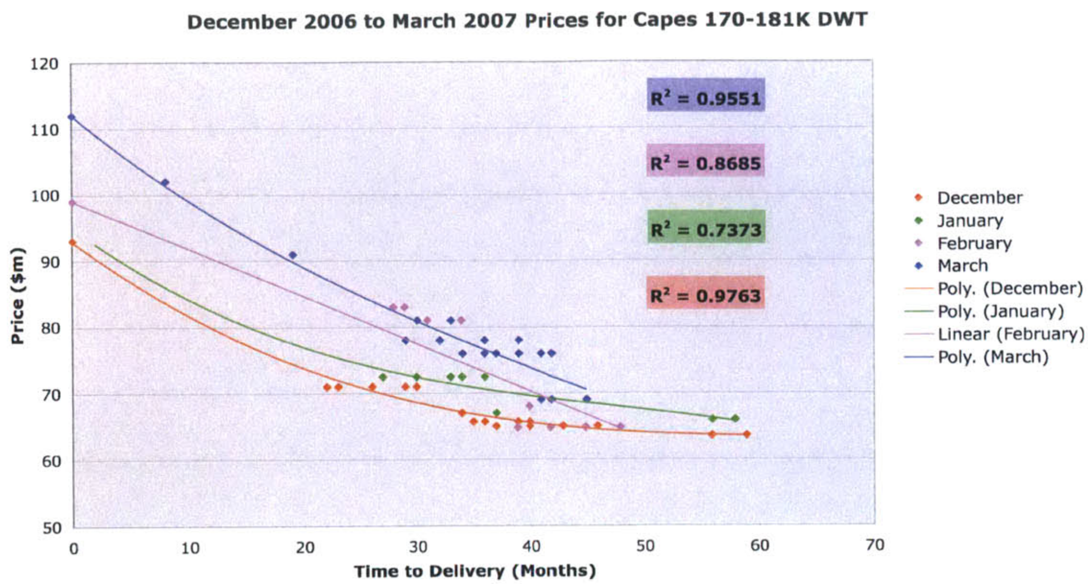

Fig 113: Price against Delivery Time for the Orders of Each Month from December 2006 to March 2007

It is shown that during the months from December 2006 until March 2007 when the market was increasing, prices have increased for all delivery dates. This is indicated by the fact that the lines are relatively parallel with minor overlapping while the ones of the more recent months are higher. The fact that the blue line, which refers to March 2007, is slightly steeper than the other ones indicates that the value of delivery time is also higher. The regression models show that price decreases with delivery time towards a plateau level. Their accuracy, which is relatively high, is indicated by the R^2 values that are highlighted on the diagram with corresponding colors to the lines of the regression models and the data points.

6.4 Other Determinants of Newbuilding Prices

The above analysis examined the effect of delivery time on newbuilding prices. There are several other factors that play a role and some of these will be discussed by considering the Newbuilding orders and newbuilding resales that took place in March 2007. The Newbuilding database consists of 40 orders in March 2007. These are summarized in Table 32 along with the 4 resale transactions that took place that month.

No.	*Buyer Name*	*Yard Name*	*Yard Country*	*Size Kdwt*	*Del. Mos*	*P ($m)*
NEWBUILDING ORDERS						
4	ANANGEL	STX	China	181	38.3	76
2	ANANGEL	Daewoo	Korea	180	31.5	81
4+4	ANANGEL	Daewoo-Mangalia	Rum.	180	34	78
4	TRANSMED	Hanjin	Philipp.	180	-	78
1	KAWASAKI KISEN KAISHA	NACKS	China	300	46	90
2	KAWASAKI KISEN KAISHA	Namura	Japan	250	56.5	85
2	GOLDEN FLAME SHIPPING	STX	China	181	38	76
2	ZOSCO HANGZHOU SHPG	Dalian	China	180	43.5	69
1	-	-	Korea	170	36	80
1	-	Dalian	China	180	42	69
2	ORION BULKERS	SWS	China	177	50.5	-
8	HEBEI	Quingdao	China	180	-	-
4	GOLDEN OCEAN SHIPPING	Jinhaiwan	China	176	31.5	-
2	PHOENIX ENERGY	Sungdong	-	-	-	-
1	MEIJI SHIPPING	Mitsui	Japan	176.7	57	-

NEWBUILDING RESALES						
1	DIANA	SWS	China	177	10	112
1	CHANG MYUNG	Bohai	China	174	8	112
1	-	Bohai	China	175	8	102
1	-	-	Korea	170	19	91

Table 32: March Resales and March Section of the Newbuilding Database [Braemar 2007b, Vafias 2007]

As analyzed previously, delivery time has a big impact on price. This can be seen most clearly in the table by comparing the prices of the 4 resale deals with the 40 newbuilding orders. Size is another important factor particularly due to the high economies of scale. This is highlighted by the price paid for the K-Line ore carriers (Kawasaki Kisen Kaisha), which is significantly higher than all other newbuildings.

Another important parameter is the specification of the vessel. Many yards have a standard design, which they sell but this is often tailored to the needs of the particular shipowner. People generally prefer to pay some extra money and make modifications particularly when ordering a series of vessels. It is also very often the case that shipyards learn by the modifications of their clients and then introduce them as standard in their subsequent designs.

The price of a newbuilding can be high compared to one from another shipyard due to modifications requested by a specific owner or because of the yard's standard specification. Dalian for example offers a double hull design, which is generally less preferable since IMO decided not to go forward with this requirement in 2005. The design specification offered by STX therefore is preferred and that's why STX vessels are more expensive than Dalian vessels by $7m as shown in Table 32. Following the previous analysis, it is clear that the difference in price cannot be explained by the 4-5 months difference in delivery time. One can also compare the two Bohai resales with the SWS resale, which is the same price as one and more expensive than the other despite its later delivery time.

6.5 Shipbuilding Country Analysis

Beside the particular shipyard, a more general factor that is taken into account is the country where the vessel was built. Ships from certain countries like Japan for example are valued higher than those from other countries such as Rumania for example and Japan can therefore charge higher prices.

One can see in Table 32 that the Rumanian vessels ordered by Anangel were at a lower price than those that were ordered in Korea even though Daewoo who is building the ships in Rumania is actually a Korean yard. Similarly, the vessels ordered by Transmed in the Philippines are also at a relatively low price compared to the typical Korean and Japanese vessels.

The vast majority of capes today are built in Korea, Japan and China. An analysis was carried out to investigate how the prices offered by these countries have varied over time. Data from the newbuilding database was used along with data from [SSY 2006] to produce the graph shown in Fig 114, which shows historical newbuilding prices for these countries.

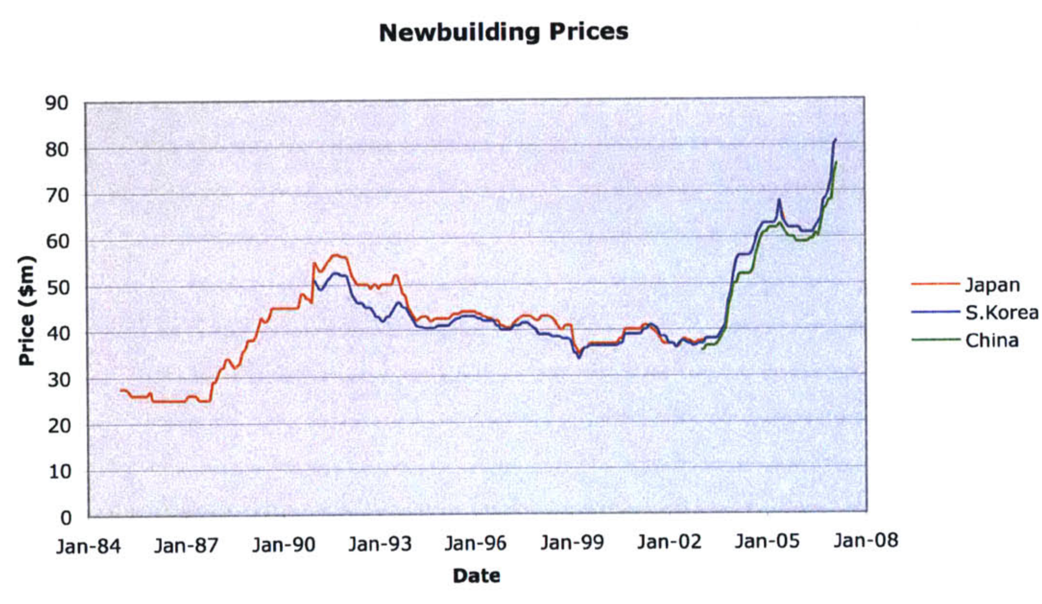

Fig 114: Japanese, Korean and Chinese Newbuilding Prices – using data from The Newbuilding Database and [SSY 2007a]

How to Read Fig 114		
Consider January 2003		
Legend	Meaning	Value
Japan	Average Japanese newbuilding prices in January 2003	$37.5m
S.Korea	Average South-Korean newbuilding prices in January 2003	$37.0m
China	Average Chinese newbuilding prices in January 2003	$35.5m

Table 33 How to read Fig 114

It is clear that newbuilding prices in these countries are directly correlated and move in parallel, meaning that they can be regarded as very close substitutes. Japan, which is the oldest player, has been the most expensive on average, followed by Korea and then by China, which is a relatively new and fast growing player. Newbuilding prices in all three countries picked up together a few months after the market boom. Fig 115 shows how the absolute difference between Japanese and Korean prices, and between Japanese and Chinese prices has varied over time.

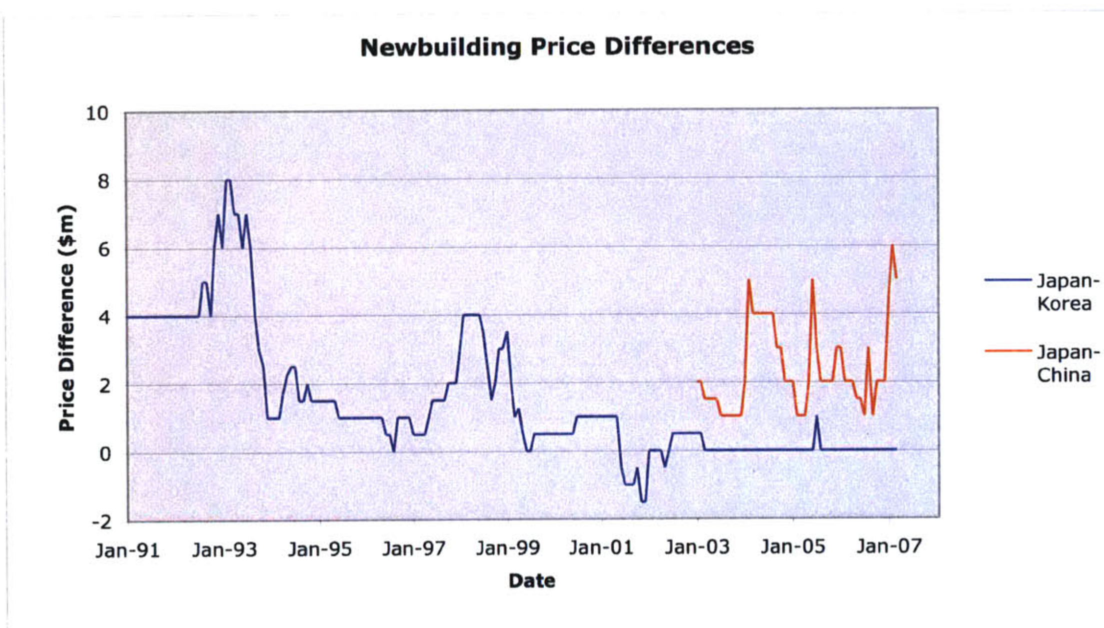

Fig 115: Japan, Korea & China Newbuilding Price Difference - using data from The Newbuilding Database and [SSY 2007a]

How to Read Fig 115		
Consider January 2003		
Legend	Meaning	Value
Japan-Korea	Average Japanese - South Korean NB prices in January 2003	$0.5m
Japan-China	Average Japanese - Chinese NB prices in January 2003	$2.0m

Table 34: How to read Fig 115

It can be seen that Japan started off as being the most expensive but the difference between Japanese and Korean prices gradually decreased until virtually zero where it has remained over the past few years. There was an instance where the difference was actually negative meaning that Korea was more expensive for a few months in 2001.

There are two possible reasons for this. First, the Korean ships could have been of better specification than the Japanese orders at the time. One must note that Korean yards are happy to allow design modifications by their clients. Japanese yards on the other hand have relatively good standard designs but allow no changes or improvements. They don't want to allow their clients to bring their own production schedule. Furthermore, they generally don't even allow the owner's supervision during construction unless carried out by an approved Japanese company on the owner's behalf. The other possible reason is that there may have been many internal Japanese contracts at the time, which are conducted in Yen, while the Yen - USD fluctuations may make them look cheaper.

China is relatively new to the market and growing fast. Though it has many yards offering a wide range newbuilding prices, it only recently moved into capes so the majority is mainly being built by experienced yards. SWS is considered the best with the most experience in capesize vessels. Bohai also has experience with capes but offers a Double Hull design, which is generally less preferred. NAKS, which is a Kawasaki – COSCO venture, has high experience with Handymaxes and is now also building capes.

China has always been cheaper than Japan though the difference in prices appears to be fluctuating over time between $1m and $6m. Since there is a wide range of prices available and different yards may be taking the majority of the orders at different points in time, this may contribute to the fluctuations in the average price difference between Japan and China. Quality in China is improving fast but Chinese vessels are still being discounted against the Korean and Japanese vessels.

6.6 Conclusions

- Newbuilding Orders are strongly correlated to current earnings and newbuilding prices even now that average delivery times are 38 months while it is a highly cyclical market
- About a quarter of the $12.9bn that was invested in newbuilding capes between May 2003 and March 2007 was invested in March 2007
- There is a significant time lag between charter rates and newbuilding prices
- Delivery time is the most important factor determining newbuilding prices in today's market. Price decreases with delivery time towards a plateau level at about 4 years
- Newbuilding orders between December and March showed that the value of delivery time was increasing as well as prices for all delivery dates
- Other parameters affecting newbuilding prices include ship size, design specification, country of built, shipyard etc.
- The main countries where capes are built today are Japan, Korea and China, which is a relatively new and fast growing player
- China is most flexible regarding the design specification and monitoring during construction while Japan is the least
- Japanese prices used to be the highest but have been about the same as Korean since January 2003
- China offers a big range of quality and prices but has always been cheaper than Korea and Japan on average

7. Freight Forward Agreements (FFAs)

7.1 Introduction

A futures contract is an agreement between two parties to buy or sell a certain underlying instrument at a future date (the settlement date), at a pre-set price (the futures price). The contract imposes an obligation on the holder to buy or sell at the settlement date.

Futures traders are either hedgers or speculators. Hedgers include producers and consumers of a commodity who try to hedge out the risk of price changes. Producers can thereby guarantee certain future revenue, while consumers can plan on fixed future costs. Speculators try to make a profit by predicting the market and buying or selling the commodity on paper accordingly. Futures markets thus serve to increase liquidity and transfer the risk between traders such as hedgers and speculators who have different risk and time preferences or a different perspective of the market.

In the capesize bulk carrier market, the most commonly traded futures are the time charter Index (in \$/day) and the freight rates (in \$/ton) along the various trade routes. The t/c Index is the average time charter rate of the four routes (front-haul, back-haul, transatlantic and transpacific). It is common to trade these futures for a certain contract period that could be a month, quarter or year. The last day of each month during the contract period is then a settlement date and the payment day is the 7th day of the following month. A Baltic capesize bulk carrier, meaning a 172,000dwt vessel up to 7 years old, is assumed for pricing.

An example of a future that might be traded today might be the T/C Index for 2008 (this will involve 12 settlement dates). The futures price is currently \$45,000/day. A charterer who knows they will need a capesize vessel in 2008 might therefore buy this contract, which will effectively guarantee that price. If the physical market in 2008 is say \$50,000/day then they will have to pay that much to charter a vessel, but they will receive the \$5,000/day difference from the counterparty of the futures contract. On the other hand, if the market is say \$40,000/day, they will be paying less to charter a vessel but will have to pay the $5,000/day difference to the counterparty of the futures contract. A shipowner who owns a cape might also hedge in a similar fashion, which would be equivalent to chartering out a vessel today for the year 2008 at 45,000$/day.

A trader who buys the future for 2008 today, may sell and buy back futures for that contract period several times before they mature. A speculator can thus also hedge their bet and make a profit or a loss on paper much earlier. This means that a profit can be made on a correct forecast of the market fluctuation between the futures buying and selling date (or vice versa), regardless of the physical market on the settlement date (2008).

On a note of caution, the traders must be aware that the solvency of their counterparts is their own risk. There have been cases where counterparts have failed to fulfill their obligation. The latest example is North American Steamship Limited (NASL) who declared its inability to fulfill its obligation on a series of contracts in November 2006. Increasing involvement of banks has been witnessed over the past few years. At a commission, banks act as a counterpart on account of their approved client. The risk of the solvency of the counterpart is thereby diminished. Furthermore, on a cross-trade with the bank, the settlement is effected immediately. This means that when a profit (or loss) is made on paper by buying and then selling a future with the bank, it goes directly into the trader's bank account without having to wait for the settlement date.

7.2 Data

Futures prices are published every day for the capesize t/c index and for freight on some trade routes. It is important to note that these are changing continuously even though they are only quoted once a day. The Bid and Offer is published for each future period and the mean value is taken as the price regardless of the number of transactions taking place. It is not always necessary however that a transaction is made at the quoted price. Month to date values, showing the average so far since the beginning of the month, and year to date values, showing the average since the beginning of the year, are also published every day along with the spot rates.

Daily forms which denote the futures price of the t/c index and trade routes C4 (Richards Bay/Rotterdam) and C7 (Bolivar/Rotterdam), were collected for the last day of each month since July 2004 from [FIS 2007]. These were then tabulated in a form that could be used to carry out a comparative analysis and to present the results in graphical form. The results are presented in the following sections.

Please note that the spot rates are the rates in the last day of each month, while actual values for a period (month, quarter, two quarters or a year) refer to the average value over that period.

7.3 Time Charter FFAs

Since hedging through the paper market is possible as discussed earlier, buying or selling a futures contract can be seen as almost equivalent to chartering in or chartering out a vessel for the futures contract period. Charterers will therefore look for the cheapest option and shipowners will look for the highest paying option between the two substitutes. As a result, when futures move up or down, this inevitably causes period charter rates to follow and vice versa.

Ideally, futures prices and T/C rates at a given point in time and for a given contract period should be identical. There are however some discrepancies owing to the fact that the futures and the physical markets are separate. Fig 116 shows a comparison between futures prices and physical time charter rates over the same contract period.

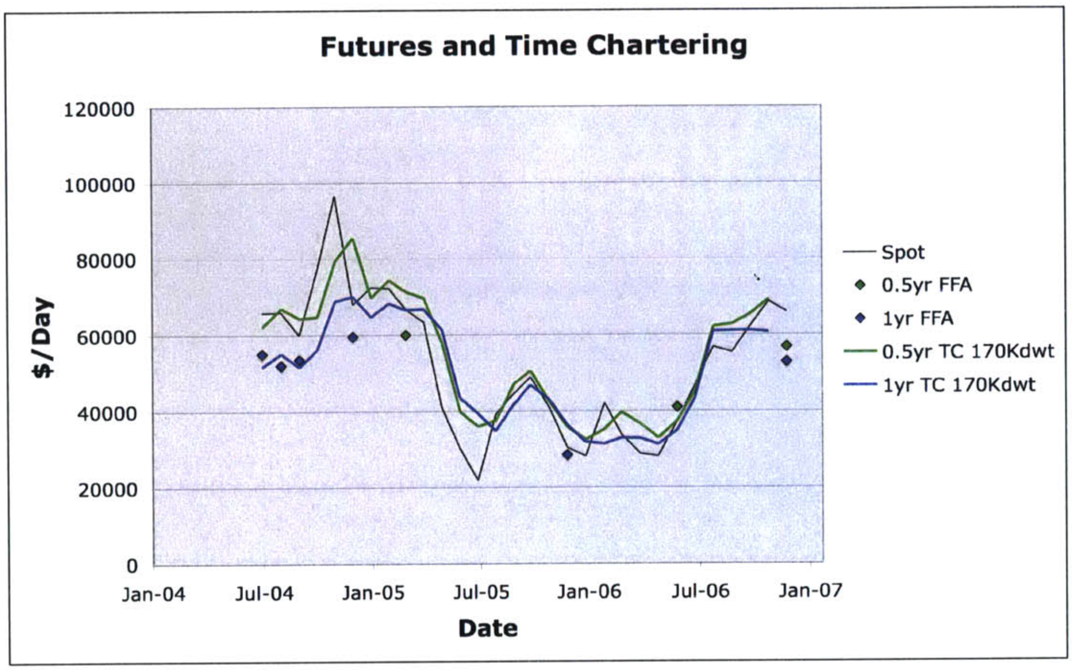

Fig 116: Comparison of Futures Market and Physical Market - using data from [Clarksons 2007a & FIS 2007]

How to Read Fig 116		
Consider July 2004		
Legend	Meaning	Value
Spot	t/c Index value on the last day of July 2004	$65,724/day
1yr FFA	Futures price for 1 year t/c on the last day of July 2004	$55,000/day
0.5yr TC	6 month physical t/c rate in July 2004	$62,000/day
1yr TC	1 year physical t/c rate in July 2004	$51,500/day

Table 35: How to read Fig 116

As mentioned in the introduction, futures prices assume a vessel of 172,000dwt up to 7 years old. These are therefore compared with the physical market for similar vessels for 6 and 12-month period t/c. A close relation is evident between the futures and the physical market. The differences are mainly explained by the fact that futures values refer to the end of each month whereas time charter values are an average for each month.

Fig 117 shows the futures price for the t/c index for the next one to eighteen months along with the spot rates since June 2004. Note that the number of months in this case is the contract period. This means that for each point, trading the future is equivalent to chartering a vessel at that time for the indicated number of months.

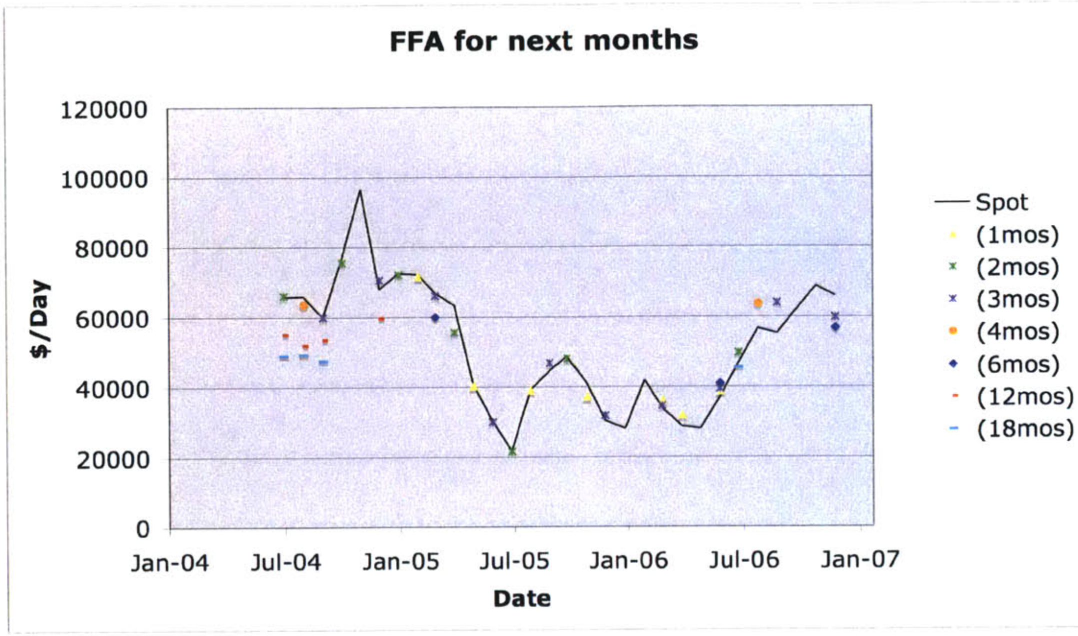

Fig 117: Futures Prices for the T/C Index along with the spot rates - using data from [FIS 2007]

How to Read Fig 117		
Consider September 2004		
Legend	Meaning	Value
Spot	t/c Index value on the last day of Sept. 2004	$59,846/day
(3mos)	Futures price for Oct'04 – Dec'04 as of End Sept. 2004	$60,000/day
(12mos)	Futures price for Oct'04 – Sept'05 as of End Sept. 2004	$53,500/day
(18mos)	Futures price for Oct'04 – Mar'06 as of End Sept. 2004	$47,500/day

Table 36: How to read Fig 117

As shown, futures prices, particularly those for few months ahead, are closely aligned with the spot market. This shows that even though the market is fluctuating between $20K/day and $100K/day in the investigated period, traders consistently value futures close to the present market. Furthermore, it can be seen that when the market is declining, the futures prices are usually slightly lower than spot rates (points lie below the line). Conversely, when the market has a positive gradient, futures prices are often slightly above the line. Futures values therefore also depend on the market direction.

The above conclusion can also be drawn by examining futures curves at various points in time. Fig 118 shows three futures curves along with the spot market to illustrate this. The flat portion of each line shows the contract period.

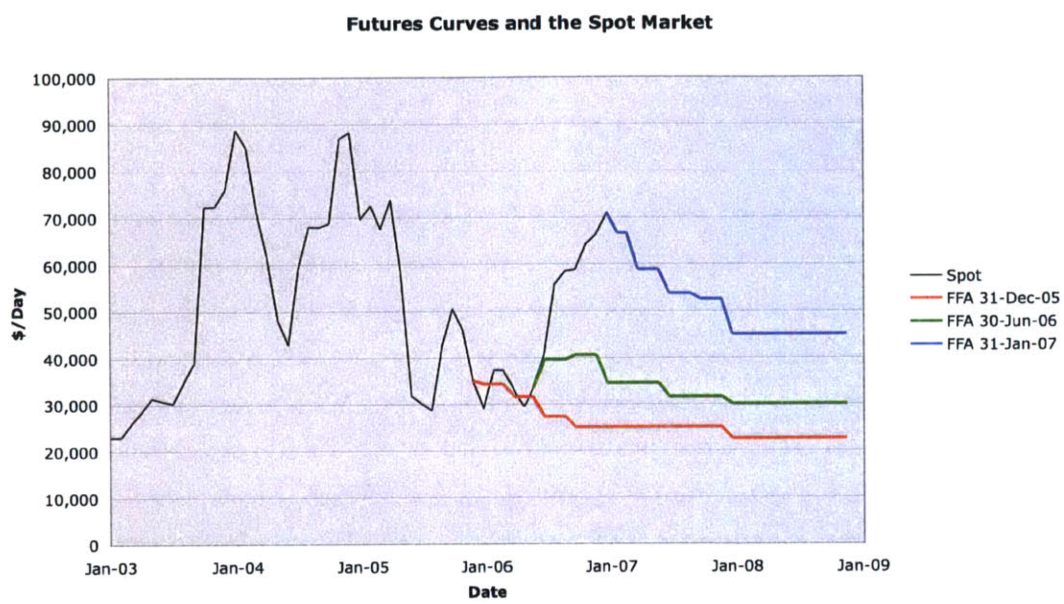

Fig 118 Futures curves for the T/C Index along with the spot rates - using data from [SSY 2007b]

How to Read Fig 118		
Consider June 2007		
Legend	Meaning	Value
FFA 31-Jan-07	Futures price for Q3-2007 as of January 31st 2007	$58,875/day
FFA 30-Jun-06	Futures price for H1-2007 as of June 30th 2006	$34,500/day
FFA 31-Dec-05	Futures price for 2007 as of December 31st 2005	$25,000/day

Table 37: How to read Fig 118

In 31-Dec-06, the market was at $34,973/day with a negative gradient. In 30-Jun-06, the market was at $33,460/day with a positive gradient. As can be seen by the futures curves on these two dates, the positive gradient of the market has a strong effect on futures prices. Even though the market was slightly lower in 30-Jun-06, futures prices were significantly higher due to the positive direction of the market. The FFA curve of

31-Jan-07, indicated in blue, was above both as the market was even higher and with a positive gradient. The blue curve however declines more steeply than the other two showing that futures curves with different origins tend to converge into the future. This is reasonable, as the influence of the current market on futures values should theoretically be lower for contract periods that are further ahead.

Fig 119 shows the futures price of the t/c index for the following quarter or year and those beyond since June 2004 along with the spot market. Note that the contract period in this case is a quarter, two quarters, or a year.

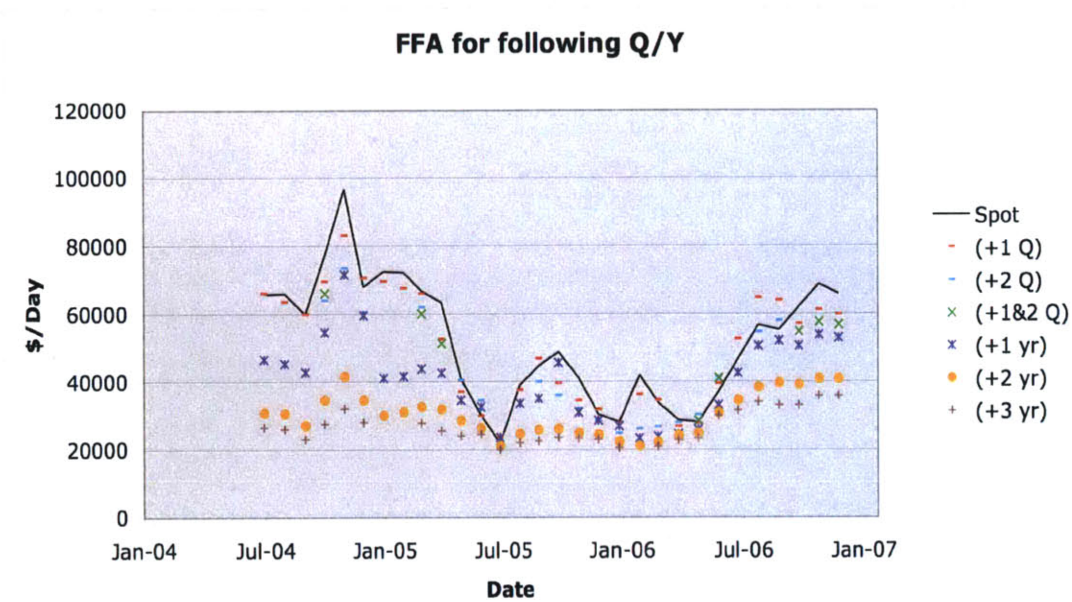

Fig 119: Futures Prices for the T/C Index along with the spot rates using data from [FIS 2007]

How to Read Fig 119		
Consider October 2004		
Legend	Meaning	Value
Spot	t/c Index value as of End October 2004	$76,792/day
(+1 Q)	Futures price for Q1-2005 as of End October 2004	$69,500/day
(+2 Q)	Futures price for Q2-2005 as of End October 2004	$64,000/day
(+1&2 Q)	Futures price for H1-2005 as of End October 2004	$66,000/day

(+1 yr)	Futures price for 2005 as of End October 2004	$54,500/day
(+2 yr)	Futures price for 2006 as of End October 2004	$34,500/day
(+3 yr)	Futures price for 2007 as of End October 2004	$27,500/day

Table 38: How to read Fig 119

It is evident again that the current market and its direction affects futures prices, and more so for the closer contract periods. Looking at the prices for the following year (+1 yr) and one or two years beyond that (+2 yr and +3 yr), the general opinion has continuously been that the market will decline and keep declining in the long term. This is logical as the market is at record high levels. It can also be seen that futures prices fluctuate less than the spot market and they also fluctuate less the further ahead their maturity is. (+1 Q) for example fluctuates the most after the spot market, while (+3 yr) fluctuates the least.

Fig 120 and Fig 121 show the futures prices for each quarter and each half-year contract period respectively from Q4-2004 until Q1-2007. These are presented along with the actual values in those periods and the spot market. Futures values and actual values referring to the same quarter are shown in the same color for clarity.

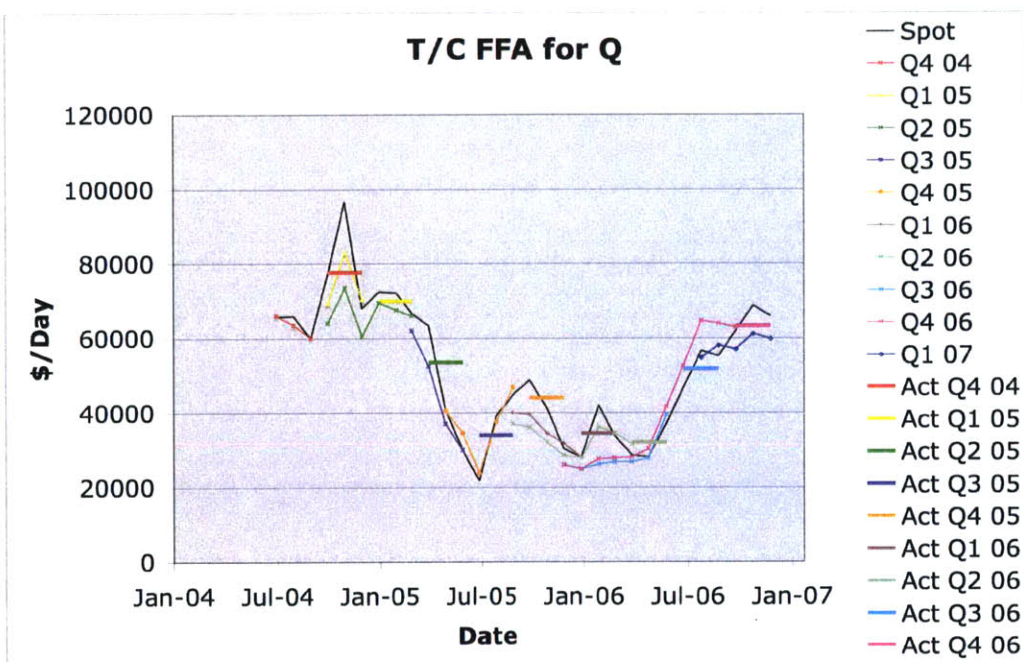

Fig 120 Futures Prices for the T/C Index along with actual values - using data from [FIS 2007]

How to Read Fig 120		
Consider December 2006		
Legend	Meaning	Value
Spot	t/c Index value as of End December 2006	$65,870/day
Q1 07	Futures price for Q1-2007 as of End December 2006	$59,750/day
Act Q4 06	Average value of the t/c Index over Q4 2006	$63,148/day

Table 39: How to read Fig 120

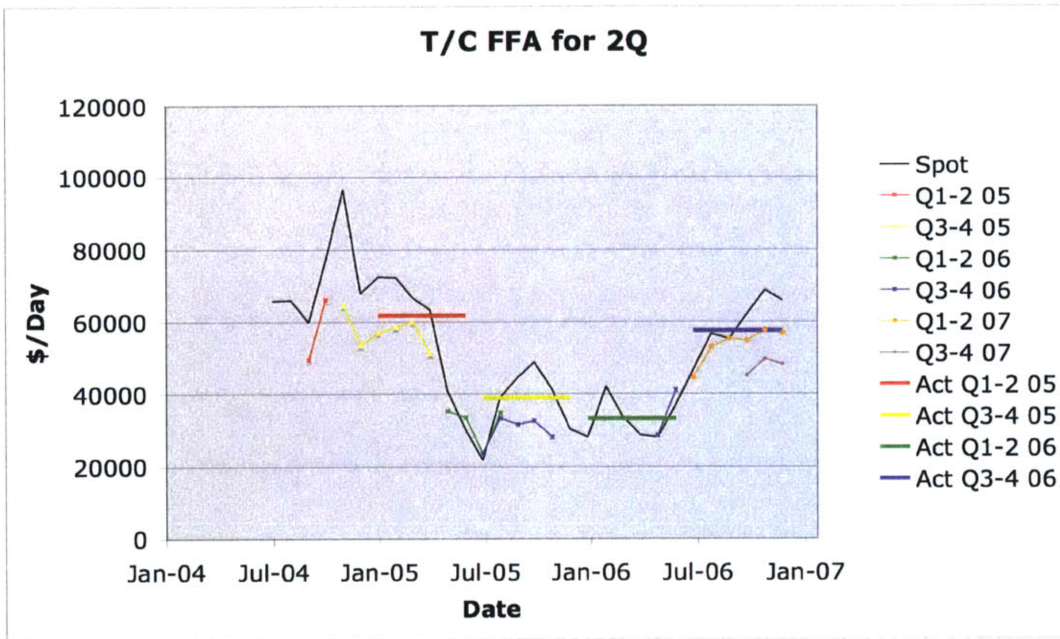

Fig 121 Futures Prices for T/C Index from H1-05 until H2-06 and actual values – Using data from [FIS 2007]

How to Read Fig 121		
Consider December 2006		
Legend	Meaning	Value
Spot	t/c Index value as of End December 2006	$65,870/day
Q1-2 07	Futures price for H1-2007 as of End December 2006	$56,750/day
Q3-4 07	Futures price for H2-2007 as of End December 2006	$48,125/day
Act Q3-4 06	Average value of the t/c Index over H2 2006	$57,415/day

Table 40: How to read Fig 121

As can be seen, the fact that the futures prices are so closely aligned with a highly cyclical market, leads to large discrepancies between futures and actual values. The futures value for Q4 2006 in January 2006 ($24,875/day) for example (in pink), was off the actual value ($63,148/day) by $38,273 per day, which amounts to more than $3.5m. The futures value for H2-2006 in July 2005 was $23,500/day while the actual value was $57,415/day, amounting to $6.24m. This obviously allows room for high profit that can be made if one employs a more sophisticated forecasting approach than merely based on the current market.

Marsoft's predictions of the market, which are based on the estimated fleet utilization, tend to be less "flat" than futures. Fig 122 Shows Marsoft's predictions of the cape spot market on January 2005 and January 2006 along with actual values.

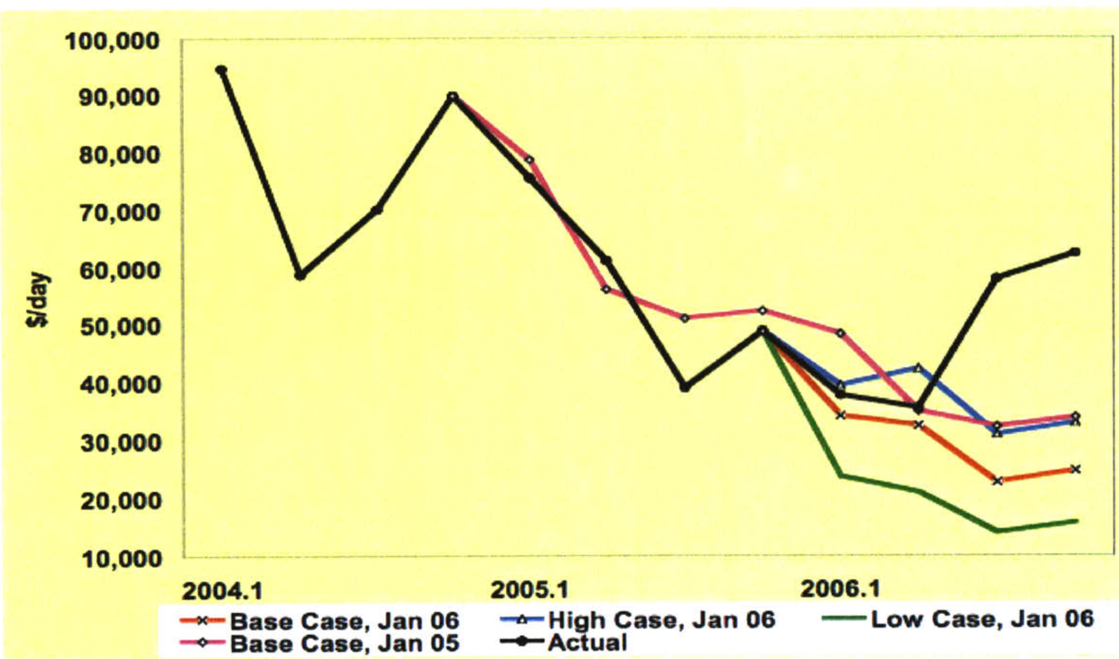

Fig 122: Marsoft Forecasts for the Capesize Spot Earnings along with Actual Rates [Marsoft 2007b]

Estimating fleet utilization can be very difficult and sometimes inaccurate as highlighted by the January 2006 estimates. This approach however is clearly more reliable than using futures as a forecasting tool.

In general, futures tend to converge towards the actual value as the maturity date is approached meaning that they are more accurate for closer contract periods. This is not always true however as futures may undergo large cycles along with the spot market during the last few months. The futures value for Q4 2005 in May 2005 ($40,500/day) for example was a much closer than that of July 2005 ($23,750/day) even though both were lower than the actual value of $43,939/day.

Fig 123 shows the futures prices for years 2007 to 2009 and the actual values for years 2004 to 2006.

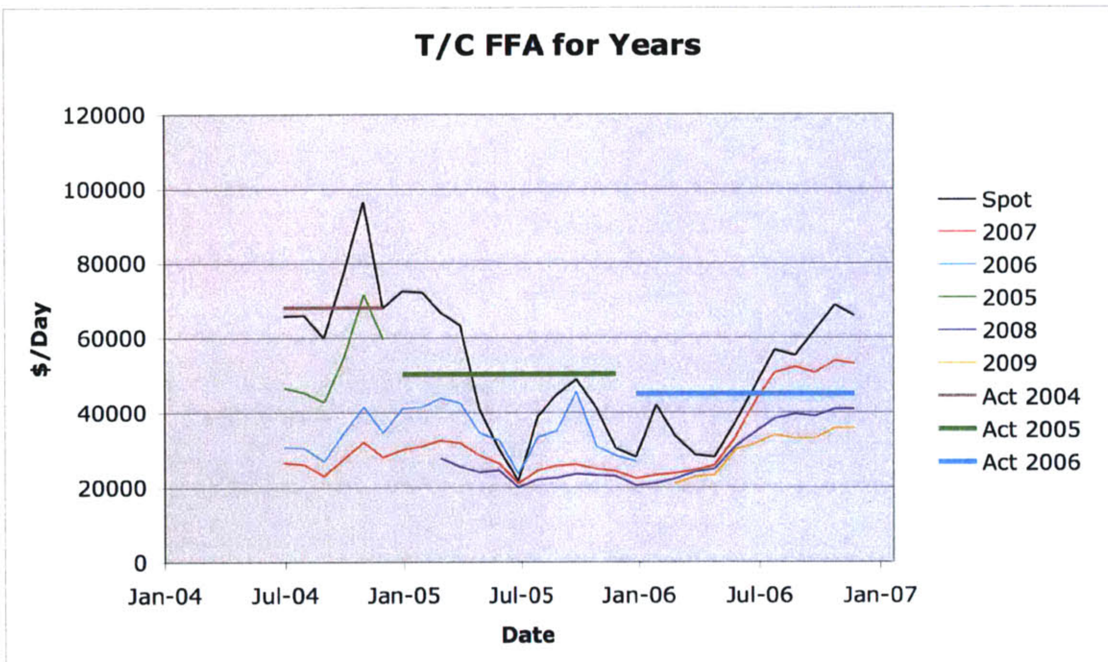

Fig 123: Futures Prices for the T/C Index along with actual values using data from [FIS 2007]

How to Read Fig 123		
Consider December 2006		
Legend	Meaning	Value
Spot	t/c Index value as of End December 2006	$65,870/day
2007	Futures price for 2007 as of End December 2006	$52,875/day
2008	Futures price for 2008 as of End December 2006	$40,750/day
2009	Futures price for 2009 as of End December 2006	$35,750/day
Act 2006	Average value of the t/c Index over 2006	$44,867/day

Table 41: How to read Fig123

The right end of this diagram demonstrates most clearly how the current market influences futures prices depending on the closeness of the contract period. After May 2006, when futures prices for years 2007, 2008 and 2009 were approximately the same, the spot rates began increasing and futures followed. They also diverged however as the price for 2007 was most affected and that for 2009 was affected the least. Again this shows how the influence of the current market is lower for contract periods far ahead.

The difference between futures prices and actual values for whole years (Fig 123) appear to be slightly smaller on average than those for half years (Fig 121), which are in turn slightly smaller than those for quarters (Fig 120). This is a logical outcome as the actual values for longer contract periods fluctuate less than those for shorter contract periods. This is because the index is averaged over a longer period in each case. It should be noted however that a given discrepancy for a longer contract period represents a greater potential profit or loss than the same discrepancy over a shorter contract period. The actual value of the index for 2006 for example was $44,867/day, so if one bought the future in July 2005 at $23,500/day, this would yield a profit of $7.8m.

Fig 124 shows a comparison between futures prices one month ahead (in red) and actual values of the index (in black).

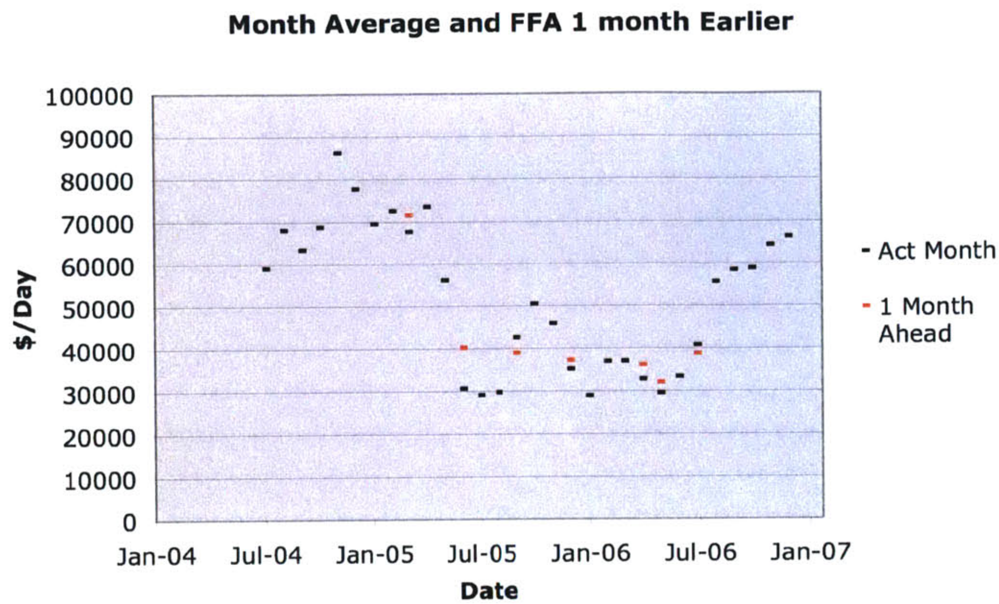

Fig 124: Futures Prices for the T/C Index along with actual values - using data from [FIS 2007]

How to Read Fig 124		
Consider July 2006		
Legend	Meaning	Value
Act Month	Average t/c Index value over July 2006	$40,828/day
1 Month Ahead	Futures price for July 2006 as of End June 2006	$38,750/day

Table 42: How to read Fig 124

As shown, futures prices are relatively accurate for the next month. The maximum difference that can be observed between futures prices and actual values in Fig 124 is $9,579/day in June 2005. A comparative analysis was carried out in order to assess the effect of time ahead on the similarity between futures prices and actual values for each quarter from Q4 2004 until Q4 2006. The results are shown in Fig 125.

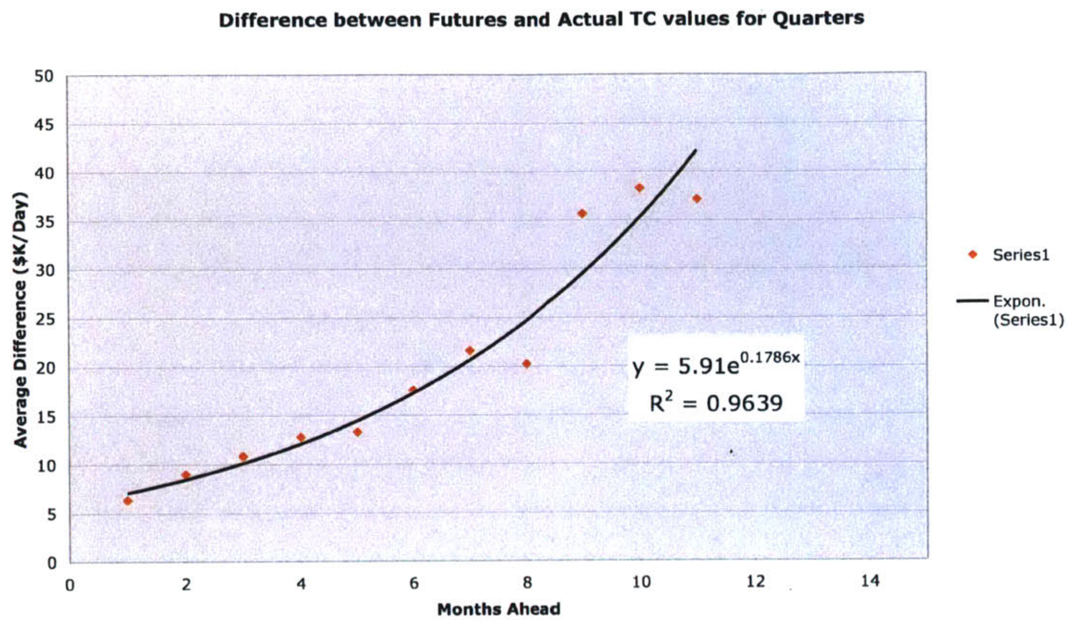

Fig 125 Average difference between futures for T/C Index and actual values - using data from [FIS 2007]

How to Read Fig 125		
Consider 6 Months Ahead		
Legend	Meaning	Value
Series1	Average difference between the actual t/c Index value over a quarter and its futures price 6 months earlier, for all quarters from Q4'04 to Q4'06.	$17,571/day
Expon.(Series1)	Exponential Regression Model	$17,257/day

Table 43: How to read Fig 125

As shown, the relationship between the time ahead and the average difference between futures price and actual value can be characterized as exponential with reasonable accuracy ($R^2 = 0.964$). This indicates that there is potential for much greater profit/loss in contracts for a period far ahead. Perhaps a regression model of the form y = a + be^(cx) would be even more accurate, where "a" resembles the average difference accrued during the time until the middle of the contract period (in this case half a quarter), and would hence be proportional to the length of contract period considered (month, quarter, two quarters or year).

7.4 Freight Rate FFAs

A similar analysis to the above was carried out on futures for freight rates. Two trade routes were considered in order to cross verify the results. These are the C4 route (Richards Bay/Rotterdam) and C7 (Bolivar/Rotterdam). The graphs resulting from the analysis are very similar for the two trade routes so only those for C4 are presented. The corresponding graphs for C7 can be found in Appendix C.

Fig 126 shows futures prices for each month from Sept 2004 until June 2007 relative to the spot market. Fig 127 shows the futures prices for a number of months ahead along with the spot rates at the last day of each month since June 2004. Note that in both cases, the contract period is one month.

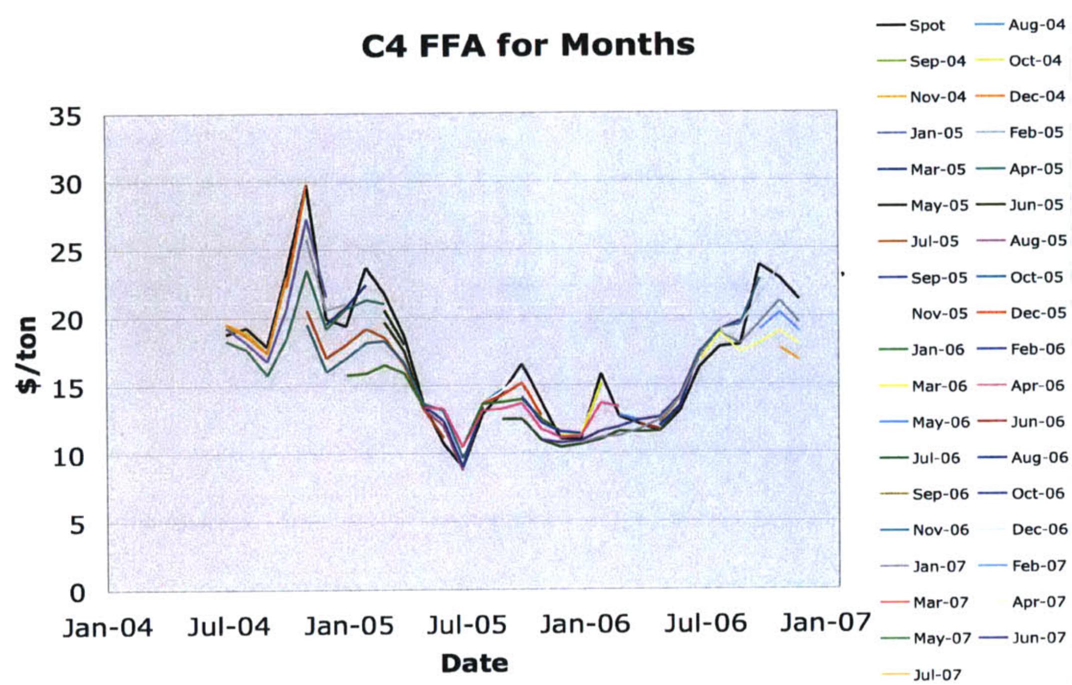

Fig 126: The spot market and futures prices for C4 freight rates in various months – Using data from [FIS 2007]

How to Read Fig 126		
Consider December 2006		
Legend	Meaning	Value
Spot	Freight rates on C4 as of End Dec. 2006	$21.21/ton
Jan-07	Futures price for January 2007 as of End Dec. 2006	$19.50/ton
Feb-07	Futures price for February 2007 as of End Dec. 2006	$18.88/ton
Mar-07	Futures price for March 2007 as of End Dec. 2006	$18.25/ton
Apr-07	Futures price for April 2007 as of End Dec. 2006	$17.88/ton
Jul-07	Futures price for July 2007 as of End Dec. 2006	$16.75/ton

Table 44: How to read Fig 126

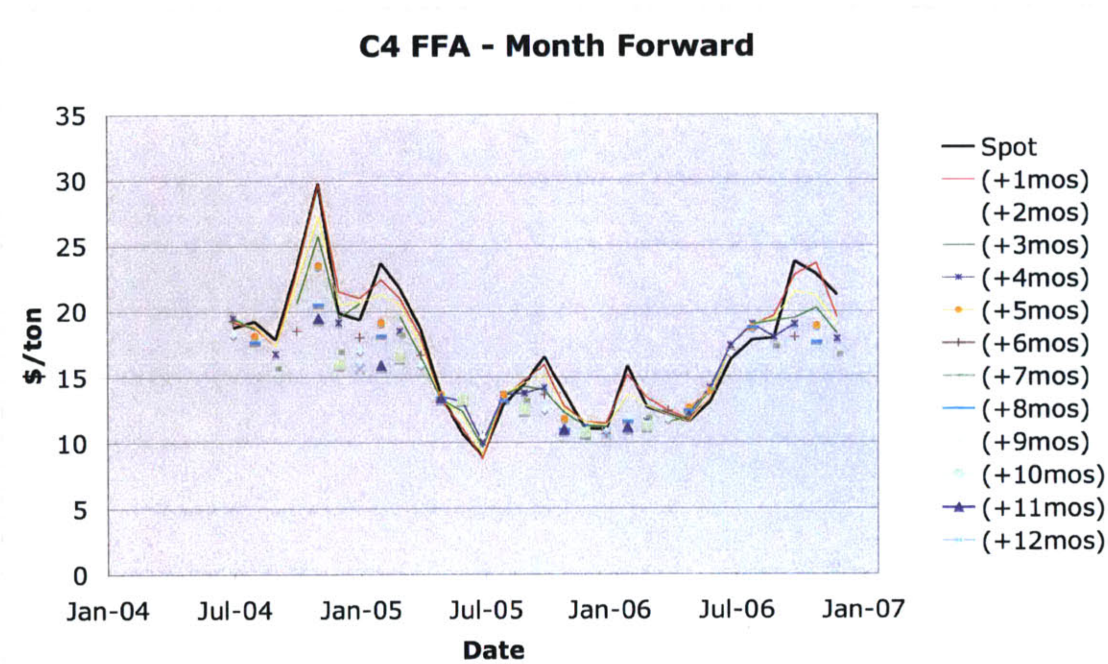

Fig 127: The spot market and futures for C4 freight rates 1-12 months ahead - using data from [FIS 2007]

How to Read Fig 127		
Consider December 2006		
Legend	Meaning	Value
Spot	Freight rates on C4 as of End Dec. 2006	$21.21/ton

(+1mos)	Futures price for January 2007 as of End Dec. 2006	$19.50/ton
(+2mos)	Futures price for February 2007 as of End Dec. 2006	$18.88/ton
(+3mos)	Futures price for March 2007 as of End Dec. 2006	$18.25/ton
(+4mos)	Futures price for April 2007 as of End Dec. 2006	$17.88/ton
(+7mos)	Futures price for July 2007 as of End Dec. 2006	$16.75/ton

Table 45: How to read Fig 127

As with the futures for the t/c index, it is clear how futures prices, even for a number of months ahead, are to a great extent dictated by current rates. This is particularly evident in Fig 126, where the futures lines appear to be going as a group following the spot market.

The general pessimism over the past several months that was witnessed for t/c is also apparent regarding freight rates. In both Fig 126 and Fig 127, the spot market (black line) is most of the time above all futures lines. Furthermore, futures prices decrease with time ahead as indicated for example by the futures prices in December 2006 shown in Table 44 and Table 45. This is also emphasized when the market is on a downturn as shown in Fig 127.

The same conclusion can also be drawn from Fig 128, which shows the futures prices for a contract period of one year, one to four years ahead, along with the spot rates since June 2004.

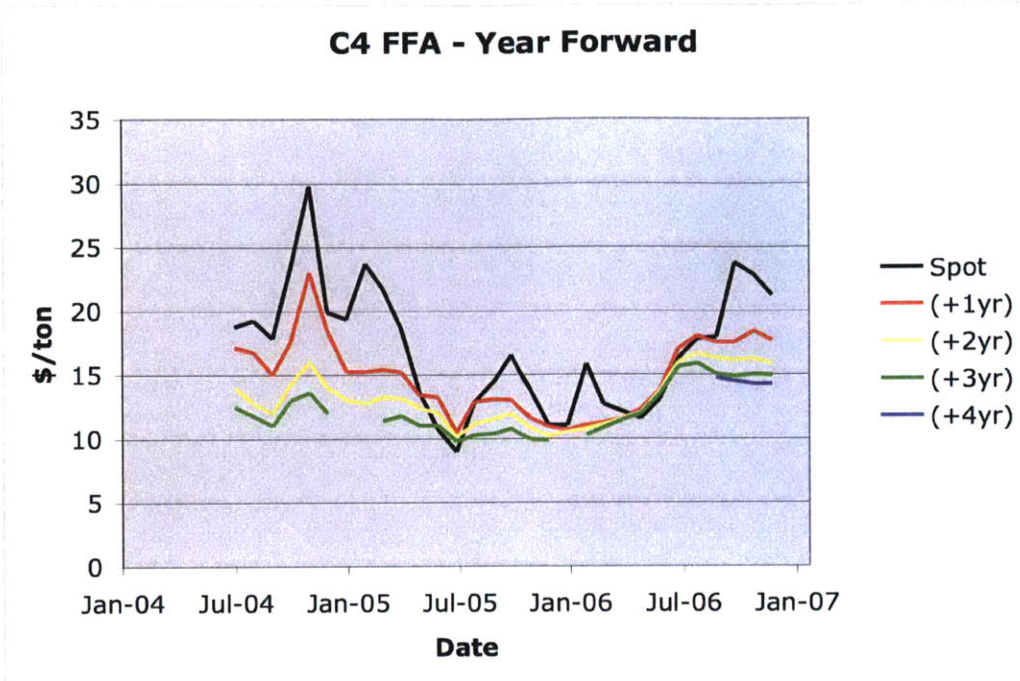

Fig 128: The spot market and futures prices for C4 freight rates 1-4 years ahead – Using data from [FIS 2007]

How to Read Fig 128		
Consider December 2006		
Legend	Meaning	Value
Spot	Freight rates on C4 as of End Dec. 2006	$21.21/ton
(+1yr)	Futures price for 2007 as of End Dec. 2006	$17.65/ton
(+2yr)	Futures price for 2008 as of End Dec. 2006	$15.80/ton
(+3yr)	Futures price for 2009 as of End Dec. 2006	$14.95/ton
(+4yr)	Futures price for 2010 as of End Dec. 2006	$14.25/ton

Table 46: How to read Fig 128

As for t/c it can also be seen that futures prices fluctuate less than the spot market and are more stable the further ahead their maturity is.

Fig 129 shows the futures prices for years 2005 to 2010 along with the spot market and actual values for years 2004 to 2006. Note that the contract period is again one year.

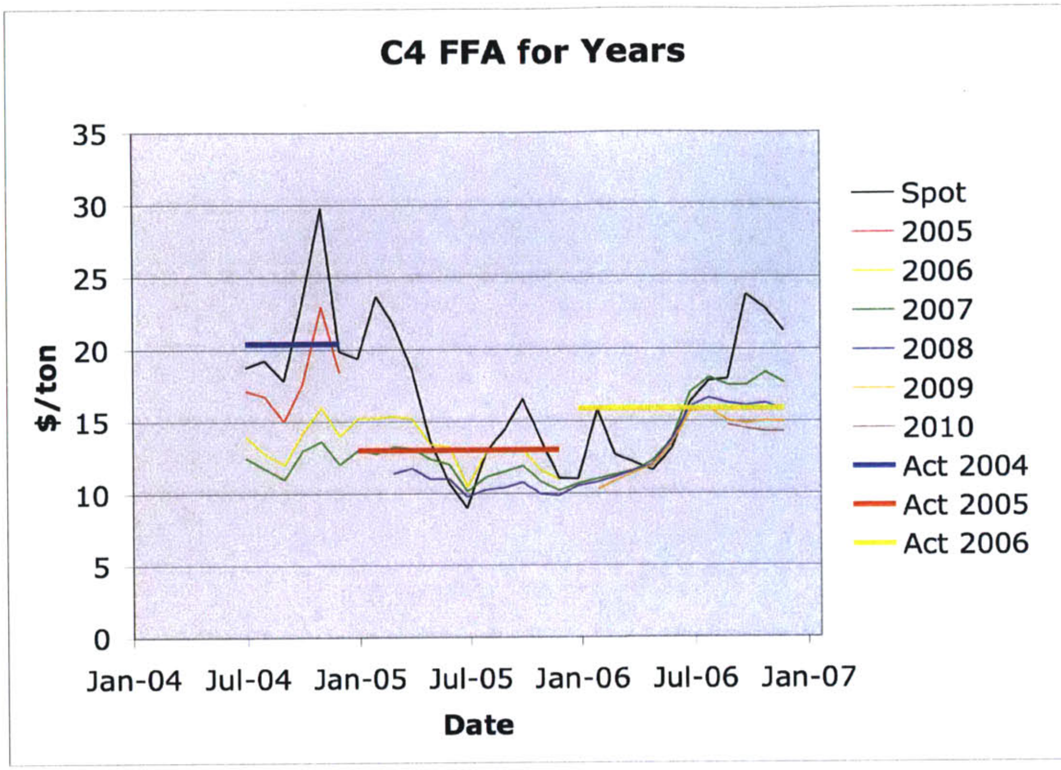

Fig 129: The spot market, C4 futures prices for years and average annual values – Using data from [FIS 2007]

How to Read Fig 129		
Consider December 2006		
Legend	Meaning	Value
Spot	Freight rates on C4 as of End Dec. 2006	\$21.21/ton
2007	Futures price for 2007 as of End Dec. 2006	\$17.65/ton
2008	Futures price for 2008 as of End Dec. 2006	\$15.80/ton
2009	Futures price for 2009 as of End Dec. 2006	\$14.95/ton
2010	Futures price for 2010 as of End Dec. 2006	\$14.25/ton
Act 2006	Average value of freight rates on C4 over 2006	\$15.89/ton

Table.47: How to read Fig 129

Futures have consistently been lower the further the contract period showing the same pessimism as futures for the time charter index. Again large differences from actual values are observed.

Fig 130 shows the spot rates at the end of each month, the average value of each month, and the futures for that month one to twelve months earlier.

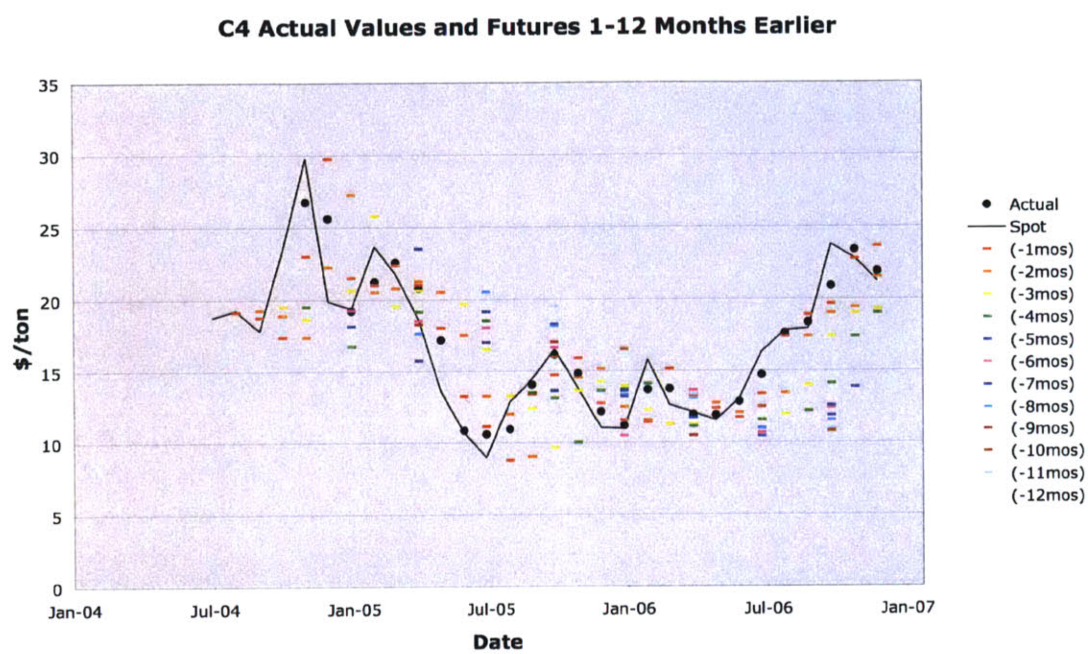

Fig 130 The spot market and futures prices for C4 freight rates 1-12 months ahead – Using data from [FIS 2007]

How to Read Fig 130		
Consider November 2006		
Legend	Meaning	Value
Actual	Average freight rates on C4 over November 2006	$23.38/ton
Spot	Freight rates on C4 as of End November 2006	$22.81/ton
(-1mos)	Futures price for Nov. 2006 as of End Oct. 2006	$22.75/ton
(-2mos)	Futures price for Nov. 2006 as of End Sept. 2006	$19.38/ton
(-3mos)	Futures price for Nov. 2006 as of End Aug. 2006	$19.00/ton
(-4mos)	Futures price for Nov. 2006 as of End Jul. 2006	$17.38/ton
(-5mos)	Futures price for Nov. 2006 as of End Jun. 2006	$13.88/ton

Table 48: How to read Fig 130

As shown in Fig 130, the closer the month is, the smaller the difference between the futures price and the actual value. It is sometimes the case, for example in October and November 2006, that the further back the futures contract was made, the lower the futures price relative to the actual value. In other months such as June and July 2005, the further back the contract, the higher the futures price relative to the actual value.

Fig 131 demonstrates the effect of time ahead on the similarity between futures prices and actual values for each month from November 2004 until December 2006.

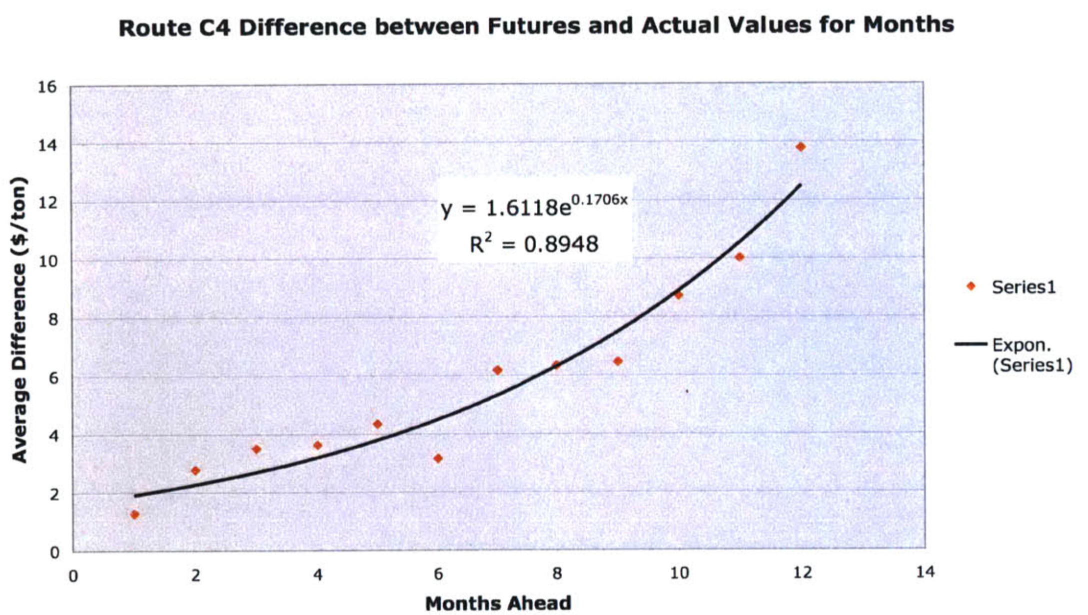

Fig 131: Average difference between futures for freight rates and actual values – Using data from [FIS 2007]

How to Read Fig 131		
Consider 10 Months Ahead		
Legend	Meaning	Value
Series1	Average difference between the actual C4 freight rate over a month and its futures price 10 months earlier, for all months from June-2004 to Dec-2006.	$8.71/ton
Expon.(Series1)	Exponential Regression Model	$8.88/ton

Table 49: How to read Fig 131

As for the t/c index, the relationship between time ahead and the average discrepancy between futures prices and actual values is evidently of an exponential form with a high grade of accuracy ($R^2 = 0.895$). A similar result was also obtained in the combined analysis of trade routes C4 and C7, which can be found in Appendix C. As discussed earlier, the inclusion of a constant "a" in the regression model to make it of the form y = a + be^(cx) would be less important than when the contract period is a quarter as opposed to a month.

7.5 Conclusions

After carrying out the above analysis on futures for capesize bulk carriers, the conclusions that can be derived are identical regarding futures for the t/c index and for trade routes C4 and C7. These can be summarized as follows:

- The futures and physical markets are separate but closely aligned and interrelated
- General opinion has consistently been that the market will gradually decline at least until 2010
- Futures prices are strongly affected by the current market and its direction
- Futures curves with different origins tend to converge into the future, showing that the influence of the current market is lower on futures prices for contract periods further ahead
- Futures curves are relatively "flat" and therefore not a good forecasting tool. Large discrepancies between futures prices and actual values are therefore common, creating potential for high profits/losses
- Futures prices fluctuate less than the spot market
- Futures prices fluctuate less, the longer the contract period (e.g. futures for years are on average more stable than futures for months). This leads to smaller absolute discrepancies but those represent a higher potential profit/loss
- Futures prices fluctuate less, the further ahead the contract period
- The average discrepancy between futures prices and actual values increases exponentially with time between the contract and the settlement date

8. Current Investment Opportunities

8.1 Introduction

As discussed in the previous sections, the capesize bulk carrier market is highly cyclical both in terms of charter rates and ship values. This creates big investment opportunities with potential for high returns over relatively short periods of time. As shown earlier, the past cycle created opportunities that would yield a return of over 1000% in just 3-4 years.

This section analyses the opportunities available in the current sale and purchase market both from a seller's and a buyer's perspective. A buyer is faced with the choice of asset to invest in and its employment. A seller is faced with the option of selling or chartering a vessel. Some representative vessel and charter combinations are chosen, covering the wide range that is available in the market. These are then evaluated and compared in order to provide recommendations to potential buyers and sellers. The analysis is carried out in a way so as to have long term significance and future reference value.

8.2 Deals Considered and Current Prices

Rather than considering actual ships that are for sale today, it is more appropriate for the purpose for this project to assume hypothetical deals of typical vessels based on recent transactions. This approach covers a wider range of ship ages and has greater long-term value, as the deals considered are more representative of those available in the market at any time.

The typical size of capes has increased significantly since the early 1970s when they were first introduced. In order to produce results that are relevant to what is most widely available, the typical size in the year that each cape was built is assumed. A few representative deals are chosen to analyze as summarized in Table 50.

Deals Considered			
Transaction	**Year Built**	**Age (years)**	**Size (DWT)**
Order	2010	0	180,000
Buy	2007	0	175,000
Buy	2002	5	175,000
Buy	1997	10	170,000
Buy	1992	15	150,000
Buy	1987	20	150,000
Sell	2007	0	175,000
Sell	2002	5	175,000
Sell	1997	10	170,000
Sell	1992	15	150,000
Sell	1987	20	150,000
Sell	1982	25	145,000

Table 50: S&P Deals Considered in the Current Project

Recent transactions have to be referenced for the current valuation of the vessels in Table 50. Table 51 shows secondhand transactions from January 1st and Table 52 shows the orders and resales since March 1st. Only those with reported prices are included.

Secondhand Deals Between 01/01/07 and 05/11/07					
Date	**Name**	**Built**	**Size**	**Notes**	**Price**
02/Jan	SPRING BRAVE	1995	151,066	Delivery in May	62.0
08/Jan	MONTEGO II	1993	149,391	T/C: 30k/d – Dec'08	50.0
08/Jan	CHS MOON	1990	151,227	-	45.0
10/Jan	BRILLIANT CORNERS	1981	105,496	-	8.7
26/Jan	LOWLANDS BEILUN	1999	170,162	T/C: 37.4k/d – Mar/Jun'10	72.5
05/Feb	YUE MAY	2007	175,000	-	99.0
14/Feb	DYNASTY	1982	132,082	-	15.0
14/Feb	PANTELIS SP	1999	169,883	T/C: 47.5k/d – Feb'08	83.0
22/Feb	THIOS COSTAS	1982	145,229	Delivery in May	18.0
02/Mar	CAPE PELICAN	2005	180,235	-	110.0
05/Mar	JOHNNY K	1994	174,770	POLAND BLT	63.5
12/Mar	ANANGEL WISDOM	2007	175,000	-	112.0
19/Mar	CAPE KASSOS	2004	171,480	Delivery in Sept	100.0
20/Mar	MARTHA VERITY	1995	157,991	-	62.0
Mar	AMERICANA	1987	148,982	-	33.0
30/Mar	IKARIA	1981	129,237	-	19.0
09/Apr	NAUTICAL DREAM	1994	151,439	-	63.5
09/Apr	Formosabulk CLEMENT	2001	170,085	Bareboat TC (10yrs)	95
09/Apr	Formosabulk BRAVE	2001	170,085	Bboat TC: 25k/d (10yrs)	95
12/Apr	ARIMATHIAN	1994	149,782	-	62.0
12/Apr	Formosabulk ALLSTAR	1995	150,393	BboatTC: 22,7k/d (10yrs)	67.0
16/Apr	GLOBAL PEACE	1982	132,049	-	19.5
16/Apr	BOSS	1985	139,816	-	31.0
22/Apr	WINNER	1985	174,004	-	37.5
04/May	AUSTRALIAN FAME I	1982	145,500	-	21.5

Table 51: Capesize Deals from January 1st to May 11th [Vafias 2007, Braemar 2007b, Tradewinds 2007]

Newbuilding Orders and Resales Between 03/01/07 and 05/11/07				
No of Ships	Delivery (Start/Average)	Size (DWT)	Yard (Yard Country)	P ($m each)
8 opt.4	2010/11 (start)	180,000	QINGDAO BEIHAI (China)	68.75
1	OCT 2008	170,000	KOREA	91
1	NOV 2007	175,000	SASEBO	102
1	NOV 2007	175,000	BOHAI	102
1	2010	170,000	KOREA	80
1	JAN 2010	181,000	STX (China)	76
2	MAY 2010 (av.)	181,000	STX (China)	76
3	JUN 2010 (av.)	181,000	STX (China)	76
2	NOV 2010 (av.)	180,000	DALIAN (China)	69
4	JAN 2010 (av.)	180,000	DAEWOO-MA. (Rumania)	78
2	NOV 2010 (av.)	180,000	DAEWOO (Korea)	81
1	SEPT 2010	180,000	DALIAN (China)	69
1	JAN 2011	300,000	NANTONG COSCO KSE (China)	90
2	DEC 2011 (av.)	250,000	NAMURA (Japan)	85
1	NOV 2009	177,000	SWS (China)	88
1	OCT 2009	177,000	SWS (China)	88
2 opt.4	2009 (starting)	170,000	DAEHAN (China)	72.5
2 opt.2	2009 (starting)	176,000	ZHOUSHAN JINHAIWAN (China)	75.75
3	2010 (starting)	180,000	QINGDAO BEIHAI (China)	69
2	2009 (starting)	180,000	DALIAN (China)	70
4	2011 (starting)	230,000	LONGXUE	90
1 opt.1	2010 (starting)	174,500	HANJIN SUBIC	80
2	2010/11	181,000	STX (China)	79.5
1	2007/10	177,000	SWS (China)	115.0
4	2010/11	176,000	NEW CENTURY (China)	69
4	2010	180,000	KOREA SHIPYARD CO.	77.7

2 opt.2	2010	170,000	DAEHAN	81
2 opt.4	2010	300,000	NANTONG COSCO (by COSCO)	80

Table 52: Capesize Newbuilding Orders and Resales Between March 1st 2007 and May 11th 2007

[Clarksons 2007c, Vafias 2007, Braemar 2007b, Tradewinds 2007]

The actual prices summarized in Table 51 and 52 have to be adjusted to estimate the prices of the hypothetical deals in Table 50. Parameters that have to be accounted for include age, size, delivery time, attached charters and the shipyard. For each hypothetical deal, the most similar ones from the recent transactions are chosen and adjusted.

When discounting for age, it is important to remember that linear depreciation in the current market is unrealistic as explained earlier. This is evident by comparing the *"Cape Pelican"* (built 2005) that was sold for $110m with the *"Anangel Wisdom"* (built 2007) that went for $112m in table 4. Linear depreciation using a 25-year lifetime would result in a depreciation rate of about $4.5m/year whereas these two deals indicate a rate of $1m/year which is more realistic considering 20-year average capesize earnings.

The value of delivery time can be estimated by comparing deals that differ only in this aspect, and by considering potential earnings during the waiting period. The value of a time charter can be evaluated by comparing the charter rate to that of the current market for a similar period. This can be either negative or positive. The charter-free value of a ship can thereby be deduced by deducting the value of the charter from the ship's price.

Finally, it is evident from Table 52 that some shipbuilding yards and countries are preferred and produce more expensive ships than others. Japan and Korea are on average more expensive than Rumania, Poland and China, which has a wide range of prices.

The chosen deals assume Korean built, charter-free vessels with prompt delivery, except for the newbuilding order that has a 3-year delivery time (current average). Using the deals in Table 51 and 52, and taking into account that rates have gone up by about 15% during April, the valuations for the hypothetical vessels are as shown in Table 53.

Valuation of Ships Considered				
Year Built	**Country Built**	**Age (Years)**	**Size (DWT)**	**Price ($M)**
2010	KOREA	0	180,000	80
2007	KOREA	0	175,000	115
2002	KOREA	5	175,000	100
1997	KOREA	10	170,000	85
1992	KOREA	15	150,000	63
1987	KOREA	20	150,000	41
1982	KOREA	25	145,000	25

Table 53: Valuation of the Hypothetical Cape Deals Considered in the Current Market as of April 30th 2007

8.3 Financing and Payments

Shipowners have access to many sources of capital in today's market. These include private reserves, partnerships, IPOs, leasing the ship, bonds etc. Very rarely however are any of these options better than a bank loan.

A leading Bank in ship finance provided some illustrative finance scenarios for capesize vessels in today's market. These are for a new building order, a newbuilding resale (prompt delivery), a ten year old and a fifteen years old vessel. As most banks, they have a policy of not financing vessels over 15 years old, though they consider them on a case by case basis and relate them to current scrap prices less a margin. For our purposes, we shall ignore the bank as a financer for vessels over 15 years old.

In order to minimize risk, the bank tries to keep the debt as low as possible compared to the ships value until the loan expires. In today's market therefore, the bank does not use a straight-line depreciation for the reasons discussed earlier. It typically finances 70% of the ship value, uses a margin of 1% over LIBOR, and frontloads the repayments as a requirement. It then relates the balloon payment with the last installment to the residual value (e.g. the scrap value in the case of the 15 year old).

The bank tries to relate to historical average values in order to account for the fact that we are currently at a very high peak in a cyclical market. 10-year average scrap values are about $220/ldt, which is equivalent to about $5.5m for a 25,000ldt cape. Table 54 summarizes the bank loan terms for the various deals considered while table 55 provides the definitions to the abbreviations used in Table 54.

Bank Loan Terms							
Ship	**P**	**L**	**M**	**Q_t (yrs)**	**Q_f (%P)**	**Q_r (%P)**	**B (%P)**
Order	$78m	~70%	1%	40 (10)	8 (1.41)	32 (0.865)	30.9
Resale	$110m	~70%	1%	40 (10)	12 (2.59)	28 (0.682)	19.82
10-yr	$70m	~70%	1%	32 (8)	8 (4.5)	24 (1.13)	6.91
15-yr	$56m	~70%	1%	20 (5)	20 (3.05)	-	8.64

Table 54: Typical Bank Loan Terms for Capes in the Current Market

Nomenclature for Table 7 & 9	
Abbrev	**Definition**
P	Bank price based on Clarkson's valuations in March
L	Loan (the rest is down payment by the shipowner)
M	Margin over LIBOR
Q_t	Number of quarterly installments
Q_f	Number of frontloaded quarterly installments
Q_r	Remaining quarterly installments
B	Balloon payment with the last installment

Table 55: Definitions for the Abbreviations used in Table 54 and Table 56

Payment front-loading is adjusted to bring the loan down to the 10-year average price, while at the same time keeping the deal feasible from the shipowner's perspective based on current time charter rates. Once that is achieved taking advantage of the current market, payments assume linear depreciation until the balloon. Fig 132 shows the 10-year average values along with the outstanding debt for the newbuilding and the resale vessel.

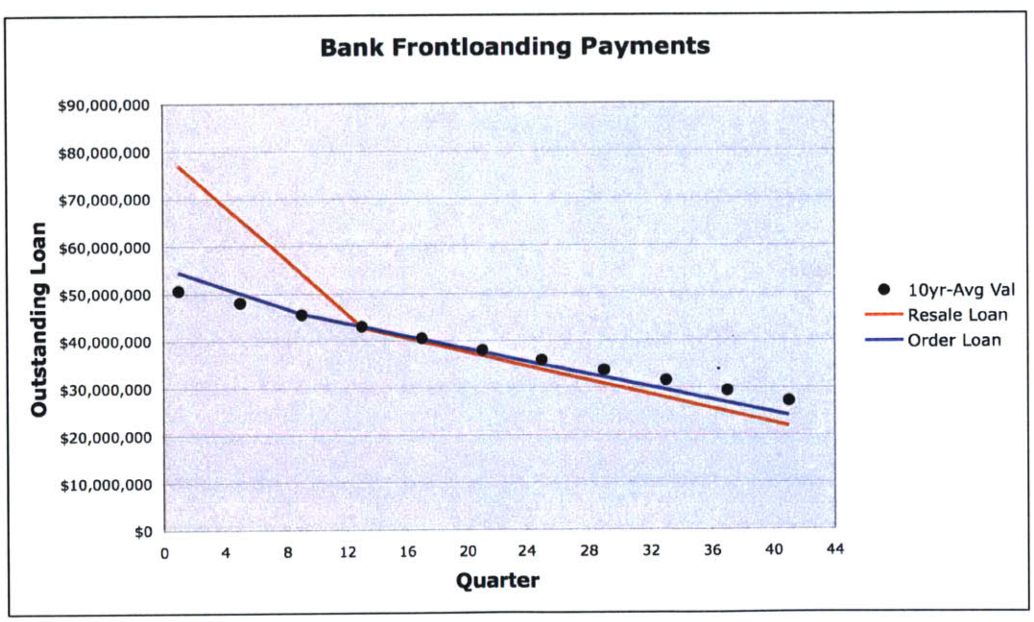

Fig 132: Outstanding Loan Brought Down to 10-Year Average Prices through Frontloading Payments [Marsoft 2006a, Levine 2006, Vafias 2007, Braemar 2007a, Tradewinds 2007]

The financing terms assumed for the acquisition deals considered in Table 50 and Table 53 are based on the bank loan term indications of Table 54. Adjustments are made to account for price differences but the payments as a percentage of the price are kept constant. The loan terms for the 5-year old vessel are assumed to be the same as for the newbuilding resale. The 20-year old vessel is assumed to be self-financed from private reserves or through a partnership.

Table 56 summarizes the loan terms for the acquisition deals considered. The delivery, legal and initial financial cost is also included in brackets as part of the down payment. This is typically about $500,000 for a secondhand vessel and about $1,500,000 for a newbuilding, which includes supervision during construction etc.

Financing Terms for Acquisition Deals							
Ship	**PDown ($m)**	**L ($m)**	**M**	**Q_t (yrs)**	**Q_f ($m)**	**Q_r ($m)**	**B ($m)**
Order	24 (+1.5)	56	1%	40 (10)	8 (1.128)	32 (0.692)	24.832
Resale	35 (+0.5)	80	1%	40 (10)	12 (2.978)	28 (0.784)	22.312
5-yr	30 (+0.5)	70	1%	40 (10)	12 (2.590)	28 (0.680)	20.560
10-yr	25 (+0.5)	60	1%	32 (8)	8 (3.825)	24 (0.960)	6.360
15-yr	19 (+0.5)	44	1%	20 (5)	20 (1.922)	-	5.560
20-yr	41 (+0.5)	0	0	0	0	0	0

Table 56: Financing Terms for the Acquisition Deals Considered

It is assumed that LIBOR is hedged for each payment at the current futures rates, which are shown in Table 57.

Futures Price for LIBOR								
Period	2007 q2	2007 q3	2007 q4	2008 q1	2008q2-2013q1	2013q2-2014q1	2014q2-2015q1	2015 q2+
Price	5.35	5.34	5.3	5.25	4.9	4.97	5	5.02

Table 57: Current Futures Prices for LIBOR [Reuters 2007]

When ordering a newbuilding, payments are made to the yard at various stages before delivery. Typical payment terms are summarized in Table 58.

Newbuilding Payment Terms			
Stage	**Years from Now**	**% NB Price**	**Amount ($m)**
Signing	0	25%	16
Steel Cutting	2	25%	20
Keel Laying	2.75	20%	16
Delivery	3	30%	24

Table 58: Typical Newbuilding Payments

It is assumed that these payments are made using the shipowner's reserves and only a post delivery loan is taken from the bank on the day of the delivery.

8.4 Cash Flow Analysis

Table 59 shows current period charter rates for a modern cape based on recent fixtures reported by [Braemar 2007b]. Table 60 indicates the factors used to adjust these rates for older vessels. These factors are only approximations based on fixtures that were reported since the beginning of 2007. It was found that vessel size is an important factor in determining rates. A 25-year old 180,000 DWT vessel for example may be chartered at a higher rate than a typical 15-year old 150,000 DWT vessel. Table 60 assumes vessels of typical size for their year of built as shown in Table 53.

Current Rates for Modern Cape with Prompt Delivery	
Charter	**Rate**
Spot (Average of 4 TC roots)	$106,366/day
1 year	$90,000/day
2-years	$80,000/day
3-years	$70,000/day
5-years	$58,000/day
10-years	$40,000/day
10-years with delivery in 2010	$30,000/day

Table 59: Current Modern Capesize Rates for Prompt Delivery as of April 30th 2007 [Braemar 2007b]

Cape Rate Adjustment Factors for Age	
Vessel	**Rate as a % of Modern Vessel Rate**
Resale	100%
5-year old	95%
10-year old	90%
15-year old	80%
20-year old	70%
25-year old	50%

Table 60: Charter Rates for Capes of Various Ages as a Fraction of the Rates for a New Vessel

Some assumptions have to be made in order to get values for charter rates of the newbuilding order with delivery in 2010. The market is not very fluid so some crude approximations are needed based on the available data. These are summarized below:

1-year charter today is \$90,000/day so the 1st year is worth ~ \$90,000/day
2-year charter today is \$80,000/day so the 2nd year is worth ~ \$70,000/day
3-year charter today is \$70,000/day so the 3rd year is worth ~ \$50,000/day
5-year charter today is \$58,000/day so the 4th&5th year combined are worth ~\$40,000/day
Based on an average ratio of 1st yr: 2nd yr rates of ~1.1, the 4th year is worth ~41,905/day

These estimates are very close to the current futures prices for similar contract periods as of May 1st 2007. Table 61 shows a summary of both.

Forward Rate Estimates and Current Futures Prices			
Year	**Rate Estimate**	**Contract Period**	**Futures Price**
1st Year	\$90,000/day	Remaining 2007	\$91,000/day
2nd Year	\$70,000/day	2008	\$69,000/day
3rd Year	\$50,000/day	2009	\$51,000/day
4th Year	\$41,905/day	2010	\$42,000/day

Table 61: Charter Rate Estimates and Futures Prices for Similar Periods as of May 1st 2007 [FIS 2007]

So a 1-year time charter with delivery in 2010 (4th year) should be about \$42,000/day. It can also be hedged at this value from now by buying the future to guarantee that rate so speculation is not required.

The rate for a 2-year charter with delivery in May 2010 (4th and 5th year combined) should be ~\$40,000/day. From Table 59, a 10-year charter with delivery in 2010 is \$30,000/day. Interpolation based on current period rates can be used to get approximate values for 3-year and 5-year rates for charters beginning in 2010 as follows:

Currently: 3 year rate = 2 year rate + ¾(2 year rate – 10 year rate)

For delivery in 2010: 3 year rate = 40,000 + ¾(40,000 – 30,000) = $37,500/day

Currently: 5 year rate = 2 year rate + 0.45(2 year rate – 10 year rate)

For delivery in 2010: 5 year rate = 40,000 + 0.45(40,000 – 30,000) = $34,500/day

The results for the deals considered are summarized in Table 62.

Charter Cases Considered		
Ship	**Charter Period (years)**	**Rate ($/day)**
Order	1	42,000
Order	3	37,500
Order	5	34,500
Order	10	30,000
Resale	3	70,000
Resale	5	58,000
Resale	10	40,000
5yr Old	3	66,500
5yr Old	5	55,000
5yr Old	10	38,000
10yr Old	3	63,000
10yr Old	5	52,000
10yr Old	10	36,000
15yr Old	1	72,000
15yr Old	2	64,000
15yr Old	3	56,000
15yr Old	5	46,500
20yr Old	1	63,000
20yr Old	2	56,000
20yr Old	3	49,000

Table 62: Charter Rates for the Acquisition Deals Considered

A 2.5% commission on the time charter earnings is typical so it is deducted in the calculation of quarterly earnings.

Since ships have to undergo repairs regularly, they are removed from service for a number of days each year. Classification requirements become more stringent as ships age and surveys become more regular and thorough. The number of days that a vessel is not earning money each year therefore increases with age. Since the bank requires quarterly payments, a quarterly analysis overall is most convenient. Table 63 summarizes the earning days deducted from each quarter depending on the ship's age. These are approximate values based on experience.

Earning Days Deducted due to Repairs and Surveys		
Ship Age (years)	**Earning Days Deducted / Quarter**	**Earning Days / Year**
0 to 9	3	353
10 to 14	4	349
15+	5	345

Table 63: Number of Days Deducted per Quarter Depending on Ship Age to Account for Repairs

Running costs on the other hand are applied for the full 365 days in each year. These account for all operating and repair costs. As a ship gets older, maintenance becomes more expensive and running costs increase. More importantly, running costs increase every year due to inflation. Table 64 and 65 summarize running costs as a function of ship's age and time.

Running Costs as a Function of Ship Age and Time		
Ship Age (years)	**Running Costs Today**	**Annual Increase in Running Costs**
0 to 9	$5,000/day	2% per annum
10 to 14	$5,500/day	2% per annum
15 to 19	$6,000/day	2% per annum
20 to 30	$7,000/day	2% per annum

Table 64: Running Costs as a Function of Ship Age and Annual Increase due to Inflation

Daily Running Costs						
Year \ Ship	New	5-Year	10-Year	15-Year	20-Year	25-Year
0	$5,000	$5,000	$5,500	$6,000	$7,000	$7,000
1	$5,100	$5,100	$5,610	$6,120	$7,140	$7,140
2	$5,200	$5,200	$5,720	$6,240	$7,280	$7,280
3	$5,300	$5,300	$5,830	$6,360	$7,420	$7,420
4	$5,400	$5,400	$5,940	$6,480	$7,560	$7,560
5	$5,500	$6,050	$6,050	$7,700	$7,700	$7,700
6	$5,600	$6,160	$6,160	$7,840	$7,840	-
7	$5,700	$6,270	$6,270	$7,980	$7,980	-
8	$5,800	$6,380	$6,380	$8,120	$8,120	-
9	$5,900	$6,490	$6,490	$8,260	$8,260	-
10	$6,600	$7,200	$6,600	$8,400	$8,400	-
11	$6,710	$7,320	$6,710	$8,540	-	-
12	$6,820	$7,440	$6,820	$8,680	-	-
13	$6,930	$7,560	$6,930	$8,820	-	-
14	$7,040	$7,680	$7,040	$8,960	-	-
15	$7,800	$9,100	$7,150	$9,100	-	-
16	$7,920	$9,240	$7,260	-	-	-
17	$8,040	$9,380	$7,370	-	-	-
18	$8,160	$9,520	$7,480	-	-	-
19	$8,280	$9,660	$7,590	-	-	-
20	$9,800	$9,800	$7,700	-	-	-

Table 65: Running Costs as a Function of Ship Age and Time

8.5 Acquisition Deal Analysis

A quarterly analysis was carried out for each deal with each of the time charters indicated in Table 62. Payments are made on time with an interest rate of 1% over LIBOR, which is hedged at the prices indicated in Table 57. Quarterly revenues and running costs are applied half way through each quarter and bank payments are made at the end of each quarter. Fig 133 shows the repayment of the loan from the day of the delivery for each ship according to the financing terms shown in Table 56.

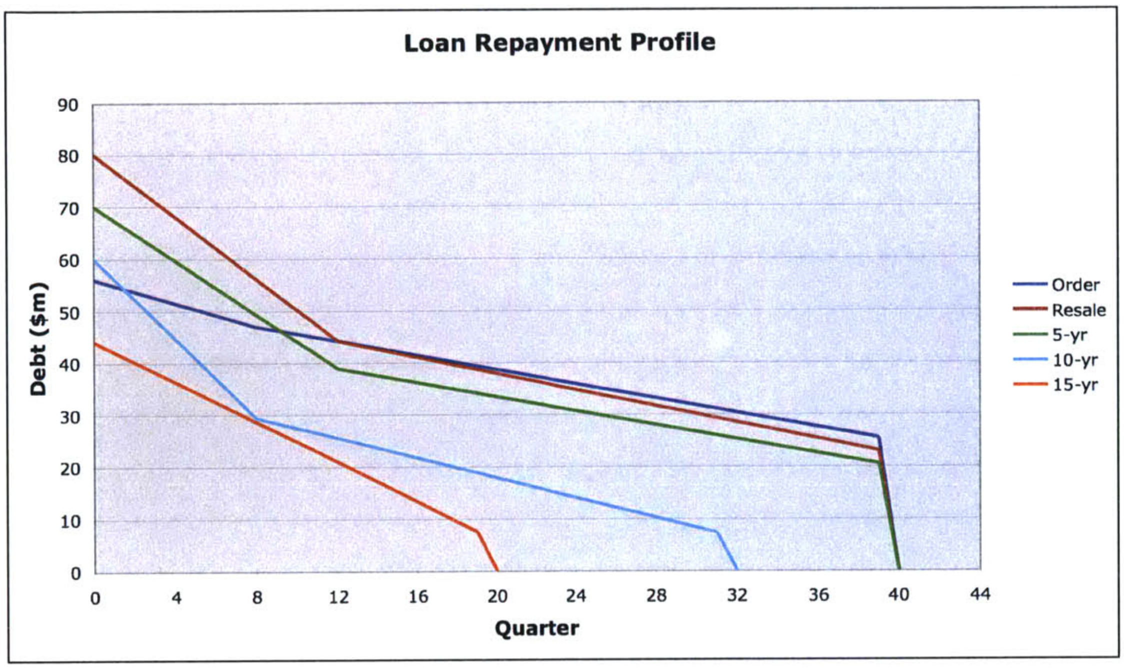

Fig 133: Loan Repayment Profile for the 5 Acquisition Deals using the Data from Table 56

Figs 134 to 139 show the quarterly payments and profits of each ship for all the charters considered. Profits vary each quarter because running costs increase with age and time, earning days per quarter decrease with age, and because the number of days in each quarter varies. The quarterly payments vary because of the frontloading requirement and because interest is paid each time on the outstanding loan, which is reduced after each payment. Furthermore, LIBOR is hedged at a different price for each payment as shown in Table 57, so the interest rate also varies.

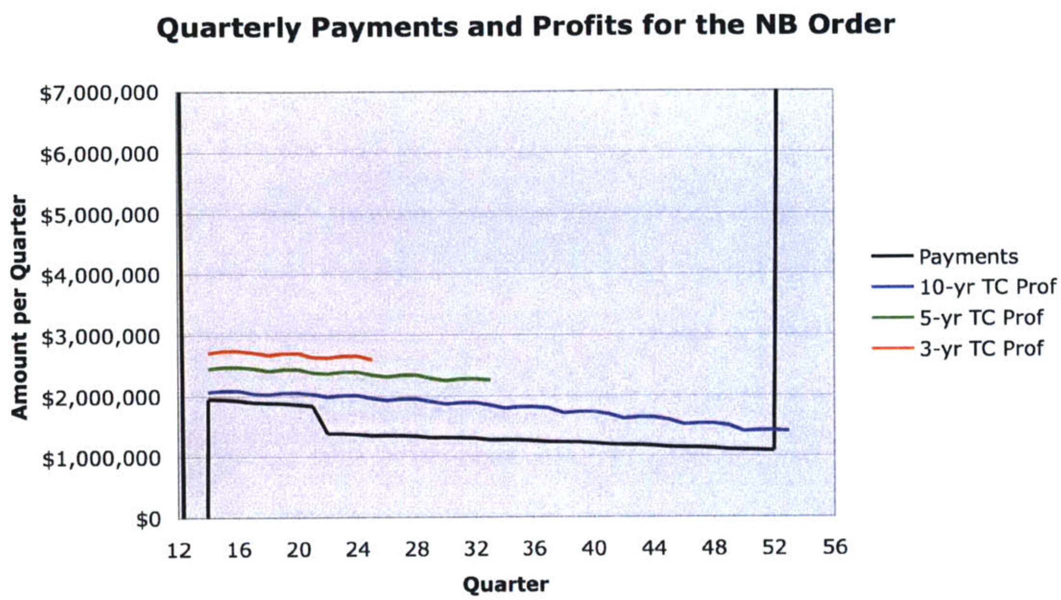

Fig 134: Quarterly Payments and Profits for the Newbuilding Order with the Time Charters Considered

The negative payment in at the end of Quarter 12 in Fig 134 is the bank loan upon delivery of the vessel after a series of positive payments during construction.

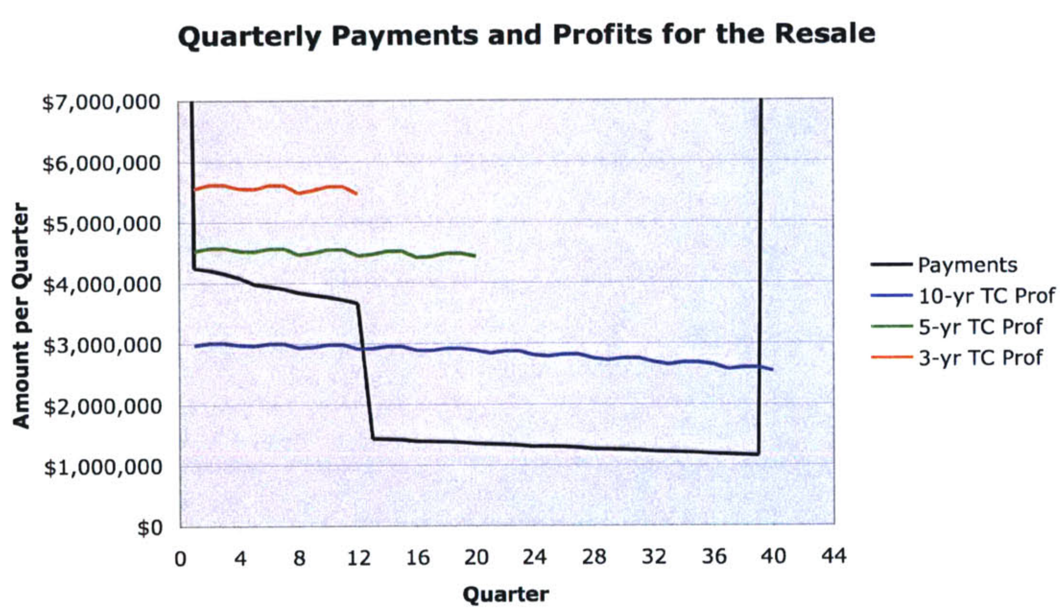

Fig 135: Quarterly Payments and Profits for the Resale with the Time Charters Considered

As shown in Fig 135, the profits of the 10-year charter are not sufficient to cover the first bank installments for the Resale. This means that the vessel would be running at a loss during the first few years. Clearly therefore, this charter option is not feasible.

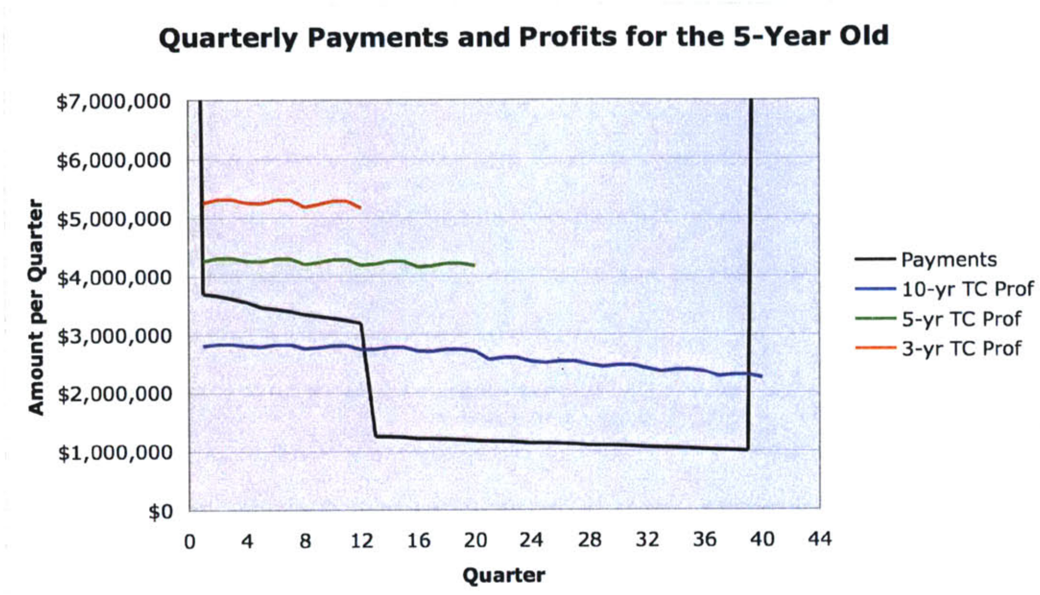

Fig 136: Quarterly Payments and Profits for the 5-Year Old with the Time Charters Considered

Again, as shown in Fig 136, earnings from the 10-year charter do not cover the first installments so this charter option is not feasible for the 5-year old vessel either.

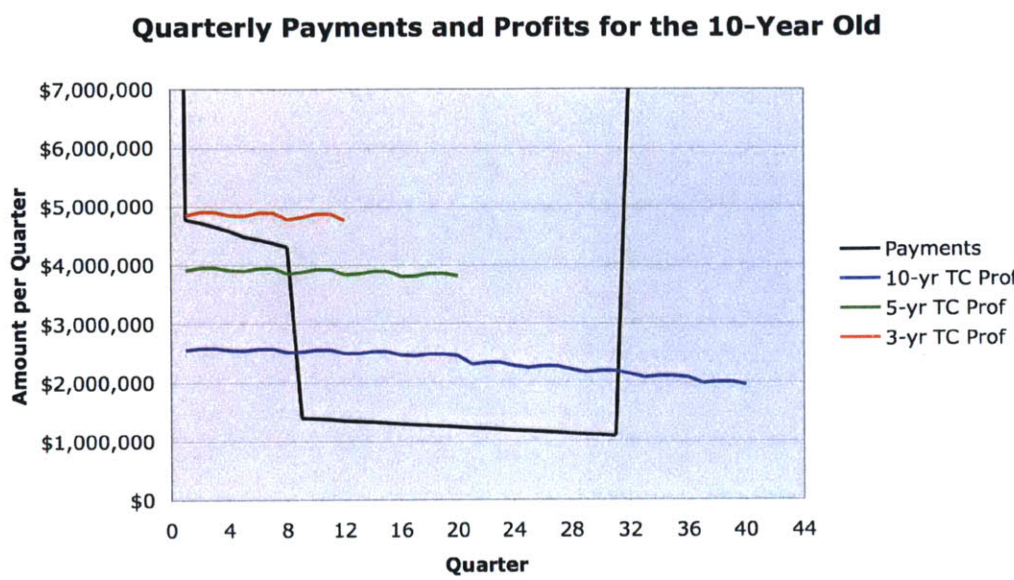

Fig 137: Quarterly Payments and Profits for the 10-Year Old with the Time Charters Considered

As shown in Fig 137, earnings from the 3-year charter barely cover the first installments while 5-year and 10-year charter earnings are inadequate. Only a 3-year charter is therefore considered for the 10-year old vessel.

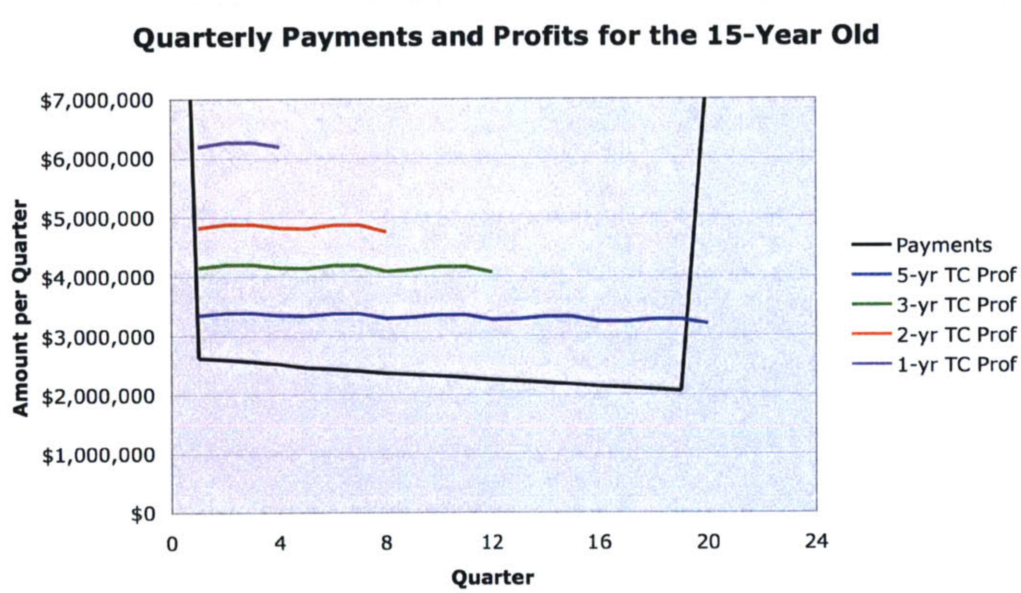

Fig 138: Quarterly Payments and Profits for the 15-Year Old with the Time Charters Considered

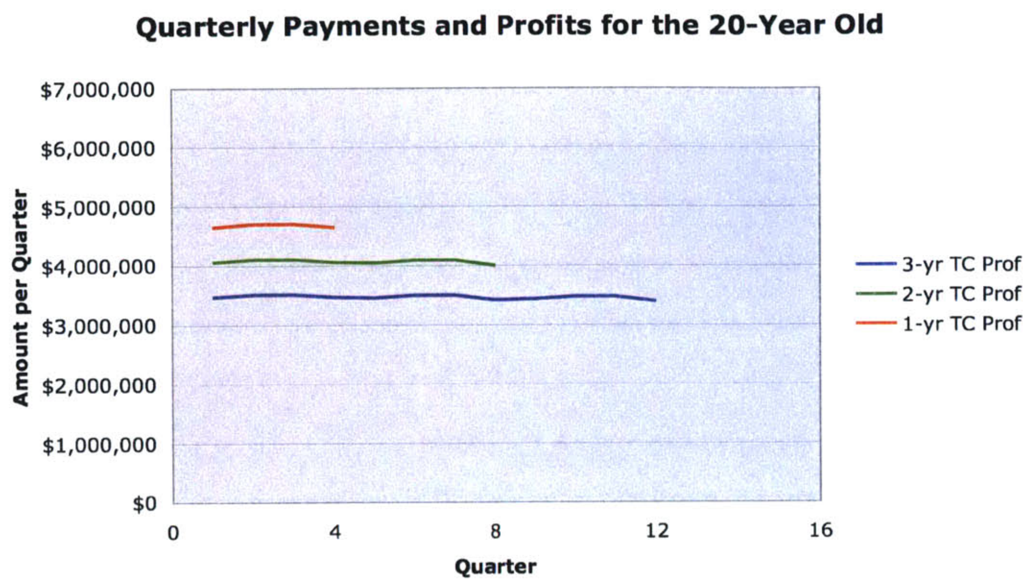

Fig 139: Quarterly Payments and Profits for the 20-Year Old with the Time Charters Considered

Figs 138 and 139 show that all charter options considered, are possible for the 15 and 20-year old vessels. All charter options from the above analysis that do not cover the full installment amount were eliminated before proceeding to the following comparisons.

The Net Present Value (NPV) and the vessel book value were calculated at the end of the charter for each option. Both these can be used to compare between the various options. The book value at the end of the loan is an indication of the equivalent amount one would have to pay on that day to acquire the vessel. If one thinks that the market value will be higher than the book value, then the deal is worth doing. The Net Present Value is an indication of today's value of the ship after the time charter ends. In other words, it is equivalent to what one would have to pay today for the charter-free ship with delivery when the charter ends.

The NPV calculation assumes that the bank loan repayments will be carried out in full meaning that the whole value of the loan (the benefit to the bank) is included. In reality, one would have the option of repaying the loan before the payments are due and thereby save on interest (the bank would normally request some kind of fee for this). The NPV of a deal at a date before the loan is repaid is therefore higher than the present value of the ship's book value at that point in time (when using the same discount rates). That is why the NPV of a deal with no charter is slightly higher than the price of the vessel.

The book value is equal to the outstanding loan plus the current value of all previous payments minus the current value of all previous profits (with interest). An interest rate of 5% is used for the book value as opposed to the discount rate of 10% used in the NPV calculations. This is because the remaining profits after payments are made are likely to be earning an interest of closer to around 5% in the bank.

As a check on the previous charter rate estimates, it was assumed that the resale is traded for 5 years on the spot market. The first 3 years are hedged at the current futures rates shown in Table 61. The rate for the following two years is then adjusted to bring the book value after five years to the same level as when the vessel is chartered for 5 years. This is provides an educated estimate based on the current market, of what the rates are going to be for the last two years (2010 and 2011). The result was $42,680/day, which is very close to our estimate of $42,000/day.

Table 66 shows the book value of each vessel after the time charter, using an interest rate of 5%, along with the vessel age and the time until the charter ends.

Book Value after TC for Each Deal										
Book Value ($m)		**Years Until TC Ends**								
Vessel (charter)	**Age**	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**8**	**13**
NBOrder (0yrs)	0				85.8					
NBOrder (1yr)	1					80.9				
NBOrder (3yrs)	3							68.6		
NBOrder (5yrs)	5								60.1	
NBOrder (10yrs)	10									51.1
Resale (0yrs)	0	115.5								
Resale (3yrs)	3				64.3					
Resale (5yrs)	5						48.9			
5yrOld (0yrs)	5	100.5								

5yrOld (3yrs)	8				50.5					
5yrOld (5yrs)	10						35.2			
10yrOld (0yrs)	10	85.5								
10yrOld (3yrs)	13				49.5					
15yrOld (0yrs)	15	63.5								
15yrOld (1yr)	16		44.6							
15yrOld (2yrs)	17			30.3						
15yrOld (3yrs)	18				21.1					
15yrOld (5yrs)	20						7.6			
20yrOld (0yrs)	20	41.5								
20yrOld (1yr)	21		24.4							
20yrOld (2yrs)	22			11.6						
20yrOld (3yrs)	23				3.2					

Table 66: Book Value for Each Deal After the Time Charter using an Interest Rate of 5%

The book value can be viewed as the amount one would pay for a charter-free vessel of that age in the indicated number of years. To compare amongst the deals in Table 66, one has to look down a single column. Taking the column of 3 years until the charter ends for example, there are 6 options to compare. Each option is equivalent to buying the vessel in 3 years at the indicated price while the age of the ship in 3 years is read from the column "age". Hence the choice (in 3 years) is between a new vessel for \$85.8m, a 3-year old vessel \$64.3m, an 8-year old vessel for \$50.5m, a 13-year old vessel for \$49.5m, an 18-year old vessel for \$21.1m and a 23-year old vessel for \$3.2m. By making such comparisons, some options can clearly be eliminated. The 8-year old vessel for \$50.5m for example is clearly better than a 13-year old vessel for \$49.5m.

Based on historical average prices, the most reasonable deals in the current market appear to be that of buying a 15-year old vessel and chartering it out for 5 years to write it off at \$7.6m, and buying a 20-year old vessel and chartering it out for 3 years to bring write it off at \$3.2m. 10-year average scrap prices are about \$220/ldt, equivalent to about \$5.5m for a cape with a lightship of 25,000ldt. These two deals therefore involve the lowest risk and rely the least on speculation of the market beyond 2010.

Table 67 shows the NPV for each ship after each time charter using a discount rate of 10%. This can be viewed as the equivalent amount one would pay today to acquire the charter-free vessel of the indicated age with delivery after so many years. With a discount rate of 10%, no option appears reasonable. The best ones are the same as in Table 66.

Net Present Value for Each Deals After TC										
NPV ($m)		Years Until TC Ends								
Vessel	Age	0	1	2	3	4	5	6	8	13
NBOrder (0yrs)	0				60.6					
NBOrder (1yr)	1					51.7				
NBOrder (3yrs)	3							39.6		
NBOrder (5yrs)	5								32.2	
NBOrder (10yrs)	10									24.7
Resale (0yrs)	0	104.7								
Resale (3yrs)	3				46.6					
Resale (5yrs)	5						33.0			
5yrOld (0yrs)	5	91.0								
5yrOld (3yrs)	8				36.1					
10yrOld (0yrs)	10	89.8								
10yrOld (3yrs)	13				39.2					
15yrOld (0yrs)	15	59.6								
15yrOld (1yr)	16		38.6							
15yrOld (2yrs)	17			24.4						
15yrOld (3yrs)	18				16.3					
15yrOld (5yrs)	20						6.9			
20yrOld (0yrs)	20	41.5								
20yrOld (1yr)	21		23.7							
20yrOld (2yrs)	22			11.9						
20yrOld (3yrs)	23				5.3					

Table 67: Net Present Value for Each Deal After the Time Charter using a Discount Rate of 10

8.6 Sell or Charter Analysis

A similar analysis was carried out from the point of view of the seller who is faced with the option of time chartering at current rates, or selling at current prices. The same scenarios of ship age and time charter combination were considered with the addition of a 25-year old cape instead of the newbuilding order.

An annual analysis was carried out as opposed to a quarterly analysis for simplicity. Charter rates for each case were based on tables 12, 13 and 15. A commission of 2.5% was applied again as in the previous analysis. Average running costs were taken for each charter based on Table 64 and Table 65. The average number of earning days per year for each case was taken from Table 63. An end value was calculated for each scenario based on the profits and current prices as follows:

$$EndVal = \left(P - NPV_{prof}\right)(1 + I)^{n}$$

$$NPV_{prof} = (\Pr of \times a)(1 + I)^{1/2}$$

$$a = \frac{1 - \left[(1 + I)^{-n}\right]}{I}$$

Where:

Prof: average annual profits

n: number of years of the time-charter

I: interest rate = 5%

If one believes that their vessel will be worth more than "End Value" after the charter, then it is best to charter the vessel. Otherwise, it is better to sell at the current price. Table 68 provides a summary of the analysis for each scenario along with the resulting "End Value".

Sell or Charter Analysis							
Ship (tc)	**R (\$/day)**	**RC (\$/day)**	**Days/Yr**	**a**	**NPVprof (\$m)**	**Price (\$m)**	**EndVal (\$m)**
0-yr (3)	70,000	5,100	353	2.723	62.0	115	**\$61.3**
0-yr (5)	58,000	5,250	353	4.329	80.1	115	**\$44.6**
0-yr (10)	40,000	5,450	353	7.722	93.2	115	**\$35.5**
5-yr (3)	66,500	5,100	353	2.723	58.7	100	**\$47.8**
5-yr (5)	55,000	5,342	353	4.329	75.3	100	**\$31.5**
5-yr (10)	38,000	5,735	351	7.722	86.3	100	**\$22.3**
10-yr (3)	63,000	5,610	349	2.723	54.1	85	**\$35.8**
10-yr (5)	52,000	5,775	349	4.329	69.1	85	**\$20.2**
10-yr (10)	36,000	5,995	347	7.722	79.1	85	**\$9.7**
15-yr (1)	72,000	6,000	345	0.952	21.5	63	**\$43.6**
15-yr (2)	64,000	6,060	345	1.859	36.8	63	**\$28.9**
15-yr (3)	56,000	6,120	345	2.723	46.3	63	**\$19.3**
15-yr (5)	46,500	6,483	345	4.329	58.9	63	**\$5.2**
20-yr (1)	63,000	7,000	345	0.952	18.2	41	**\$24.0**
20-yr (2)	56,000	7,070	345	1.859	31.0	41	**\$11.1**
20-yr (3)	49,000	7,140	345	2.723	38.7	41	**\$2.6**
20-yr (5)	40,500	7,350	345	4.329	48.5	41	**-\$9.6**
25-yr (1)	45,000	7,000	345	0.952	12.3	25	**\$13.4**
25-yr (2)	40,000	7,070	345	1.859	20.7	25	**\$4.7**
25-yr (3)	35,000	7,140	355	2.723	26.5	25	**-\$1.8**

Table 68: Sell or Charter Comparison for the Various Scenarios Using an Interest Rate of 5%

The age of each vessel after the charter is equal to the initial vessel age (shown in the left column) plus the length of the charter (shown in brackets). In the first row, the decision is between selling the vessel today for \$115m, or chartering it out for 3-years if the owner expects that the value of a 3-year old vessel in 3 years will exceed \$61.3m.

Some decisions are very clear. One for example should definitely choose to charter a 20-year old vessel for 5 years as oppose to selling it because the negative "End Value" shows that it will make more money during the charter than it is now worth even of the residual value of the vessel is ignored. Similarly, it is definitely worth chartering the 25-year old vessel for 3 years as oppose to selling it.

It is important to note that these decisions rely on the fact that the charterer will continue to pay the agreed rate if the market goes down. Since the risk varies depending on the integrity of the charterer and the probability of the market declining, it is not quantifiable and therefore not incorporated in the analysis. In real life, one may base their decision on their interpretation of the risk involved in a given situation.

Assuming low risk charters, the most sensible option for each ship was chosen from table 68. The choices are based on historical average values and personal opinion. They are summarized along with a brief explanation in Table 69.

Summary of Best Options		
Ship	**Best Option**	**Comments**
0-yrs	Sell or 5-yr charter	A 5-year old vessel in 2010 should be worth more than $44.6m if orders are made at above $80m for delivery in 2010
5-yrs	Sell	High risk involved in all other options
10-yrs	Sell	10-yr charter: A 20-yr old ship in 20 years may be worth slightly more than $9.7m but it is not worthwhile
15-yrs	5-yr charter	$5.2m is less that the 10-yr average scrap value of ~$5.5m
20-yrs	5-yr charter	Profit of $9.6m plus the residual value of a 25-yr old vessel
25-yrs	3-yr charter	Profit of $1.8m plus the residual value of a 28-yr old vessel

Table 69: Best Chartering or Selling option for each Vessel Based on Current Rates and Prices

1-year and 10-year charters seem to be bad options compared to intermediate periods. 10-year charters allow very little room for significant profits, while 1-year charters rely heavily on a strong market thereafter. If one wants to avoid relying on a strong market for many years, the best option for vessels of age 15 years or older, is the longest time charter available.

8.7 Conclusions

- We are currently at a very high peak of a highly cyclical market. The following few years are therefore valued significantly higher value than remaining ship's life

- Banks respond to this by frontloading loan repayments to bring a high loan down to 10-year average values. This makes some charter options unfeasible because the earnings are inadequate to cover the first payments

- Out of the possible options from a buyer's point of view, only older vessels seem to make sense as they involve lower risk and rely the least on speculation of the market beyond 2010

- From a seller's point of view, 1-year and 10-year charters appear to be redundant options in general while 3-year and 5-year charters or selling are chosen for all vessel ages

- If one does not want to rely on the market staying strong, it is generally worth selling newer vessels and chartering old vessels (15+ years) for as long as possible

9. Overall Comments and Conclusion

Since the development of capes in the late 1960s, their market has been closely correlated with that of the dry bulk fleet. China's recent economic expansion and huge increase in demand for iron ore, has created a boom for capes that account for the great majority of iron ore transportation.

China's steel production industry is expanding rapidly and this drives the demand for iron ore imports. Furthermore, China has gradually become a net coal importer, causing its previous importers to go to Australia. This has led to a heavy increase in tonne-miles and to record-high delays and queue lengths in Australian ports, driving freight rates extremely high. Demand is also affected by the high oil prices, which not only boost the economies of oil producing countries, but also cause many factories and power plants around the world to convert to steam coal, creating more employment for capes.

The global supply of capes is inelastic in the short run due to the limited capacity of yards and ports and the length of delivery times. The high increase in demand, combined with the inelasticity of supply has led to exceedingly high spot and t/c rates. Record-breaking newbuilding, second hand and demolition prices have followed. The weak US $ has also helped boost trade and the freight market.

Most people do not expect the market to last at the current levels for long so the next few years are valued much higher than the remaining ship's life. This has made the second-hand more expensive than the newbuilding that has an average delivery time of 3 years. A modern resale today with prompt delivery is worth about 150% the price of a newbuilding order. This has also narrowed the gap in prices between older and newer vessels. Spot rates are also significantly higher than t/c rates and the difference increases with t/c period length. Since the crisis of 1986 when a 9-year-old cape was of scrap value, the market has moved to the opposite extreme with a 13-year old cape today worth as much as a newbuilding order.

Supply will increase by about 30% by 2011 on the basis of the current newbuilding orderbook. However, China's imports/exports are expected to keep increasing and there is a corresponding optimism on the demand side. Hence there may be a tight balance between supply and demand until then and this will determine the outcome of the market.

There has been minimal scrapping over the past few years leading to an increasing scrapping pool. A decline in rates will force old ships out of the market, thereby counteracting the decline. The resolution of the congestion problem will effectively increase supply and will have an imminent impact on the freight market. If China's demand drops significantly, the increase in supply over the coming years will lead to a shipping crisis. This could make the next decade one of the worst in the history of shipping. Even if that happens however, ship values are unlikely to drop for a relatively long time because of cash reserves and optimism that has been built up during the current boom.

The market is cyclical and very volatile both in terms of ship earnings and ship values, particularly for capes. This cyclicality leads to huge losses but also provides big investment opportunities particularly with older vessels. The latest cycle has created opportunities, which in instances yield return on investment of over 1000% in just 3-4 years. Today we are probably near the peak of the market with average daily earnings of about \$115K/day and a modern resale worth in excess of \$115m. Such high returns are therefore unlikely to be repeated in the near future. The less risky investments today are in older ships and rely the least on speculation of the market beyond 2010. From a seller's point of view, it is generally worth selling newer vessels and chartering out older ones for as long as possible.

The futures (FFA) market provides good investment opportunities to those that wish to hedge or speculate. The FFA market and the physical market are not identical but one affects the other and they are closely aligned. Large discrepancies between actual values and futures prices are very common creating opportunities for high profits. The average difference between futures prices and physical values in fact increases exponentially with the time between the contract and the settlement date. Future prices are strongly affected by the current market and its direction and they are relatively flat. They are therefore a relatively bad forecasting tool and create a risk for big losses. One therefore has to adopt a more scientific approach to forecasting the market and to hedge accordingly.

10. Future Outlook and Recommendations

As part of future research, one could extend the work of the current thesis using more data to produce a forecast of the market. The investment opportunities analyzed could then be modified accordingly to come up with recommendations based on the forecast. Alternatively, the analysis of the current thesis could be applied to a different category of ships such as VLCC/ULCC that is the equivalent niche market for the wet bulk shipping industry. An interesting topic to examine as part of this analysis is the conversion of single hull VLCC's to ore carriers and the effect this has on their values. Panamax bulk carriers are also particularly interesting because the expansion of the Panama Canal in 1914 will open up new trade routes and lead to the evolution of a new ship design, which will depend on a wide range of factors that are worth exploring.

Appendix A: Supply

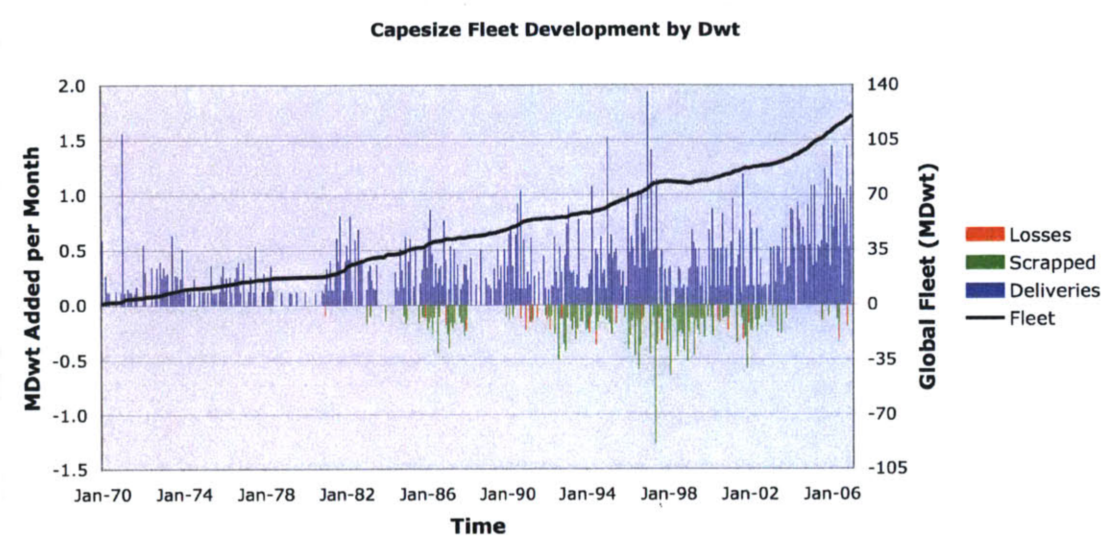

Fig 140: Capesize Orderbook and Monthly Contracts over the past 10 years – using data from [Clarksons 2007a & Clarksons 2007c]

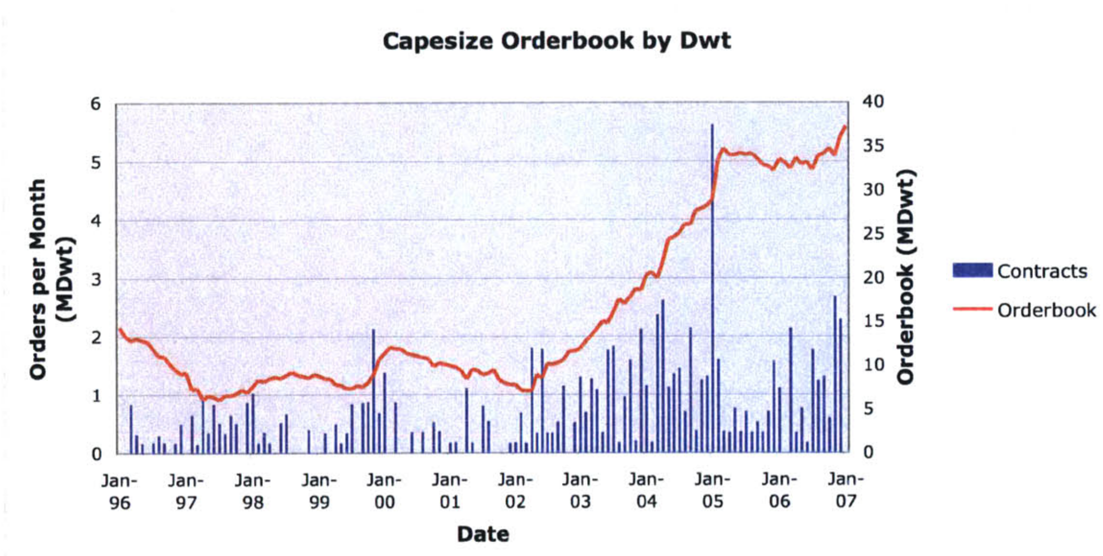

Fig 141: Cape Sales per Month and Average Sale Prices – using data from [Braemar 2007b, Tradewinds 2007, Vafias 2007, Levene 2006, Clarksons 2006a & Clarksons 2006c]

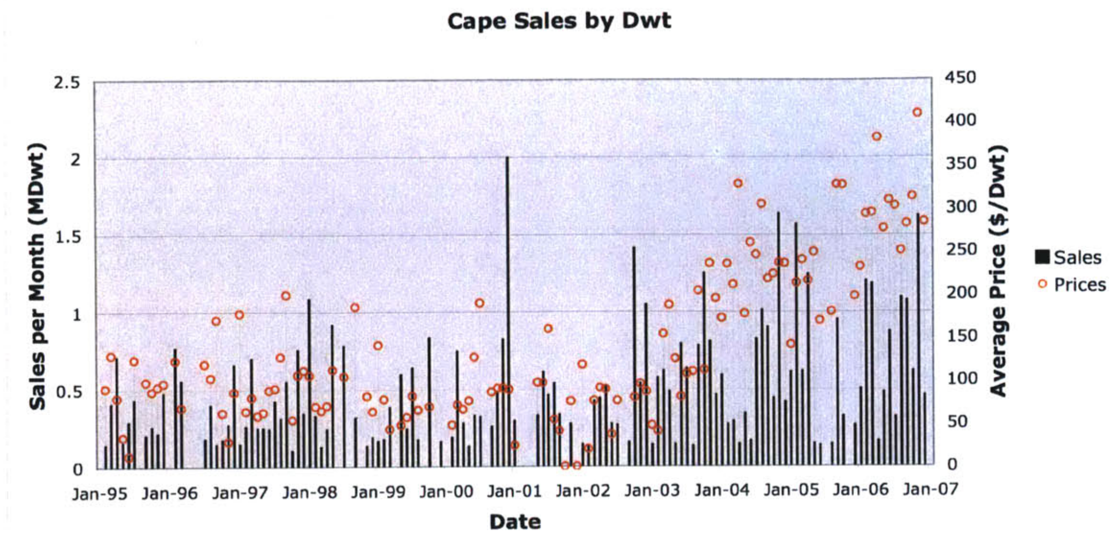

Fig 142: Cape Sales per Month and Average Sale Prices – using data from [Braemar 2007b, Tradewinds 2007, Vafias 2007, Levene 2006, Clarksons 2006a & Clarksons 2006c]

Appendix B: Ship Values

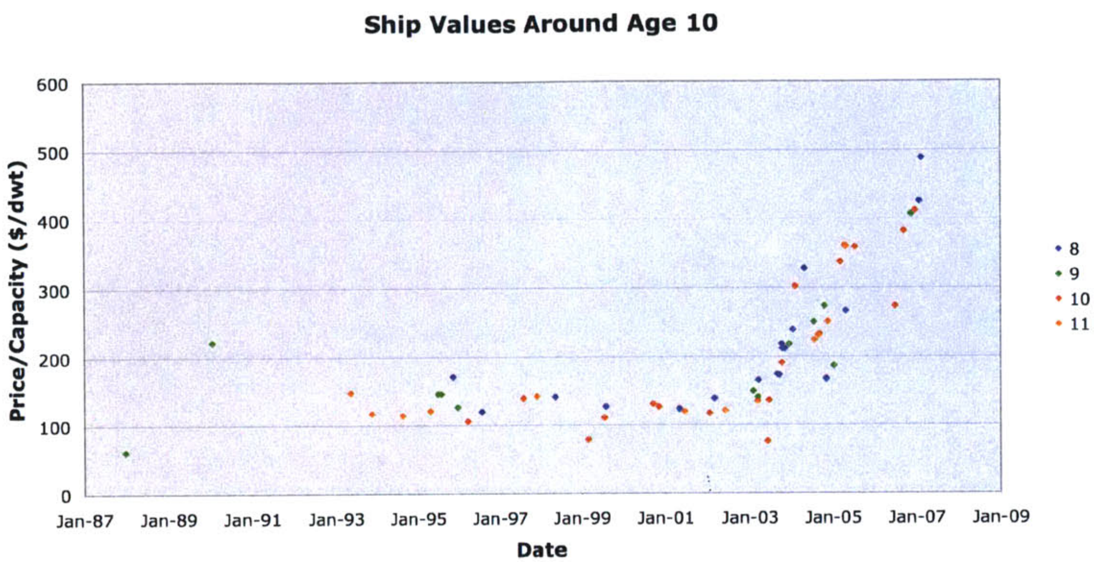

Fig 143: Vessel Price vs. Time to Show the Discount at 10 Years Old

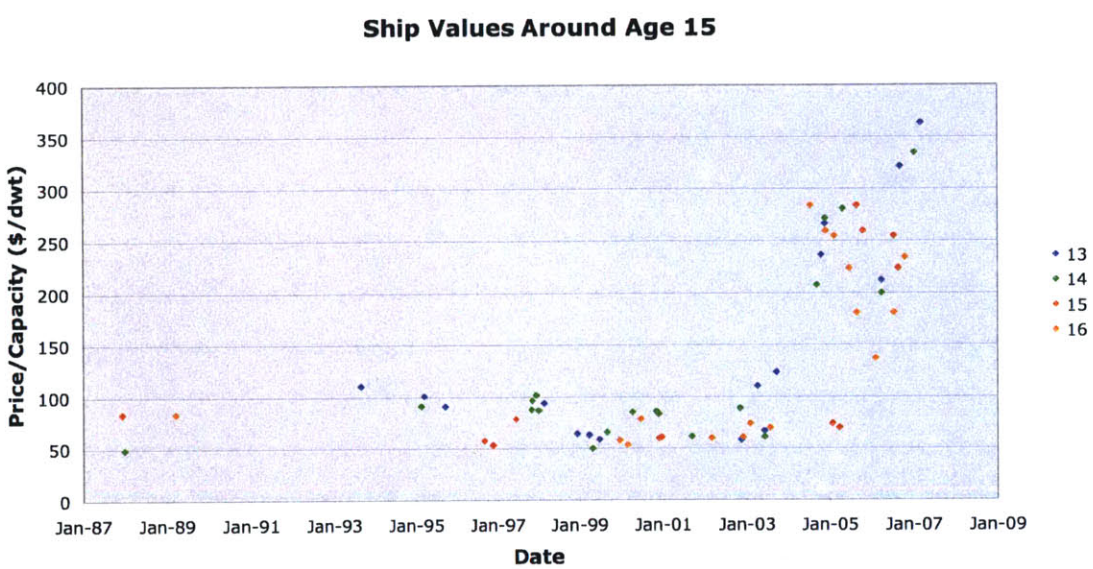

Fig 144: Vessel Price vs. Time to Show the Discount at 15 Years Old

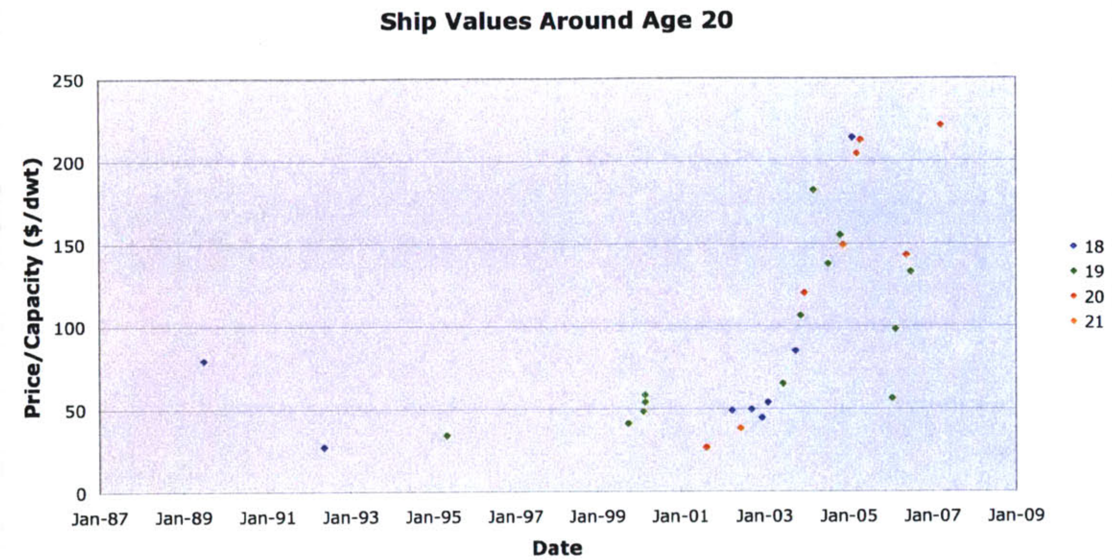

Fig 145: Vessel Price vs. Time to Show the Discount at 20 Years Old

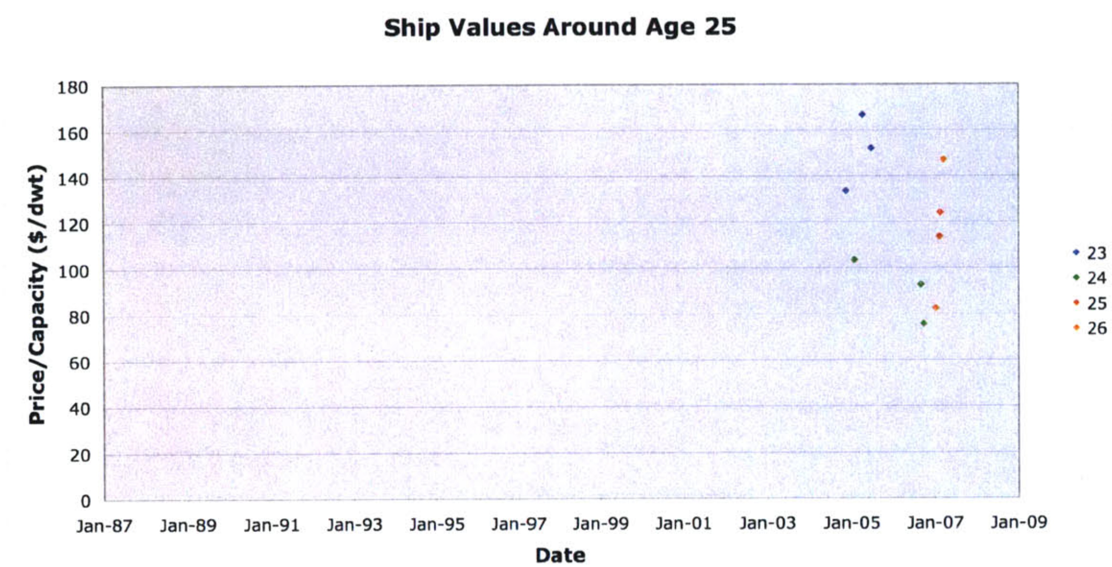

Fig 146: Vessel Price vs. Time to Show the Discount at 25 Years Old

Appendix C: C7 (Bolivar/Rotterdam) FFA

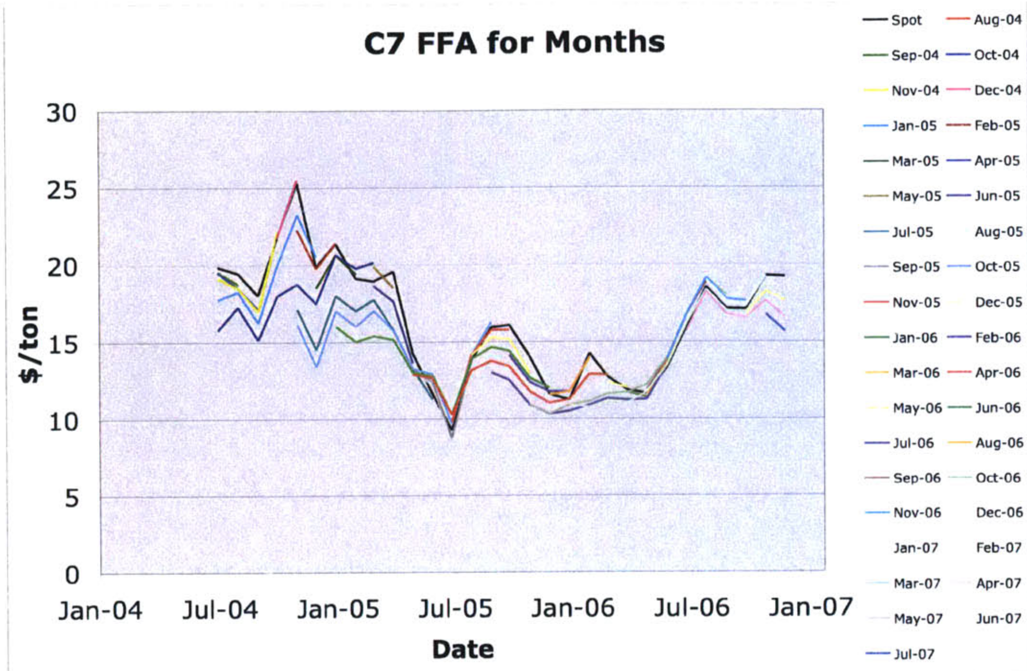

Fig 147: The spot market and futures prices for C7 freight rates in various months – Using data from [FIS 2007]

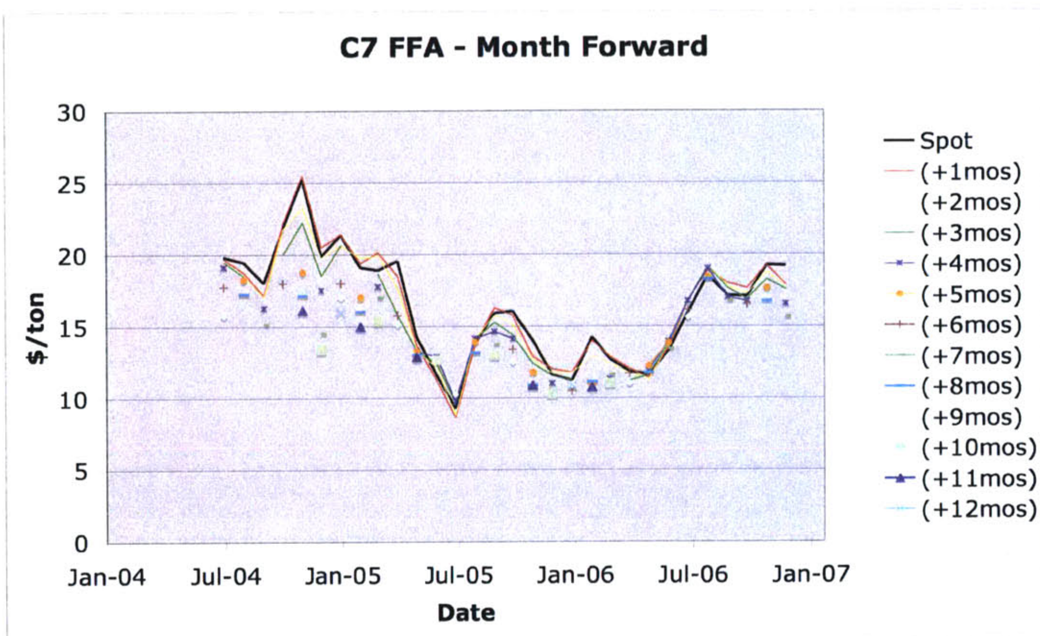

Fig 148: The spot market and futures for C7 freight rates 1-12 months ahead – Using data from [FIS 2007]

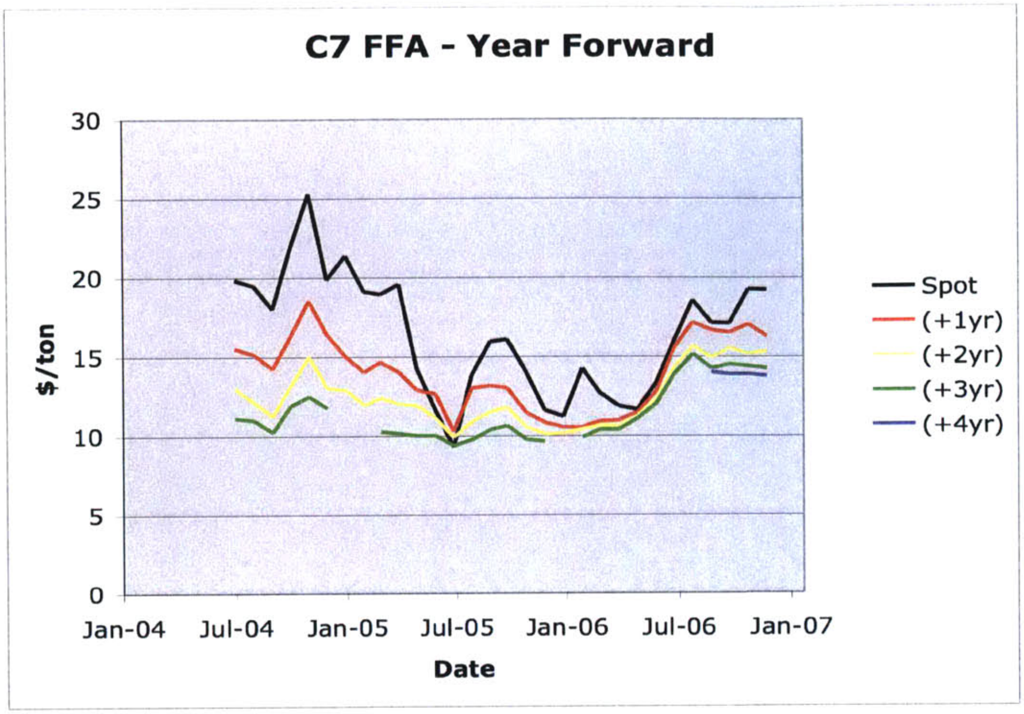

Fig 149: The spot market and futures prices for C7 freight rates 1-4 years ahead – Using data from [FIS 2007]

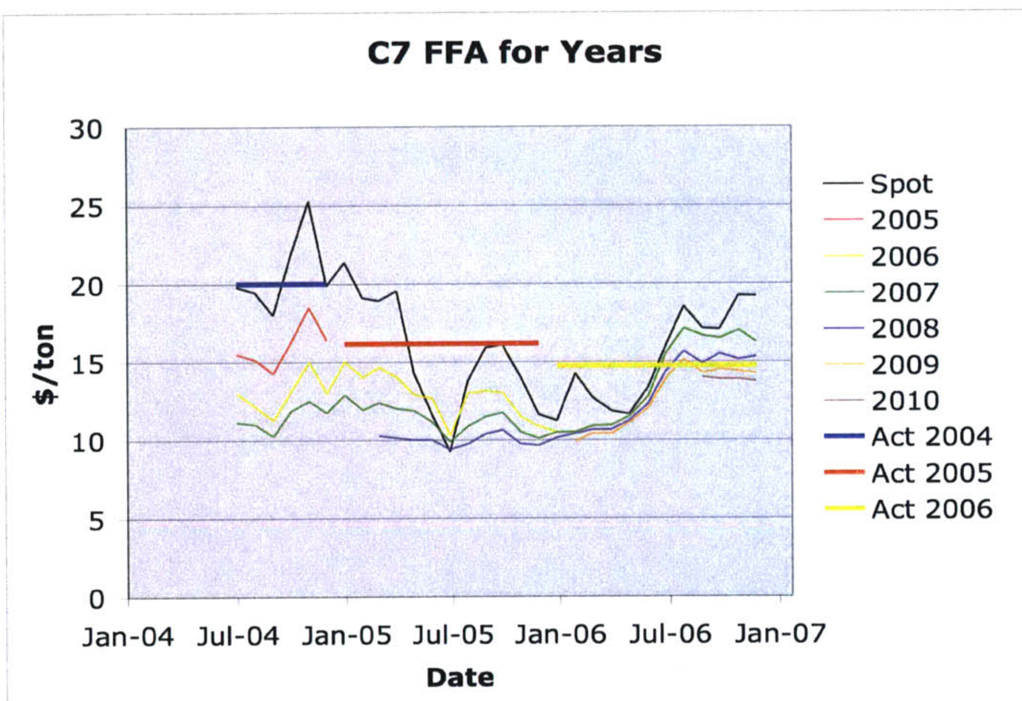

Fig 150: The spot market, C7 futures prices for years and average annual values – Using data from [FIS 2007]

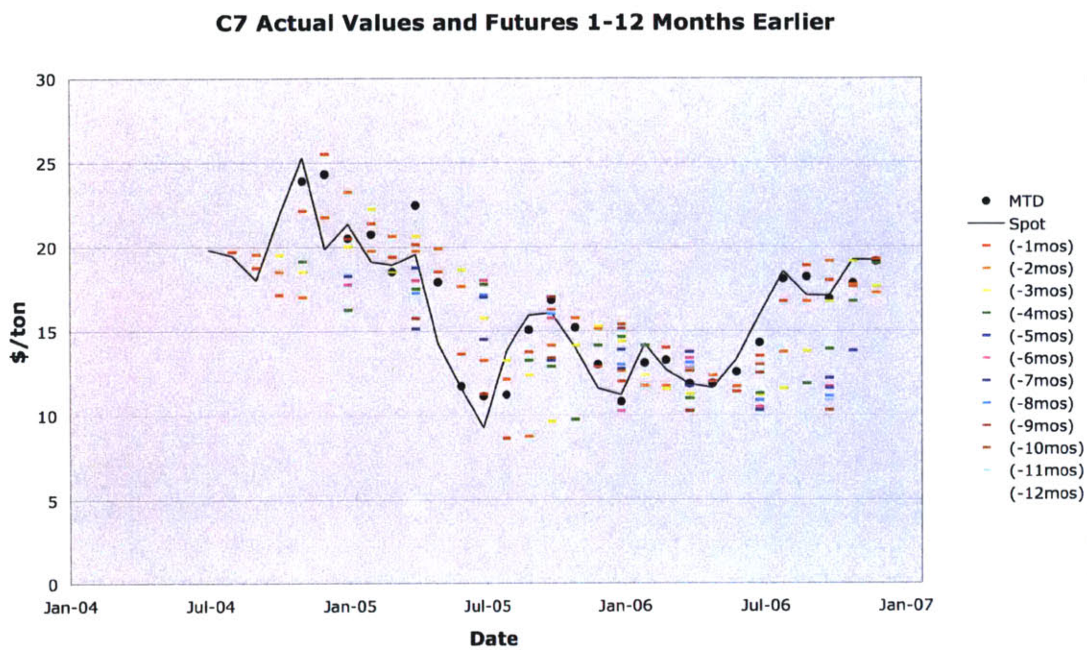

Fig 151: The spot market and futures prices for C7 freight rates 1-12 months ahead – Using data from [FIS 2007]

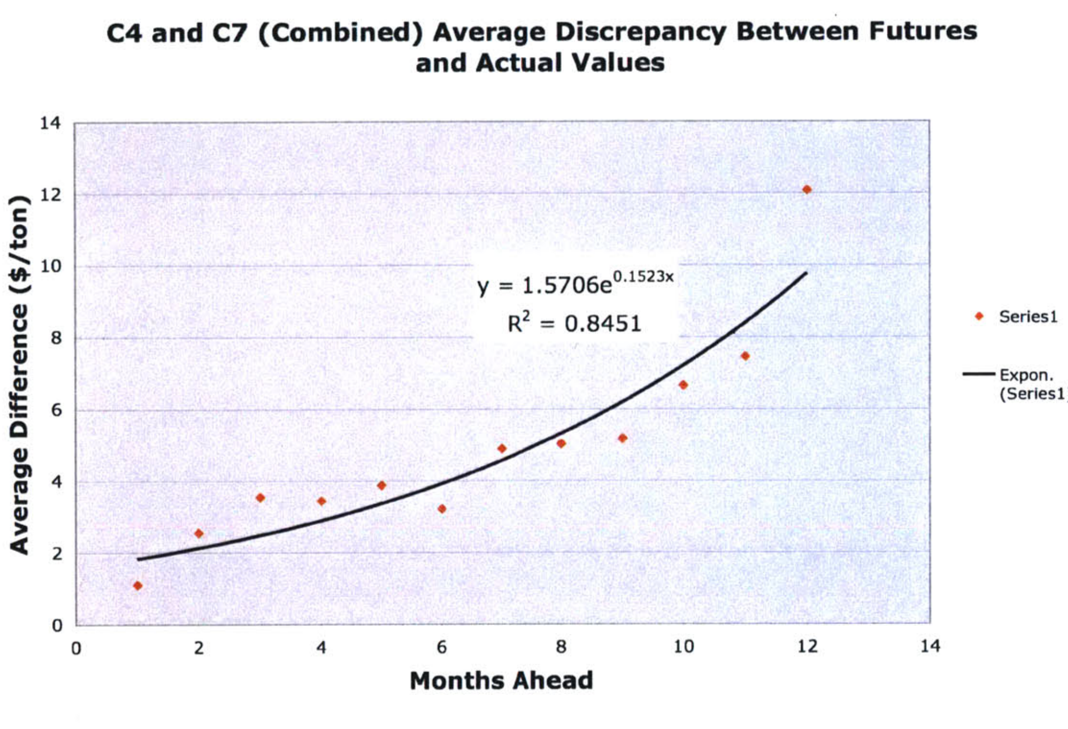

Fig 152: Average difference between futures for freight rates and actual values – Using data from [FIS 2007]

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