

SHIP INVESTMENT STRATEGIES
IN FLUCTUANT SHIPPING MARKET CONDITION:
TURKEY'S PERSPECTIVE

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ÖZ

Deniz yolu taşımacılığı, tarihsel olarak dünya ticaretinin en büyük kısmını kapsayan bir taşıma şeklidir. Limanlar ise deniz yolu ticaretinde uluslararası lojistiğin önemli noktalarını oluşturur. Birleşmiş Milletler Ticaret ve Kalkınma Konferansı tarafından geliştirilen "Düzenli Deniz Ticaret Rotalarına Bağlantı Endeksi", ülke limanlarının uluslararası ticarete katkısını artırmak ve küresel deniz lojistiği ağlarıyla bağlantısını ölçmek amacıyla oluşturulmuştur. Bu çalışmada, bu endeks ile birlikte küresel ticarete yer alan ülkelerin ekonomik açıdan ticarete olan yatkınlıklarını ölçmek için "Ekonomik Açıklık Endeksi" kullanılmıştır. Bu endeks, ülkelerin toplam ihracat, ithalat ve gayri safi yurtiçi hasıla verileriyle hesaplanır. Regresyon analizi gibi nicel araştırma yöntemleri kullanılarak, bu iki endeks arasındaki ilişki ölçülmüştür. Analiz sonucunda, Türkiye'nin denizcilik sektöründe gelişmiş bir konuma sahip olduğu ve gayri safi yurtiçi hasılasında büyük bir paya sahip olduğu görülmüştür. Bu çalışmanın amacı, Türkiye'nin ekonomi ve deniz ticaretine ilişkin konumunu inceleyerek geliştirmek ve bu gelişim için stratejiler belirlemektir. Bu çalışma aynı zamanda deniz ticaretinin, küresel kriz ve belirsizlik dönemlerinde ticareti en az etkileyen unsurlardan biri olduğunu göz önünde bulundurarak deniz lojistik ağlarının geliştirilmesine yönelik tek yönlü bir model oluşturmayı hedeflemektedir. Ülkemizin kıyı yapısına uygun olarak liman kapasitelerinin artırılması ve çeşitli yeni lojistik hizmetlerle geliştirilmesi, ülkemizin uluslararası pazarda rekabetçi bir üstünlük sağlamasına yardımcı olacaktır. Gelecekte, küresel kriz anlarında ekonomik istikrarın ve refah seviyesinin korunmasında lojistik ağlarının, denizcilik ve liman gelişimi konularının bir gereklilik haline geleceği öngörülmektedir. Bu başarı, küresel bir stratejiyle elde edilecektir.

Anahtar Kelimeler: Deniz taşımacılığı, denizcilik, deniz ticareti, gemi yatırımları, denizcilik pazarı

ABSTRACT

Maritime transport has become the way of carrying the greatest amount of world trade, which has been the case in recent years. In maritime trade, ports are the most important points that logistics opens up to international routes. The United Nations Conference on Trade and Development has developed the "Link to Regular Maritime Route Routes" in order to enhance the contribution of international ports to the development of the country's ports and to measure their links to major global maritime logistics networks in maritime trade. Regression analysis, which is one of the quantitative research methods, was used to measure the relationship between this index and the "Economic Openness Index", which was developed to measure the economic vulnerability of the countries involved in global trade and which was obtained by calculating the total export, import and gross domestic product of countries. Analysis of results in improved maritime and gross domestic revenues of developing countries with a large share of Turkey's economy and examined the positions and strategies for the development of sea trade was aimed to determine. In addition to the general development of the country, it is predicted that maritime trade is one of the factors that will enable trade to be least influenced by the fluctuations in the global crisis and uncertainty period and this study aims to create a one-way model for the development of maritime logistics networks from every direction. Increasing port capacities and developing new logistic services for our students in line with the coastal structure of our country will be a bridge to provide a competitive advantage for our country in international global markets. In the near future, logistical networks, maritime and port development issues will be a requirement for the protection of our country's level of economic stability and prosperity in times of global crisis. Global success in this regard will be possible with a global strategy.

Key Words: Maritime transportation, maritime, shipping trade, ship investment, shipping market

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Being a seafarer requires more mental energy rather than physical power. On my sailing period at sea, I learned how to be strong and careful on every operation at sea so that my any mistake would cause sinking of the vessel. As well in my study life, I always used this motto, too “Any mistake sinks the vessel.” Therefore, I dedicated myself to research and development in maritime in order to decrease possible mistakes in maritime sector. This study is a part of “How a captain tries to save her vessel in heavy and bad seas”.

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1. INTRODUCTION

1.1 Subject

National economies have been an essential element of the sustainable life cycle process within the developing and evolving world. Therefore, countries have developed new policies and strategies to adapt to this change, follow up on world economic development, evaluate governance improvements in intra-industries and have a more stable economy by increasing the welfare standards of society. The increase in global industrial production has caused countries to be affected by this development and become more connected to global economies by the economic growth of countries within intra-industries. Trade activities of intra-industries and total industrial production rates show how countries are becoming open to international economies during globalization (Rose, 2004).

However, maritime transportation is considered a crucial component of the global supply chain and accounts for over 80% of international trade in terms of transportation volume (Dursun A. et al., 2012, UNCTAD, 2013). Therefore, it is essential to search for maritime trade indicators to estimate world economic development. Combining traditional trade indicators of countries with primary shipping factors can provide more specific results on countries' economic development to manage a shipping strategy. Emerging countries such as Turkey have different investment and governance policies on maritime trade. One of them is reducing taxes on ships' national flag registration and flying their flag on world seas as some of them prefer convenient flags (Stopford, 2002). Even though countries put specific shipping governance strategies on the investment side, the decision-making depends on ship investors' discretion. At this point, a significant financial resource issue is being faced. Financing ships are becoming more complex every day, even though the Turkish government has decreased the national taxes. Since there is a bad impression of Turkish ship investors in global ship financing due to not-in-time investments without analyzing the market conditions, financial corporations and ship finance banks find Turkish investors' position as a risk in the competitive market.

The shipping sector is very sophisticated in analyzing investors' behavior and putting a rationale action behind it. The market cycle is constantly changing, and specifications of shipping operations are getting more complicated as technological

developments increase. Therefore, it creates unique characteristics for the sector, and international and volatile infrastructure invests in different types of ships. The company's investment decisions are essential. However, the government-based investment policies such as investing in national flags instead of other convenient flags or improving liner trade standards by establishing good port infrastructures also have a significant role in a country's development. A national-based governance policy on shipping will incentivize shipping companies to fly their own countries' flags while financing their ships from national sources. Additionally, domestic funding sources will contribute to the country's economic progress in terms of trade balance and enhance the growth rate during the process of globalization.

Additionally, maritime trade continues to develop to newly established governance policies and strategies in Turkey. Decrease of register taxes on Turkish flag ships, coaster scrap incentives and steps on technical developments in maritime can be sorted for instance. Within this development, Turkish seaborne trade requires the most effective infrastructure on ship and port investment developments.

On the trade side of ship investment decision, Stopford (2002) mentioned that liner shipping which has been initiated with container transportation is a cost-effective method that either includes chemical, bulk, product and LNG carriage. On the country economics side, shipping lines provide direct development by depending on port development and increasing trade volume. According to Cumalıoğlu (2010), not only liner shipping, also tramp shipping places an important role on seaborne trade. However, in this study, the tramp side is neglected and only liner shipping connectivity is added into the analysis.

1.2 Literature Review

In previous literature, it is seen that most of the researches include profit analysis on ship investment of companies without consideration of a governmental based development and policies. Since strategic development of shipping must commence at countries' level, private sector will also take benefits from this development as a team player. For competition, strategies must be well evaluated and organized.

The studies shows that the nature of the ship investment problem can not be disregarded while analyzing shipping strategies. Decision criteria varies between container operators and a bulk carrier shipowners. On the other hand, oil companies tend to adapt more logistical strategies and become an asset player by focusing to have good knowledge on technical management (Klausner, 1970), (Haralambides, 1993), (Thanopoulou, 2002).

The UNCTAD report introduced a formula for trade allocation, consisting of a 40% share for national export cargo, a 40% share for national import cargo, and a 20% share for cross-trading rights (UNCTAD, 1971). Therefore Shneerson D. (1983), mentioned that shipping is a subject of government intervention through operation and capital costs within subsidisation of shipbuilding industry and flag preferences. He researched profitability of investment in shipping from balance of payments aspect. He discussed methodological problems of shipping and calculated Domestic Resource Cost (DRC) for Israeli fleet for explaining the national view. He also optimized DRC as per ship's age for a bulk carrier and added the case study. His study showed that highest profitability can be provided from second hand ships between 10 to 13 years old. This study can be an initiative of ship investment analysis however, must be improved according to current market conditions as well as within consideration of government based policies.

In his book of Stopford (2002), mentioned that shipping market cycle is a bridge between supply and demand sides. The traditional supply and demand model in economics is usually used to analyse market's turnover. It is accepted that shipping market is competitive and this supply and demand amount can be an indicator which affect charter freight rates. To Stopford (2002), the demand side is world economy and affected from many different variables such as global crisis, sudden economic shocks, value of transported goods and services and other force majors. Therefore, shipping market is defined as volatile and this factor causes discussions on decision-making of ship investors.

A study conducted by Meifeng L. et al. (2010) investigated the investment patterns of container shipping firms and examined the decision-making process of fleet expansion in a highly competitive shipping industry. The research utilized a combination of theoretical and empirical methods to analyze companies operating with vessels of different sizes. The theoretical aspect focused on explaining the

important factors influencing firms' capacity investment decisions from operational and strategic perspectives, taking market competition into account. In the empirical part, they gathered data from shipping firms regarding ship investments and found that market demand played a key role in investment capacity. According to Meifeng L. et al. (2010), firms' investment would increase in response to competitors' capacity investments. However, they argued that time charter rates and newbuilding prices were not significant factors in shipping capacity investment. As a result, their study falls short in providing precise estimations for the overall shipping market due to its emphasis on theoretical analysis rather than quantitative shipping market indicators. Additionally, it only focuses on the container segment of ship investment.

Evangelos P.R. et al. (2012) conducted an analysis of multi-criteria factors in ship investments. Typically, shipping projects are evaluated primarily in monetary terms, with investment decisions made to achieve financial benefits. However, the authors argue that there is a need to expand the traditional perspective of shipping investment decisions in a multi-criteria environment. They suggest that the influences on shipping decision-makers (DM) cannot be solely explained in financial terms, and therefore, a multi-criteria optimization approach using the Analytical Hierarchy Process is necessary to address the problem. DMs have the ability to make trade-offs between financial and non-financial considerations based on their individual preferences. Thus, the authors state that controlling biases in the psychological aspects of the shipping industry not only enhances efficiency but is also essential. According to Evangelos P.R. et al. (2012), adopting a multi-criteria evaluation approach for shipping investment processes represents an alternative attempt to develop new strategies for fleet portfolio management and provide diversification alongside the traditional quantitative approach.

Floriano C.M. et al. (2012) conducted research on investment strategies for tanker ships using Monte Carlo simulation, which involved analyzing auto-correlated series of time-charter rates as well as prices of new building and second-hand ships. The authors employed a real option approach to estimate the likelihood of project abandonment. Their methodology only included a specific tanker segment which is called Suezmax and has deadweight tonnage more than 110,000 metric tonnes. It is indicated in their researches that investment analysis return is significantly sensitive according to managerial flexibility to project abandonment and explains risk

behaviour of the investors. However, this study focused on only Suezmax tanker segment and the other segment of ships such as container or bulk carriers can not be included in such method of calculations and there is a lack of model on providing general strategies before investment attempt.

Metin C. et al. (2009) utilized a fuzzy approach to examine the dynamic parameters of the shipping market and their impact on ship investment decisions. Their study focused on applying the principles of Quality Function Deployment (QFD) within the framework of Ship of Quality (SoQ) to the shipping investment process. The authors incorporated the Fuzzy Analytic Hierarchy Process (FAHP) and Fuzzy Axiomatic Design (FAD) algorithms to determine shipping investment decisions specifically in the crude oil tanker market, including Very Large Crude Oil Carriers (VLCCs), Suezmaxes, and Aframax. By employing the SoQ framework, they identified key factors such as market priorities, charterers' perceptions, data-oriented investment decisions, and final investment decisions. As Floriano C.M., et al., (2012), their model was also included only for tanker ship investment. However, it is necessary to expand the model for other types of ships. Additionally, by thinking of the background of shipping executives, their model involves more engineering definitions and may not be competitive for quick use of shipping executives and governments to develop new shipping strategies.

Revenko V.L and Lapkina I.A. (1997), noted that political and economic factors can not be disregarded in international shipping. He drew an inference that owners behaviours tend to continue to operate their fleet in order to reach utilization of tonnage most efficiently despite the volatile and uncertain market conditions. In his research, many different quantitative models have been indicated. Main topics of the models when used for analysing company's policy are asserted as structure of existing fleet, cash flow projections and company's management performance. According to this model, a shipping company's stable operations can only be maintained with a modern fleet and profitable charter contracts. At this point, sale and purchase activities of ships place at important level.

Alizadeh H.A. and Nomikos N.K. (2006) examined the performance of trading strategies that combine technical trading rules and fundamental analysis in the buying and selling activities of dry bulk ships. They conducted a time series analysis using data from 1976 to 2004 to assess the relationship between ship prices and average

time charter rates. The results of their analysis indicated that trading strategies based on earnings were significant when considering the second-hand market for ships. According to Alizadeh H.A. and Nomikos N.K. (2006), their analysis of future ship price behavior can be utilized for timely investment decisions in the shipping industry.

Greenwood R. and Hanson S.G. (2013) studied volatility of ship prices and return on investment of dry bulk cargo ships. In their research, they established a correlation between ship earnings, secondhand ship prices, and industry investment. Their model also includes basic assumptions of Kaldor's (1938) cobweb theory which describes fluctuations can arise from rules and causes behavioural actions of investors. They suggested that pro-cyclical investor expectations by neglecting the competition may cause economic volatility in competitive industries and rejected the rational expectations of perfect foresight.

As the most updated one, Danish Ship Finance (2015), analyzed shipping market semi-yearly and mentioned that a new structure must be provided in the shipping industry. Currently, shipping industry is in a structural slowdown due to decreasing trade volume rather than expected is encountered. Due to the overcapacity of in-service ships, market cycle faces a counter trend. However, investment decisions are still continued. At this point, government based precautions keeps an important role unless the overcapacity is outfaced.

As additional to journal papers, there have been different master and doctorate dissertations on ship investment issues. According to PhD thesis of Umut Tolga Gumus, financial risk concept of ship investments is explained and the importance of assessing financial risks before performing investments is asserted. He used Monte Carlo Simulation Method on evaluating possible risks which are arisen from market's uncertainty. For setting up a new investment strategy, this analysis' risk assumptions may be used for putting a theoretical approach to new models.

Sinem Derindere Koseoglu stated in her PhD thesis that volatility of shipping market causes some companies to get profit while others fail in the industry. She investigated the factors effecting investment decisions of maritime companies by focusing risks of shipping freight rates and secondhand values of capesize ships by using economic tools and methods. According to her, maritime transportation is

affected from many domestic and international factors such as trade volume, political changes, oil prices, interest rates, exchange rates, meteorologic conditions and cash flow operations between ship owners and charterers. This causes fluctuation and unexpected risks in the market. Since the cycle of the market, speculative investment processes can not be underestimated. Timely investments provide both success and failure and therefore, analysing financial risks plays an important role. In her study, she found that secondhand ship prices are completely correlated with new ship building prices of ships which means when new-built ship prices increase or decrease secondhand ship prices linearly do the same. Also, while investments in new-built ships are mostly based on the expenditure, secondhand ship prices are affected by supply and demand side in shipping market. However, this cycle complicates investment decision of ships due to high risks. Due to the fact that her study only includes capesize vessels investments, it is very restricted to insert trade factors in the model. Therefore, a new model including more variables of trade will be more effective on conducting new investment estimations for various segments at shipping market.

In master thesis of Ozgur Alemdag, explained a new management model for ship owners. He asserted that ship management concept is new for Turkish ship owners due to having a traditional and family-based structure. As per his study, ship owners must choose a management model and evaluate their performance to be assertive in the competition. He provided a questionnaire by using “Balance score card” and measured performance criterias of ship management companies. However, this study has lack of investigation on evaluating ship owners’ real perception on investment and their attitudes to government based strategies.

In master thesis of Ipek Akman Durgut, she included more perceptual analysis of ship owners to ship management concept. She conducted a questionnaire between Turkish ship owners in order to analyse their attitudes and perceptions to third party ship management. According to her, outsourcing has become very important on providing cost effective of companies in other sectors and maritime sector can also get benefit from this new method.

As additional to ship management concept as Ipek Akman Durgut stated, merging of companies under one management can also be profitable for maritime companies in Turkey, however this must be well analysed.

Within this respect, this study consists of total six chapters. This chapter includes a general overview of strategic investment and Turkey's perspective with mentioning in previous literature. In the second chapter the significance of maritime transportation in the global trade market has been explained with sub-titles of competition in maritime transport, freight markets of different types of ship segments and trade indicators which have possibility of affecting maritime transportation have been described. Third chapter comprises investment factors in shipping in more details with topics of ship finance, financial evolution of shipping, historical part of global ship financing including types of financial corporations, sensitivity of finance models against crisis and ship finance status in Turkey as well as types of ship managements. Fourth chapter presents data selection and collection process as well as the methodology that can be effectively used to generate a new statistical model. In the fifth chapter, analysis results and recommendations combining quantitative and qualitative technics have been inserted. In the last section, a conclusion of the overall study has been depicted.

2. MARITIME TRANSPORTATION IN GLOBAL TRADE MARKET

2.1 Competititon and Volatility in Maritime transport

In the international trade and logistics sector, the success of a firm depends significantly on its competitive priorities. According to Li (2014), a firm's competitive position is determined by four long-term structural decisions: facility, capacity, technology, and vertical integration. However, the maritime sector operates differently. Maritime transportation, as the oldest mode of economic transportation, remains a crucial part of the overall transportation system. Competition among shipping carriers is limited as long as there is a sufficient volume of commodities to be transported through this method. Maritime transportation competes with railroads and pipelines primarily for the transportation of low-value and bulky commodities such as petroleum products or coal. Various external economic factors significantly impact competition in the industry. When chartering a vessel for transportation, traders consider various specifications of the vessels, including type, tonnage, flag, gearing condition, seaworthiness status, and fuel consumption, which play a vital role in the decision-making process. Thus, competition in maritime transport cannot be

solely described by supply and demand dynamics in the shipping market. As technological advancements continue, the diverse fleets of different owners will become increasingly important in shaping competition within the industry.

The shipping market has experienced significant volatility since the commencement of the recovery phase in shipping freight history (Stopford, 2002). In particular, the year 2008 stands out as a pivotal period due to the global shipping crisis. Shipping finance before 2008 was readily available, benefiting from a period of robust growth and historically high shipping rates. This favorable environment led many shipping companies to expand their operations and place substantial long-term orders for new vessels. The new build market witnessed a significant surge in value from 2003 to 2008, with the total worth of newly ordered ships exceeding \$800 billion. Notably, approximately half of these orders were placed between 2007 and 2008, coinciding with the peak of vessel prices (Stopford, 2010). Banks provided loans with high accessibility, allowing up to 80 percent of the loan-to-value ratio for new vessels, leaving minimal margin for error in vessel values. Furthermore, a significant portion of these new vessels were scheduled for delivery in the immediate years following the 2008 financial crisis (PIMCO, 2012).

The economic and financial crisis resulted in a global recession, creating a completely transformed landscape. Following the events of 2008, there was a decline in global demand for goods and an influx of newly introduced vessels into the market. This combination led to a significant drop in charter rates across various markets. Consequently, the values of ships also experienced a sharp decline, which posed significant challenges for the shipping industry, including financial losses, loan defaults, and bankruptcies. Compounding these issues was the necessity to secure financing for new build vessels that were under yard contracts and couldn't be reassigned or canceled.

The banking sector faced significant challenges during this period, as they grappled with default payments and the decreased value of collateral securing their loans. Despite the vessel prices plummeting below the outstanding debt, banks opted to defer repayments and restructure loan terms to avoid writing off defaulting loans and initiating vessel foreclosures. Currently, there is approximately \$500 billion in shipping debts, with the top 40 banks holding over 90 percent of this amount. Among them, the top 12 banks account for more than half, and European banks finance over

80 percent of the shipping debt (PIMCO, 2012). German banks, being major financiers in the sector, suffered more pronounced losses. For instance, Nordbank reported a nearly threefold increase in loan impairment charges for its ship portfolio in 2012. This situation prompted the German regulator BaFin to intensify scrutiny of banks' shipping exposures in 2012 (Maritime Briefing, 2013).

In recent years, traditional banks have implemented measures to safeguard their existing assets by tightening their financing policies or completely withdrawing from financing the shipping industry. Specifically, the top 10 banks in shipping have reduced their shipping loan portfolios by more than \$50 billion since 2008 (PIMCO, 2012). This has created a challenging environment in the shipping market, leading to further declines in the prices of second-hand ships. Despite this, while many European banks like Nordbank, Commerzbank, Société Générale, BNP Paribas, Royal Bank of Scotland, and Lloyds Banking Group are reducing their exposure to the shipping sector, non-European banks are stepping in. Banks from the United States, such as Citigroup and Bank of America Corporation, have increased their involvement, while the Commonwealth Bank of Australia and Chinese banks have also intensified their focus on the shipping industry.

Moving forward, it is expected that banks may not offer the same level of financing support to the shipping sector as they have in the past due to various limitations. As the market has experienced a slowdown, the perceived reliability of vessels as valuable assets has diminished, leading lenders to exercise greater caution. While traditional financing options may still be accessible, they are likely to be subject to stricter criteria and regulations. The implementation of new regulations will also lead to a significant increase in capital requirements for the banking industry, potentially necessitating ship owners to have more core equity capital and resulting in higher borrowing costs from traditional financing sources (KPMG, 2012).

Examining the current state of the shipping market, it is evident that the financial markets have been marked by a persistent decrease in interest rates, which were already at historically low levels in 2015. The economies of the Eurozone have witnessed modest growth, with certain countries even encountering negative growth rates. This feeble growth, coupled with declining commodity and energy prices, has brought the EU perilously close to deflationary conditions. Below figure shows the time charter rates regarding the main vessel types' (Clarksons 2015):

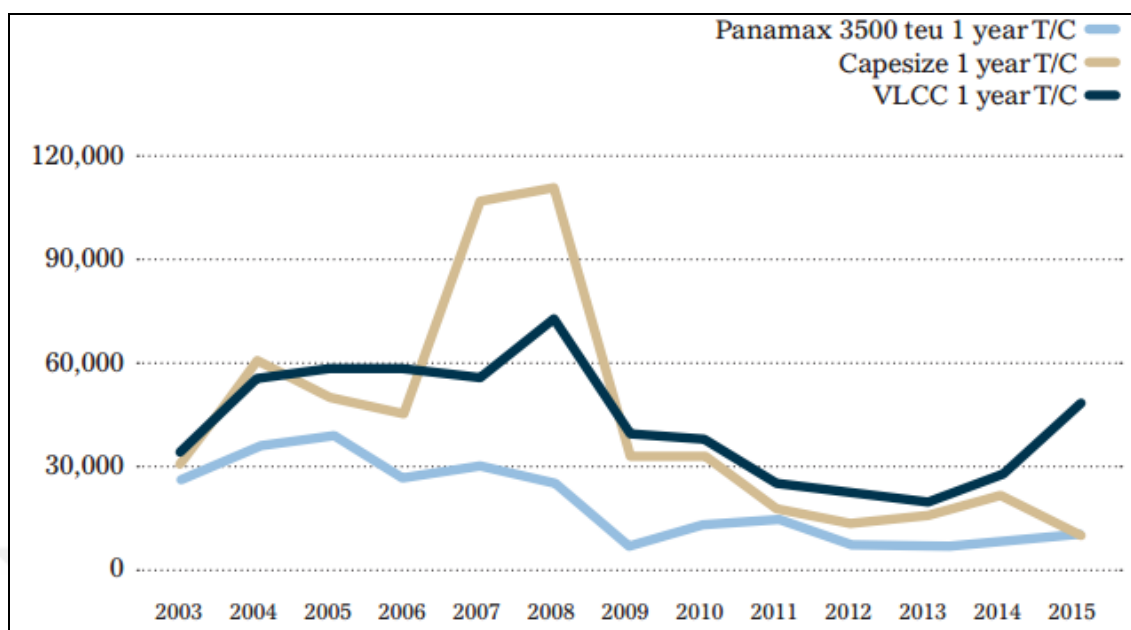


Figure 2.11. Time Charter Rate per Day 2015 (In US Dollars)

(Source: Clarksons & Danish Ship Finance, 2015)

The market competition remained stable from 2013 to 2014. While some banks have decreased their ship financing activities, new lenders have entered the market or increased their business operations. Asian export credit institutions are extensively contributing to financing new buildings in their respective countries. Currently, most banks focus on reputable ship owners, the segment that financing companies have been targeting both before and after 2008. As a result, the credit margins paid by the best ship owners slightly decreased in 2014, and the terms and conditions offered to the ship owners have improved compared to the peak of the crisis. According to Danish Ship Finance (2014), the bulk carrier ship prices reached their lowest level in the previous ten years in 2015, despite the 2008 crisis. On the other hand, tanker market rates are increased and tanker ship prices have been affected positively since the demand to carriage of petroleum cargo increased due to lower crude oil prices. However, it is very weird to explain why the bulk carrier ship prices have been at the deepest level within a non-stop falling down for last one year while the tanker rates always have been an increase. At this point changing of globalization process is detected and this process will be explained briefly in trade indicators section.

When looked into the reasons of decreasing ship prices in years, it is shown that while a crisis situation occurring, ship prices and values also change rapidly due to decreasing Time Charter rates per day data. Time Charter rates are calculated as the total earnings of the vessel which are gained from their charters and dividing it to calender days in a year in order to find the average per day. By the decreasing ship values, either total asset of small ship owners become little until they become can not pay the bank loans of the vessels. Therefore, small companies prefer bankruptcies, while on the other hand the investors choose to purchase these ship owners' vessels. Below figure shows the ship values in US Dollars by effected in the years including supply and demand of market (Clarksons, 2015).

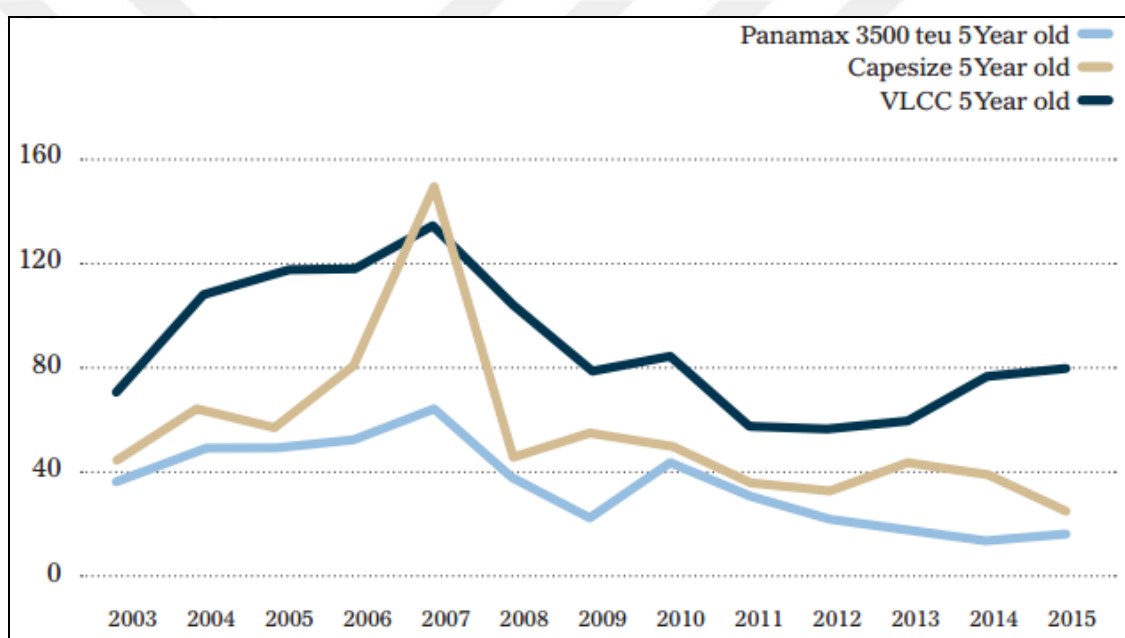


Figure 2.12. Ship Prices by Segment 2015

(Clarksons, 2015)

This high volatility creates a high risk for ship owners and also lending's side for the market. The strengthening US dollar provided support for the observed trend. The extraordinary repayments resulted in income that was not recurring, leading to earnings from lending activities surpassing the company's expectations before impairment charges. When excluding the non-recurring income, earnings from lending activities before impairment charges also slightly exceeded expectations. The years 2015 and 2016 posed challenges for several major economies. According to the

IMF (2015), the global economy was projected to expand by 3.5% in 2015. The European, Japanese, and US economies were anticipated to experience stronger growth compared to 2014, while expectations for the Chinese economy indicated a gradual slowdown in the growth rate. However, nobody was expecting that Chinese small growth more than expected will so merely affect bulk carrier market more than whole maritime transportation by all segments. According to IMF, in 2016 it is reported that macroeconomic realignments keep more important role between countries and regions due to Chinese slowdown and rebalancing. Decline in commodity and oil prices in 2015 and early 2016 causes a slowdown in investment and trade due to decreasing capital flows to emerging economies (IMF, 2016). Therefore, especially bulk carrier market has encountered a direct decrease so that China was holding the highest ratio in bulk cargo trade.

As technological advancements continue to rise, ship owners are currently confronted with new stringent demands that directly impact their competitiveness in the shipping market. For instance, a ship owner must comply with special Ballast Water Management rules if their vessel call United States ports and invest into this system at least one million dollar. However, as per latest shipping notice from United States Coast Guard, they provided an extension letter up to five years so that IMO side also has not been ratified (Green4Sea, 2015). The market is getting worse; however stricter environmental requirements are continued. Hence, in the coming years, significant financial investment will be necessary to fulfill these requirements, posing a challenge for shipping companies. Additionally, the environmental regulations may have an impact on the prices of older vessels, as it might not be economically feasible to retrofit them with the required new technologies (Danish Ship Finance, 2014).

Competitiveness between ship owners can be also affected by how much the running cost values are incurred. For instance, in current market labour expenses on Chinese cargo ships are cheaper than European based crew which totally affects the running cost expenses of both ship owners. Since salaries of crew and the other crewing expenses keep almost 50% of overall costs, ship owners prefer to occupy crewing expenses at the lowest level. As the crewing expanses become lower, running cost values are also get lower and charter rate expectation of the ship owners may become less. This contradiction causes a return to market as a big competition in the

low shipping market. As like in this example, Chinese ship owners become more competitive to fix their vessels for carrying cargoes by expecting less profits than European ship owners. Therefore, the need to competition in shipping market arises in very low and high freight markets more than stable and non-volatile market cycles.

2.2 Freight markets

Shipping of different cargo types and freight rates have influenced average market rates and assisted to calculate an index by Baltic Exchange Maritime Council. Baltic Dry Index (BDI) is used for dry cargo transport and freight rate estimation while Baltic Tanker Index (BTI) is used for crude oil and dirty tanker freight rates estimations. Besides, freight and charter rates of container vessels are indicated according to Baltic Container Index (BCI). For example, the Baltic Dry Index (BDI) is an index that evaluates the average cost of transporting raw materials such as coal, iron ore, cement, and grains across fifty different shipping routes, taking into account various ship sizes. This characteristic of the BDI establishes it as a significant indicator of economic activities, as it reflects events occurring in the early stages of global commodity cycles (Sismanyazici, 2014). It is important to note that all Baltic Indices, including the BDI, are influenced by multiple factors that contribute to their variability. These factors encompass commodity demand, ship availability, seasonal patterns, bunker-oil prices, port congestion, canal capacities, and geopolitical influences, which directly impact the charter rates of vessels and consequently affect the Baltic Indices (Hofstra, 2013). Therefore, it keeps an important role for maritime companies to establish a strategy for investing, chartering and operating their ships.

On the other hand of crude and product tanker segments, current market does not reflect that a strong demand is available. As much as new refineries are opened and new regulations come into force, oil trade activities have been becoming within in a positive effect to rise up the market. However, demand side can not be explained only with the amount of how much transportation activites are being held in the market. This implies that fluctuations in prices and regional disparities can create opportunities for arbitrage based on commodity prices. For example, a sudden shift in regional activity, such as port congestion, can influence the demand for crude oil. Investors usually order new tanker vessels within the foresight of existing market will

go upwards (Danish Ship Finance, 2015). Therefore, all segments of shipping market have specific upward and downward rates as in below figure (Figure 2.21):

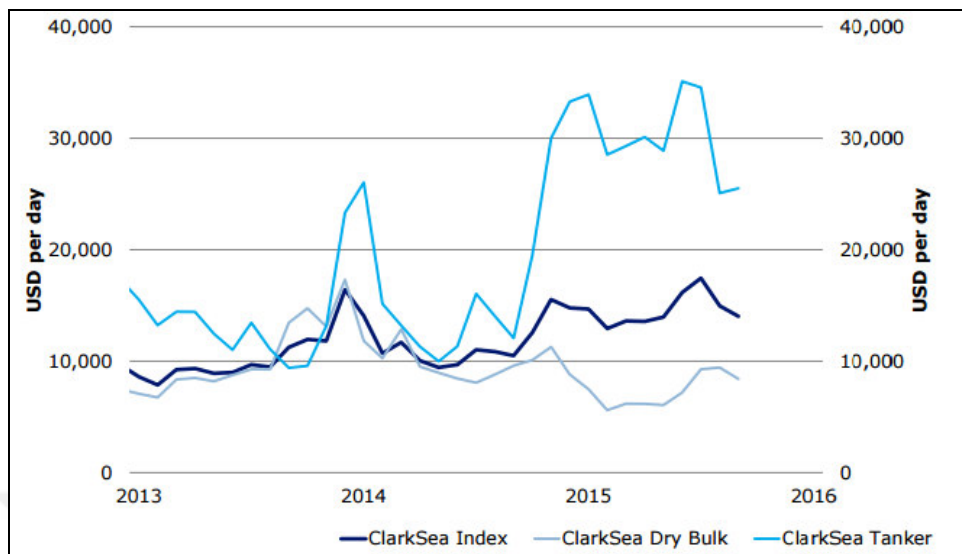


Figure 2.21. Variations Between Segments

(Clarksons & Danish Ship Finance, 2015)

When the freight rates of all tanker, bulk and container segments are calculated as average by years, it is seen that latest six years have faced the lowest level of the market. Between the period of 2000-2008, time charter average rates were higher than the years after 2008 global crisis. It has been observed that freight rate environment is in an improvement however, its relatively low average level creates a big competition for ship owners which are trying to survive in the market. Below figure explains last sixteen years' average freight rates of all segments (Figure 2.22):

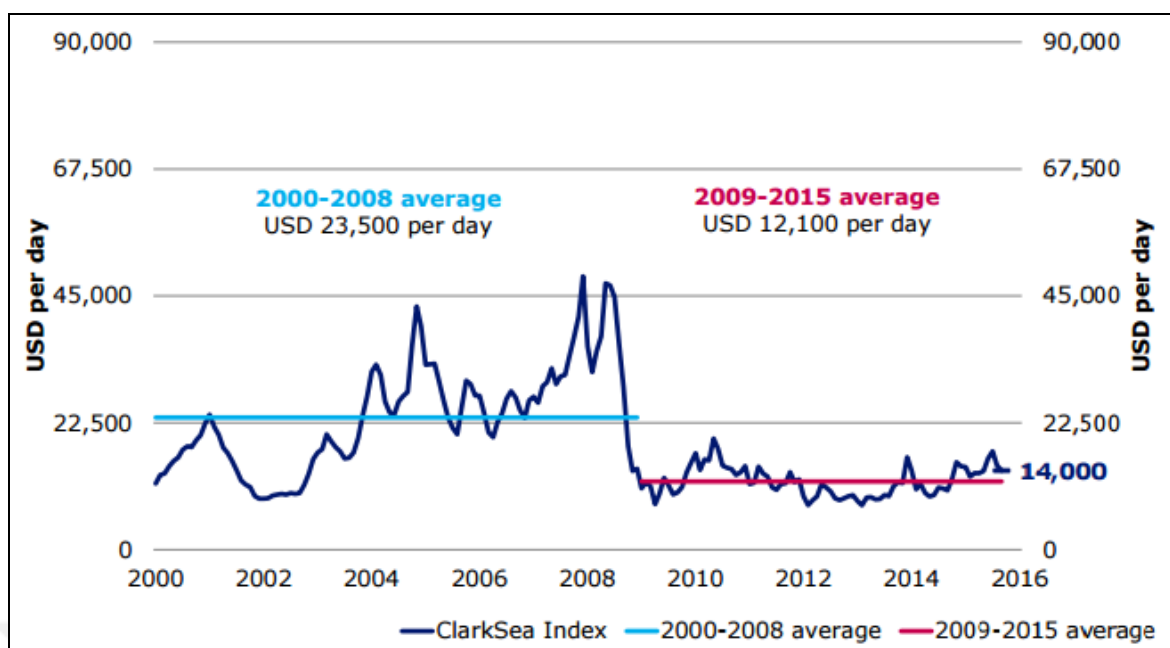


Figure 2.22. Freight Rate Average by Years

(Clarksons & Danish Ship Finance, 2015)

According to Danish Ship Finance (2015), upcoming shipping market is expected to continue to be volatile despite the fact that scrapped ships provide a temporary relief in the market. Therefore, demolition of old ships are necessary to prevent low freight rate of market (Danish Ship Finance, 2015). In the following sections, nature of the market as per different ship types and market rate calculation methods will be explained and some recommendations for ship owners will be provided. In this section, markets of all different ship types are not explained; only the markets which are a part of Baltic Exchange freight reporting are included in the study. In short, the limitation of the study has been indicated as consisting major rates of tanker, bulk and container freight markets.

2.2.1 Tanker Market

The Baltic Exchange, recognized as the sole independent provider of data on dry and wet maritime freight markets, gathers information from various ship types and routes. This data is used to establish benchmarks for physical contracts and shipping freight derivatives, as well as economic indicators (Baltic Exchange, 2013). In tanker market reporting the freight rates are divided into two different sub indicators as called clean and dirty tanker indices in Baltic Exchange. Clean tanker

ships are defined as carrying refined products without heavy residual components, on the other hand, dirty tanker ships mostly include the carriage of crude oil, vacuum gas oil, heavy fuel oil and other unrefined products which constitute dirty substances. In details, clean and dirty difference becomes aground within the importance of cleaning operation on board a tanker vessel. Cargo residues must be not affecting the clarity of next cargo and not cause any combustion due to contamination with next cargo to be carried in the same tank. Therefore, a clean tanker can be suddenly become dirty as a dirty tanker requires a higher effort to complete the cleaning process which means there are not any specific limits on explaining how much a tanker can be called as dirty or clean in the market (Velson 2015). Due to the fact that Baltic Exchange sells all the collected data to ship managers with a charge, below tanker index is taken from Capital Link which shows similar data as Baltic Exchange and is fully free of charge (Figure 2.2.11).

At a glance of previous tanker market (Figure 2.2.11), it is seen that global crisis in 2008 affected this market in a downward trend. However, between period of 2012 and 2014, it has slight increase which rise up the highest level by the end of 2014. Due to the global politics change and fast fall of crude oil prices have caused a deep point trend in tanker market. Despite all this slight downward trend is still continued within the first quarter of 2016, freight rates of tanker ships are still higher than the operational expenses. Therefore, tanker market can be called as a more stable market rather than the bulk carrier market which is explained in 2.2.2 of this thesis.

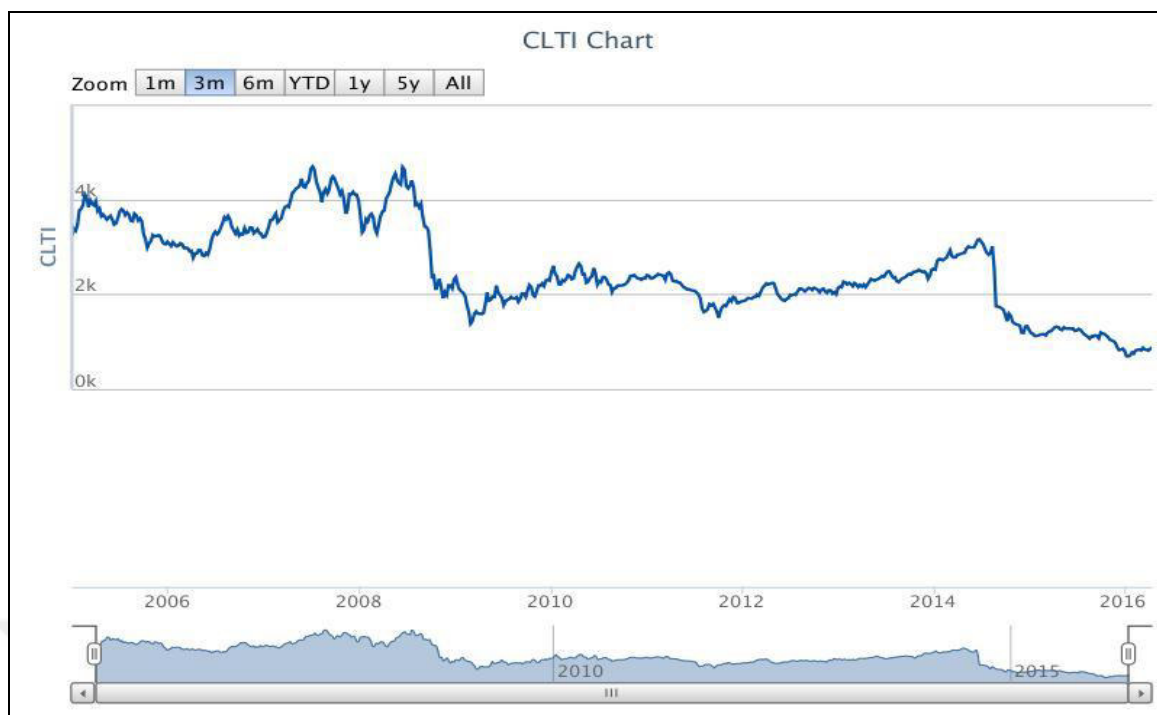


Figure 2.2.11. Last 10 Years' Average Dirty and Clean Tanker

Indices

The market for Crude Tankers displays a scarcity of viable vessels for scrapping and a significant number of orders in progress (Clarksons, 2016). While there has been strong demand for Crude Tankers in 2015, it does not necessarily indicate genuine end-user demand. Factors such as increased travel distances, temporary occurrences like floating storage, and congestion at tanker terminals have contributed to this trend. Additionally, the low prices of crude oil, elaborated in section 2.3.9, and surplus volumes have further stimulated transportation requirements. In the short term, Crude Tanker demand may strengthen due to seasonal factors and disruptions caused by winter conditions in the Northern Hemisphere. However, in the medium term, it remains highly susceptible. Refinery consolidation may result in longer travel distances and reduced fleet productivity if more Asian imports are sourced from the Atlantic Basin instead of the Middle East. The ongoing rebalancing of the Chinese economy and the expansion of the ESPO pipeline, which transports Russian crude oil to China by 2020, are also concerning for seaborne crude oil volumes. Additionally, geopolitical tensions are escalating not only in the Middle East but also in the South China Sea and other regions. Consequently, the projected

demand for Crude Tankers may fall below current investor expectations. If demand proves insufficient to engage the fleet, freight rates and secondhand values may suffer, given the scarcity of viable scrapping options to offset a potential decline in demand (Clarksons, 2015).

According to Clarksons, there has been a positive market trend observed in the product tanker segment. This growth is attributed to the increased utilization rates of refineries, leading to higher volumes of transported goods. Consequently, the availability of vessels has become tighter due to limited onshore storage capacity, resulting in extended offshore storage durations for cargoes. However, the medium-term outlook for the Product Tanker market is influenced by the entry of new vessels. While the implementation of stricter regulations regarding emissions and fuel standards may stimulate trading activity, the overall impact is expected to be somewhat mitigated by the high fleet productivity. The ongoing rebalancing of the Chinese economy poses a significant risk to seaborne volumes of petroleum products, particularly in terms of diesel demand. Furthermore, the Product Tanker market heavily relies on trade driven by arbitrage opportunities. The long-term prospects for Product Tanker demand are also jeopardized by advancements in energy efficiency and the increasing presence of renewable energies and energy storage technologies. It is projected that by 2030, seaborne volumes of petroleum products may decrease compared to current levels. Overall, the outlook for Product Tanker demand may be less optimistic than anticipated by current investors, and freight rates and secondhand values could be negatively affected if demand fails to engage the fleet (Clarksons, 2016). According to BIMCO, volatile oil prices contribute to a stronger oil tanker market compared to a stable-priced market. Fluctuations in oil prices and increasing arbitrage opportunities resulting from price disparities for the same oil products in different regions worldwide facilitate global business operations. Therefore, the trading of crude oil and other products plays a crucial role in estimating the demand factor in the tanker market (BIMCO, 2016).

Different demand transactions between countries provided to rise up different tanker shipping routes. Different routes and trade areas also revealed a need of diverse carriage tonnages either. Tanker vessels' freight rates and operational expenses also differ as per their segment of tonnage. Technological developments in terminal

construction and need for demand to high capacity tonnages have mainly provided below tonnages (Table 2.2.11):

Table 2.2.11.

Tonnages of tankers in different segments (Allied Shipping Research, 2016)

Tanker type	Tonnage (DWT)
VLCC	310,000
Suezmax	160,000
Aframax	115,000
LR1	75,000
MR	52,000

As in example of Aframax tonnage tankers, there have been four different base routes such as Northern Sea to European continents, Mexican Gulf to Singapore range, Caribbean Sea to United States Gulf and Baltic Sea to United Kingdom continents. Time charter fixing rates of all these routes are calculated as arithmetical average and freight rates are reported as per total profits per day as per USD (Allied Ship Research, 2016).

As different from crude oil and product market, LPG and LNG market are quite different to make estimations. There are big contracts between big players in the market as well as big ship owners who indicate the competitiveness of the market. When it is looked into last ten years' development of gas carrier market, it is seen that there is a deepest level in the middle of 2008 due to global financial crisis. However, as opposite to crude and product tanker market, gas market has become in a very upward trend until 2012. After a stable market between 2012 and 2014, it has been in a downward trend again for the last two years. This can be explained within the effect of decreasing crude oil prices due to invention of shale oil in United States (Seabornetrade, 2016). During the initial three quarters of 2015, the present LPG market, specifically the Very Large Gas Carrier (VLGC) sector, demonstrated remarkable resilience despite a substantial increase in fleet size. The demand for LPG

Tankers was sustained by a confluence of robust end-user demand and temporary interruptions affecting vessel availability (Figure 2.2.12).

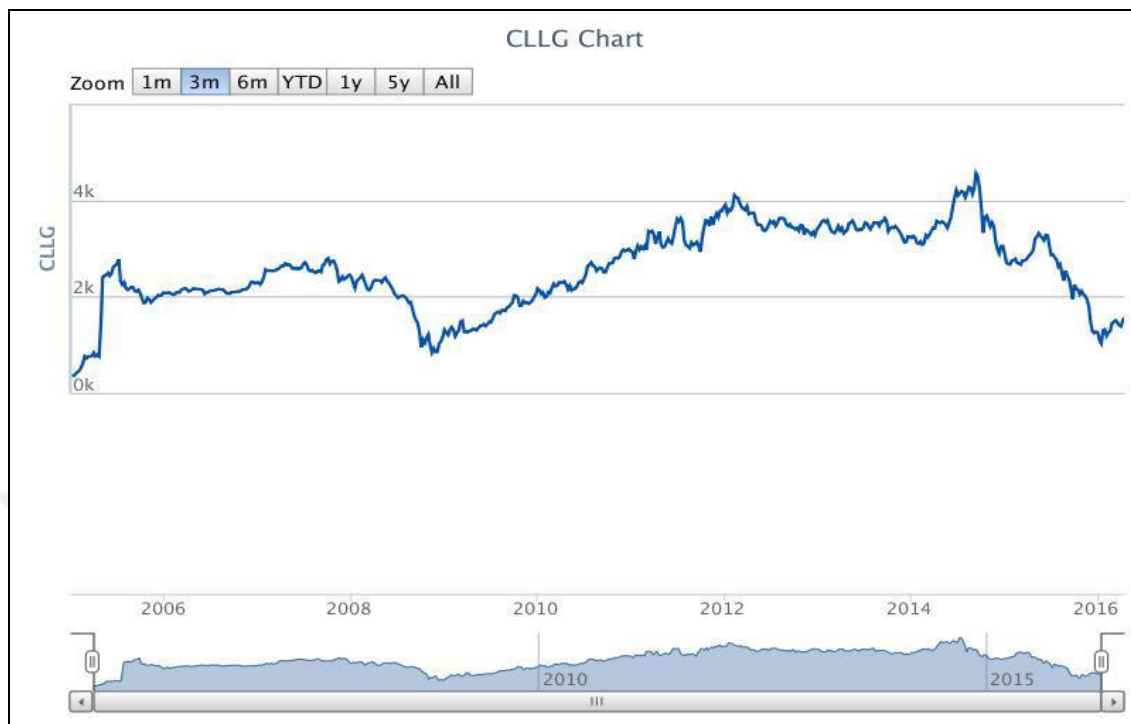


Figure 2.2.12. Last 10 Years' Average Gas Tanker Indices
(Capital Link, 2016)

The continuous growth of the petrochemical industry in Asia and the expansion of export facilities in the US have contributed to the increasing demand for LPG, considering the adjusted distances. In the immediate future, freight rates are expected to remain relatively strong. However, there are concerns that the demand may not be sufficient to absorb the influx of new LPG Tankers indicated by the orderbook, leading to a potential decline in demand compared to the projected expansion of the fleet. The ongoing rebalancing of the Chinese economy and the upcoming expansion of the Panama Canal, which could reduce average travel distances, add to these concerns. It is worth noting that while the demand for petrochemical LPG may experience temporary fluctuations, the demand from the residential sector might help mitigate the impact. Looking ahead, the long-term outlook is influenced by both positive factors, such as the residential sector, and potential threats posed by the sharing economy and the shift towards a more circular economy. As a result, freight rates and asset prices could be negatively affected. In

the short to medium term, secondhand prices are expected to face the most significant impact, as they experienced a greater increase than newbuilding prices during the upswing. In certain instances, secondhand prices have even surpassed newbuilding prices.

In general of tanker shipping market, there are a lot of political issues on the prediction of the future of freight rates. Latest reports of BIMCO shows that Iran can increase its exports as well as Iraq, however the fights between both neighbours are causing competitive oil prices. For example, Iraq's oil production reached at utmost level in January 2016 including Kurdistan as the crude oil output. BIMCO (2016) predicts that Iran's increasing export strategy will result in a higher supply of oil in the market. Additionally, this policy is anticipated to contribute to Iran's economic growth, which in turn will have a favorable influence on the shipping industry. However, at this level, sanctions of trade are appeared. To UK P&I which is a well-known ship & cargo insurers, suggest to their ship owners not to sail to Iranian ports until the sanctions completely get removed (UK P&I, 2015). Especially United States Dollar based money transfers get stuck in the Office of Foreign Assets Control (OFAC) list which is a mechanism of targeting foreign countries against terrorism and narcotics traffickers by United States (OFAC, 2016). As additional to Iran's and Iraq's export activities, China in contrast continues to support crude oil imports to China in order to get advantage from exporting refined oil products. It is expected that demand to VLCC vessels by Chinese transport may increase and this will provide a positive impact on tanker freight market. Therefore, political changes must be also well understood by tanker ship owners before performing investment processes or chartering activities.

2.2.2 Dry Bulk Market

Dry bulk market has more volatile structure rather than the other segments like tanker or container. Coal, iron ore, cement, grains and other commodity rates are even affected by any small change in World trade which also cause an indirect effect in freight transportation rates. Hofstra (2013) explains that the Baltic Exchange has developed a significant measure called the Baltic Dry Index (BDI) to monitor and regulate freight rates in the bulk carrier shipping sector. The BDI serves as an assessment of the average cost of transporting raw materials across approximately 50

different shipping routes, categorized by ship size. It provides valuable information about the prices associated with shipping raw materials in the global trade market and plays a crucial role in determining input costs. Consequently, the index is widely regarded as a leading indicator of economic activity as it reflects developments occurring in the early stages of global commodity chains. A high BDI value indicates a tight shipping supply resulting from robust demand, which can potentially lead to inflationary pressures throughout the supply chain. Conversely, a sudden and significant decline in the BDI signifies an upcoming recession, as producers significantly reduce their demand, prompting shippers to lower their rates substantially in an effort to attract cargo.

BDI includes average of different bulk market rates. There are different tonnages of bulk carrier vessels as per nominated in voyages at different trade routes. For instance, supramax freight rates are calculated as per arithmetical average of routes between European continent and Mediterranean to Far East, Pacific Ocean Range, and Far East to European continent, United States Gulf to Baltic Sea and Baltic to United States Gulf (Allied Ship Research, 2016). As the example of size and specification difference, a Capesize, Very Large Ore Carrier (VLOC) and Panamax vessels are non-geared vessels and do not have a crane or lifting gear to load or discharge her cargo by own (TAB, 2015). That is why, the port facilities where these kinds of ships will call need to have their own lifting capability to conduct cargo operations and it is essential to know port infrastructure before fixing the cargoes under chartering operations. The various types of bulk carriers available in the market can be categorized as follows (Table 2.2.21):

Table 2.2.21.

Tonnages of bulk carriers in different segments (Allied Shipping Research 2016 & TAB 2015)

Tanker type	Tonnage (DWT)
Very Large Ore Carrier (VLOC)	220,000
Capesize	180,000
Post Panamax	125,000
Panamax	82,000
Supramax	62,000
Handymax	50,000
Handysize	40,000

Since BDI explains a general condition in the market, specific sub indices have been also generated as per different ship sizes as in above table. The indices can be classified as the Baltic Capesize Index (BCI), Baltic Panamax Index (BPI), Baltic Supramax Index (BSI), and Baltic Handysize Index (BHI). Sub-indices are generally independent from another one however, in the overall value of BDI, some relations can be existed. For example, a Panamax vessel's trade routes and cargoes are almost the similar for all ship owners; in contrast in supramax and handysize, many different types of cargoes can be seen especially between trades of emerging countries. On the other hand, in the latest BDI report it is seen that capesize trend BCI is much more tending to increase instead of Supramax vessels and BSI (Allied Ship Research, 2016). Therefore, it is essential to look into the components of BDI and also its development in latest ten years in order to make correct estimations for fixtures.

The major factors that may affect BDI, can be sorted as commodity demand, ship tonnage supply, bunker oil prices, seasonality as well as geographic structures and political issues. Commodity demand plays a significant role in determining the quantity of cargo being transported, regardless of the fluctuations in commodity

prices. While demand side increases, ship supply may be as stable and cause a need to new tonnages. In contrast, as the demand side decreases due to less production of raw materials BDI is also expected to decrease. The commodity demand must be considered as a part of ship supply in order to see how many ships are available to be chartered in the market. Hofstra (2013) stated that “Many bulk carriers, such as tankers, cannot be readily converted to other uses so the bulk market is quite segmented and fairly inflexible. The average ship age can also play since the useful life of a ship is about 25 years. If the average age becomes too high, there are expectations that significant capacity may be reduced and that this would imply a rise of the BDI. Inversely, the addition of new capacity in terms of ship orders may trigger a decline of the BDI, particularly if demand is not expected to change significantly in light of this new supply.” Therefore, availability of ships and cargoes keep an important role on indicating the BDI beforehand. On the other hand, seasonality changes may affect the demand to raw materials as well as bunker oil prices and port infrastructures. In current market, bunker oil prices are at the lowest level and this directly affects the operational expenses of ship owners. It is foreseen that as the bunker prices fall, the demand to Maritime transportation would increase; however, this theory has been failed for bulk carrier segment in 2015-2016 period (Clarksons 2016). Hence, fluctuations in oil prices have a direct impact on shipping rates. Specifically, when energy prices experience a decline, the Baltic Dry Index (BDI) can also decrease in response (Hofstra, 2013).

Port congestion, extra waiting times before passing canals or straits may also affect the availability of spot ship supply. Additional, while the freight rates are calculated before fixtures, canal passing fees are also added into this final value including agency charges. For example, a supramax vessel must pay at least 200,000 USD to pass via Suez Canal which is calculated as per total loaded Cargo tonnage (Suez Canal Rules 2015). Payment of this amount changes as per charter type of the vessel as voyage or time charter and at last freight rates are calculated as the minus of this additional charge. Another external factor that affects the BDI value is political and geopolitical status between countries. Freight rates can be adversely affected by various factors such as the risks of piracy, instances of war, and embargoes imposed on certain countries. Trading of ships in high risk areas cause an increase the insurance charges of ship owners and this creates a constraint on decision making of

trade areas of ship owners. It is therefore, BDI value must be well evaluated before conducting businesses or investment into bulk carrier ships. Below figure summarizes last ten years' BDI fluctuation (Figure 2.2.21):

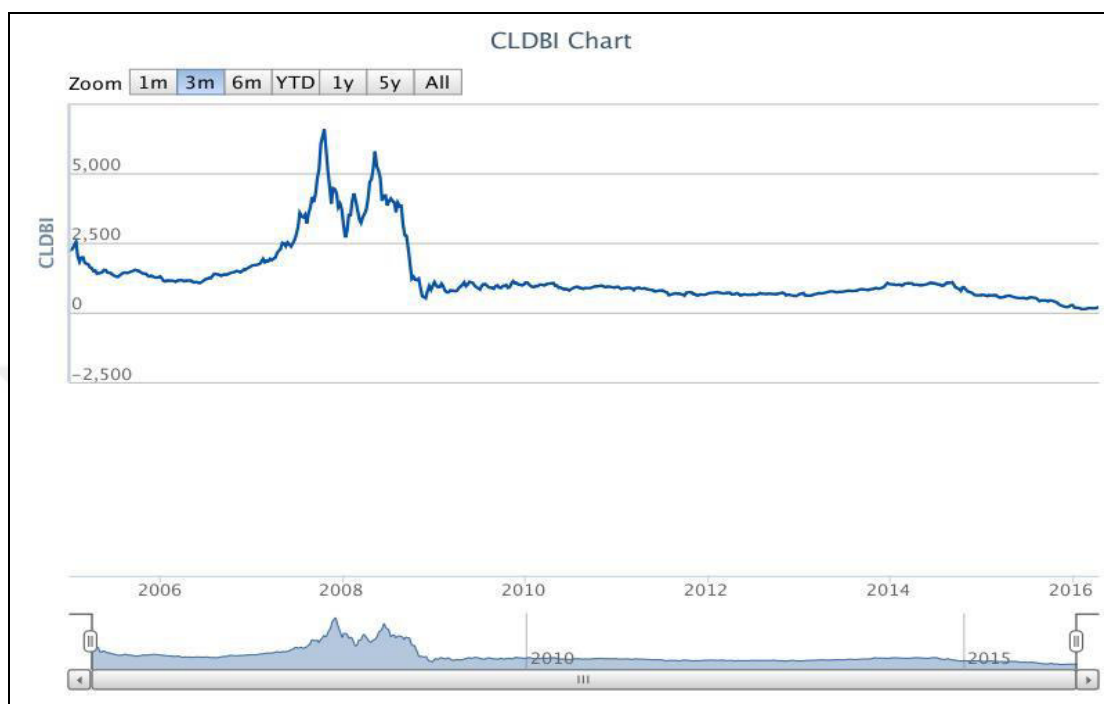


Figure 2.2.21. Last 10 Years' Average Bulk-Dry Indices

(Capital Link, 2016)

The above graph demonstrates the high volatility of the BDI in recent years, particularly from 2005 to 2009, when it exhibited bubble-like behavior. This surge was primarily driven by fluctuations in commodity prices, particularly oil. Subsequently, the index experienced a sharp decline, returning to historical levels and has since remained weak despite a recovery in global trade. This can be attributed to the significant influx of ships into the market, as many were ordered during the peak years, resulting in excess capacity compared to demand. Danish Ship Finance (2015) indicates a slight recovery in the Dry Bulk market since its historical low in 2015; however, freight rates remain low, and the issue of oversupply persists. Depressed market conditions have prompted shipowners to postpone or cancel orders and dismantle vessels, effectively limiting fleet growth to 2% in the first nine months of 2015. It is projected that fleet growth will reach approximately 4% by the end of

2016. However, the ongoing rebalancing of the Chinese economy has curtailed Dry Bulk demand, with modest growth of only 1%, the lowest seen since 1999, excluding the post-financial crisis period of 2009. The short-term outlook is uncertain due to a 17% orderbook-to-fleet ratio and the ongoing Chinese economic rebalancing. In the near future, the rebalancing efforts are expected to further reduce Dry Bulk demand as investments in construction and infrastructure slow down. Consequently, freight rates and secondhand values are anticipated to remain at low levels for the next two to three years. Looking ahead, the medium- to long-term prospects are clouded with uncertainty, primarily due to the remarkable technological advancements in solar, wind, energy efficiency, and energy storage (e.g., batteries), which pose a threat to the long-term demand outlook for fossil fuels. While fossil fuels will remain a major energy source for a few more decades, increased energy efficiency and potential decarbonization technologies may reduce the medium- to long-term demand for coal. On the other hand, the long-term outlook for steel and other construction materials appears relatively promising, given the anticipated urbanization processes in China and emerging economies. In summary, Dry Bulk vessels may experience a short-term decline in transport volumes before stabilizing at a lower level (Danish Ship Finance, 2015).

According to Fearnsearch (2015), it is expected that net fleet growth of bulk carriers will slightly decrease due to bad market and increasing demolition activities. However, growth and supply will still be in growth due to new building ships. On the trade side, iron ore growth expectations are not pleasant so that zero growth rate is estimated. Coal trade also stays as stable or less trade activity is expected for further. In total trade, a potential 2%-3% contraction in demand is expected as well as freight rates of bulk carriers seem to remain under pressure through to 2017 and 2018. Therefore, ship prices will be affected from this decreasing trend and deep prices are expected to continue within this period (Fearnsearch, 2015).

The rapid fall of bulk carrier market is affected from Chinese less growth rate than expected estimations. Despite the concerted efforts made by steel mills worldwide to limit the influx of Chinese steel into their domestic markets, the volume of Chinese steel exports during January and February did not witness a significant decline. The decrease in exports amounted to a mere 1.6%, totaling 17.85 million tonnes. However, recent data for March indicated a drop in exports to 10 million

tonnes. In 2015, China inundated the global market by exporting 112 million tons of steel, which consequently led to a decline in scrap steel prices. In the year 2016, three critical factors to monitor closely are Chinese imports of coal and iron ore, as well as the extent of dry bulk tonnage that will be scrapped. These factors carry substantial weight in determining the fundamental dynamics of the dry bulk shipping market, overshadowing other considerations (BIMCO, 2016). However, this is a theory between supply and demand rates. As the BDI value increases, ship owners will purchase new vessels so that they can develop their fleet by extra earning in the market. While the supply side increases, this will cause a decline in BDI as well as freight rates and also cause ship owners to go bankruptcy due to low earning rates. This cycle must not be overseen by the ship owners and freight market rates must be well assessed. Therefore, this study aims to generate awareness between ship owners or managers within the new specifications of current market condition.

2.2.3 Container Market

The advancements in cargo handling have necessitated the adaptation and conformity of general cargo ship designs to accommodate new techniques. As a result, the cargo compartments of modern multipurpose vessels are designed to be as rectangular as possible, facilitating the efficient arrangement of containers and palletized cargo. Similarly, on the exposed decks, contemporary designs enable the stacking of containers, often reaching two or more tiers in height, while considering factors such as vessel stability, visibility from the bridge, and deck structural integrity. As the container vessel technology has been developed, container market also has become relatively more stabilized structure than bulk carrier spot market, particularly not more than tanker market. Container market rate is calculated as per Ningbo Containerised Freight Index (NCFI) which is a sub-calculation index of Baltic Exchange. The NCFI index captures the weekly movement of 20 ft, 40 ft, and High Cube containers. It represents a combination of these three container types and encompasses shipping routes from Ningbo to destinations such as the East Mediterranean (Piraeus & Istanbul), West Mediterranean (Barcelona, Valencia, Genoa), Europe (Hamburg & Rotterdam), and the Middle East (Dammam & Dubai). The index relies on transactional data obtained from a group of 11 freight forwarders based in Ningbo, who conduct their business on the Ningbo Exchange's e-trading platform. Various additional charges, including bunkers, port congestion, peak season,

and Suez Canal fees, are taken into account. The NCFI index is calculated using a classical price index model. To ensure accuracy, abnormal data points, which are individual outliers that could influence the calculation outcomes during the index preparation, are identified and eliminated based on the 3 Sigma Criteria. Furthermore, the average price of each container type in each port is determined through the index calculation model. This involves comparing the average price of each container type with the baseline average price of each port, and then calculating the index value for each container type in each port. Finally, the values obtained for each route are weighted according to the volume of trade they represent (Baltic Exchange, 2016)

Container ships are evaluated in terms of their capacity, commonly referred to as twenty-foot equivalent units (TEU), which is also employed to assess the capacity of container terminals. The TEU measurement is based on a volume of 20 foot long that is calculated as 6.1 meters as a standard sized metal box. These containers are designed in a manner that facilitates their seamless integration into various modes of transportation, including ships, trains, and trucks (Rowlett, 2000). The measurement scale of containers also have arisen a new challenge in demand of container market. Supply and demand in container freight market and geographical structure of World ports have created a diverse necessity for container vessels' sizes as well as bulk carriers and tankers. For instance, some types of container vessels are constructed as per the maximum tonnage intake and maximum draft requirement of Panama and Suez Canals. Otherwise, the maximum breadth of the vessels keep significant role especially for Panama Canal. However, developments in port and canal infrastructures always are continued nowadays, as the most popular one is Panama Canal's expansion. The new scale of vessels which can pass through Panama Canal has been changed as per the following table (Table 2.2.31):

Table 2.2.31.

Capacities of container vessels in different segments (Wikipedia, 2016)

Container type	Capacity (TEU)
Ultra Large Container Vessel (ULCV)	14,501
New Panamax	10,000 - 14,500
Post Panamax	5101 - 10,000
Panamax	3,001 – 5100
Feedermax	2,001 – 3000
Feeder	1,001 – 2000
Small Feeder	Up to 1000

A quick look at the container freight market rates reveals that the container industry is facing challenges in effectively utilizing the increasing number of large vessels being delivered. The key to recovery lies in the capacity management strategies employed by individual companies within the industry. Given that demand is not expected to grow sufficiently to match the capacity of new ships entering the fleet, it becomes crucial to extensively idle the modern and efficient vessels while continuing the demolition of inefficient ones. These actions will contribute to improving the market conditions in the short and medium term. In the long run, maintaining a low level of contracting for new-buildings is essential for effective capacity management. As of 2016, positive progress has been observed in all these aspects (BIMCO, 2016). Below figure show the last ten years' freight development index of container shipping (Figure 2.2.31):



Figure 2.2.31. Last 10 Years' Average Container Indices

(Capital Link, 2016)

There is limited evidence to suggest that the demand in the foreseeable future will be sufficient to utilize the Post-Pana-max fleet. Furthermore, the market could face disruption due to technological advancements. The manufacturing industry is undergoing transformation with the introduction of advanced robotics and 3D printers. Large-scale automation and robots replacing workers are becoming more prevalent for cost-effective mass production. Additionally, 3D printers enable on-site production for smaller-scale and high-value goods. If these trends continue to mature during the operational lifespan of the current trading vessels, it could pose significant challenges for the long-term prospects of Post-Pana-max vessels. Trade patterns and travel distances may be affected in the next five to ten years, and by 2030, there could be a shift towards more regional trades with fewer long-haul overseas trades. Such a shift would exert considerable pressure on the relatively new fleet of super large Post-Panamax vessels. In April 2016 report of Zachariassen weekly market report that Container liner markets are in the process of further consolidation. A new alliance called Ocean Alliance, is to be formed between CMA CGM, COSCO, China Shipping, OOCL and Evergreen, in order to be able to keep up with 2M, consisting of

the market leaders MSC and Maersk. In addition, Hapag-Lloyd has revealed progressed talks with UASC for closer cooperation which might lead to a merger in the end. In the sale and purchase area, MOL is said to have disposed of two 6,350 TEU vessels built in Japan to buyers from Southeast Asia (Zachariassen, 2016). The latest merging activity in container transportation was also held by Japanese biggest container companies as a surprising merging. Nippon Yusen Kaisha (NYK) Line, Mitsui OSK Lines (MOL), and K Line have formed a collaborative partnership, announcing their intention to manage the world's sixth largest container fleet, which represents approximately 7% of the global capacity (Financial Times, 2016). That means the competitive is in an increase in container market and consolidating the power of ship owners is very important decision-making to minimize the financial risks in decreasing and hard market conditions. Consolidation will create a new competition structure for all types of shipping market and may be an effective solution for other ship owners which manage tanker and bulk carrier vessels, too. As per the latest shipping market reports, it is seen that container timecharter market is under temporary effects of volatile market conditions.

During the first half of 2015, the trajectory of timecharter rates continued to rise, a trend that began in late 2014. However, in the third quarter, rates started to decline and approached the low levels observed in 2013 and 2014. Although timecharter rates are still 18% higher than the average of 2014, they have been decreasing since reaching their peak in May. This decline can be attributed to the waning impact of temporary factors such as port congestion on the US west coast and the introduction of new intra-Asian services at the beginning of the year, which were later canceled due to underwhelming demand. For instance, a 4,400 teu Panamax vessel reached a peak of approximately USD 15,350 per day in May but dropped to USD 10,000 per day in September.

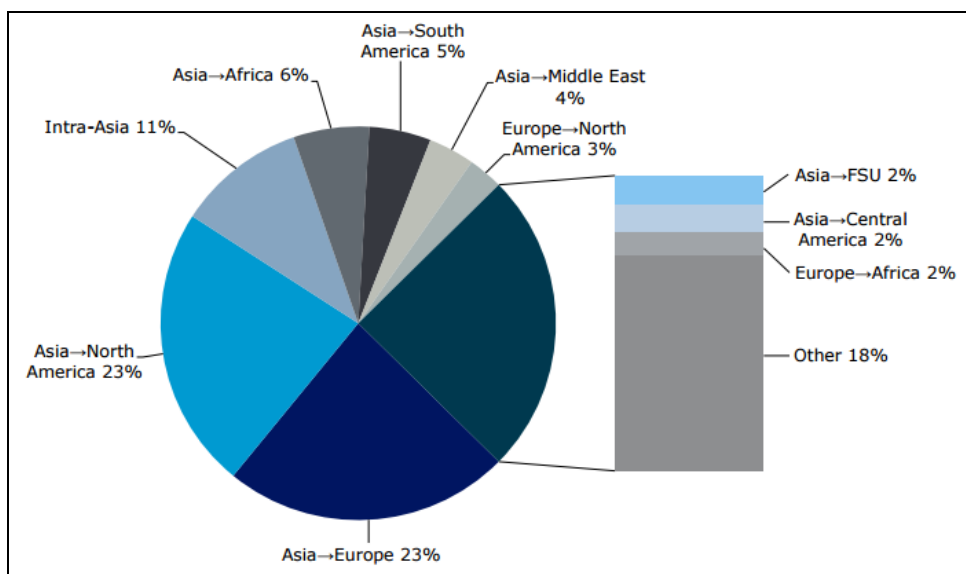


Figure 2.2.32. Top-ten Key Point Area of Container Trade 2015

(IHS Global Insight & Danish Ship Finance, 2015)

Additionally, liner operators mostly preferred investing in contracting and/or joint ventures during year of 2015 and 2016. Initially, it appeared that liner operators were refraining from entering into contracts and instead relying heavily on tonnage providers for investments. However, the situation has undergone a significant transformation since April. In the past six months, the orderbook of liner operators has surged by 81%, whereas the orderbook of tonnage providers has experienced a decline of 18%. As a result, the distribution of the orderbook, which was previously dominated by tonnage providers at 68% in April, is now evenly divided between the two parties. Both liner operators and tonnage providers now possess substantial exposure to the larger vessel categories. On the last few days of April 2016, it is reported in Zachariassen weekly market report that Container liner markets are in the process of further consolidation. A new alliance called OCEAN ALLIANCE, is to be formed between CMA CGM, COSCO CHINA SHIPPING, OOCL and EVERGREEN, in order to be able to keep up with 2M, consisting of the market leaders MSC and MAERSK. In addition, now Hapag-Lloyd has revealed progressed talks with UASC for closer cooperation which might lead to a merger in the end. In the S+P area, MOL is said to have disposed of two 6.350 TEU vessels, the MOL PRECISION and MOL PROMISE (2002 Japan built) to buyers from Southeast Asia (Zachariassen, 2016). That means consolidation will create a new competition

structure for shipping market and may be an effective solution for other ship owners which manage tanker and bulk carrier vessels too.

According to BIMCO, the demand side of the container market shows limited overall growth in the early months of 2016, with significant variations between different trades. The figures are also influenced by the Chinese New Year, which disrupts trade statistics during the initial months of each year. BIMCO's data for US imports on the east coast reveals a substantial increase of 6.5%, surpassing the strong levels observed in 2015. However, the imports of loaded containers on the west coast are only remarkable when compared to the poor volumes of 2015, which were affected by the conflict between the International Longshore and Warehouse Union (ILWU) and the Pacific Maritime Association (PMA), causing congestion at major ports. In Jan-Feb 2016, volumes from Asia to Europe decreased by 6.8% compared to the previous year, as reported by Container Trade Statistics (CTS). This decline cannot solely be attributed to the reduction in volumes destined for Russia; the demand within mainland Europe itself remains weak. In 2015, volumes transported from Asia to Europe experienced a decline of 3.6%, with a notable drop of 24.2% in volumes specifically destined for Russia. Head haul TEU-miles globally decreased by 1.2% in Jan-Feb 2016, as measured by SeaIntel, reflecting a similar negative trend seen in 2013. In contrast, 2014 and 2015 witnessed growth in sailing distances outpacing underlying TEU demand. This decrease in container shipping demand is also evident in the freight rates of container routes departing from Shanghai, monitored by the Shanghai Shipping Exchange. By mid-April, nearly all head haul freight rates reached their lowest recorded levels. Both trades heading to the US east coast and west coast are approximately 50% below the six-year average for April. The situation is slightly worse for shipments to Europe from Shanghai. Some exceptions are observed for destinations in East Japan and Santos, where rates surpass the 2015 levels but still fall below the six-year average. Time charter rates have seemingly reached their minimum point, with very few charters extending beyond six months. This demonstrates the reluctance of market participants to commit to longer terms under the current market conditions. The "bid and ask spreads" for longer term time charters have significantly widened, indicating a substantial change in this market over the past year.

The provided chart illustrates relatively stagnant charter rates across most segments, but for 4,250 TEU ships, rates declined from USD 5,700 to USD 5,250 per day in April alone (BIMCO, 2016):

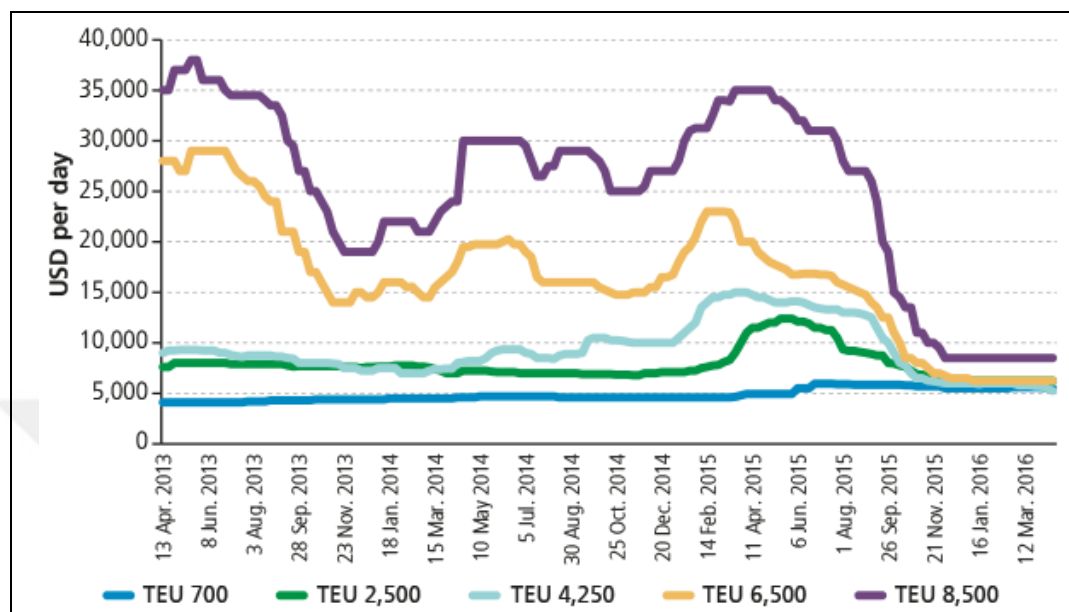


Figure 2.2.32. Charter Rates 6-12 Months on TEU basis as between 2013-2016

(BIMCO & Harper Petersen & Co., 2016)

On the supply side, it is evident that the delivery of new containership capacity and the scrapping of large vessels have surpassed expectations in 2016. In the first quarter, a total of 240,730 TEU was added to the global fleet, leaving 105,509 TEU remaining. The net growth of the fleet during this period amounted to 0.7%, and BIMCO predicts it will reach 3.4% by the end of the year. March 2016 witnessed the highest rate of demolition for large container vessels thus far. As an example, a fifteen-year-old post-panamax vessel with a capacity of 6,479 TEU was sold to an Indian scrap company at a favorable price of USD 295 per light-weight ton, equivalent to approximately USD 8,260,000. The demolition of excessive shipping capacity is crucial for the recovery of the container shipping industry. Several years of negative fleet growth are necessary to restore sustainable freight rates. BIMCO's projection of 250,000 TEU being scrapped in 2016 represents only a fraction of the current fleet size, amounting to 1.26% (BIMCO, 2016).

For the further estimation on container supply growth, it is seen that container supply will increase rather than the previous year while the demolition rates are expected to decrease due to higher freight rates. However, for 2018, it is expected to remain same as in 2016. Therefore, growth rate of container fleet is in an expanding trend as global as in the following figure (Figure 2.2.34):

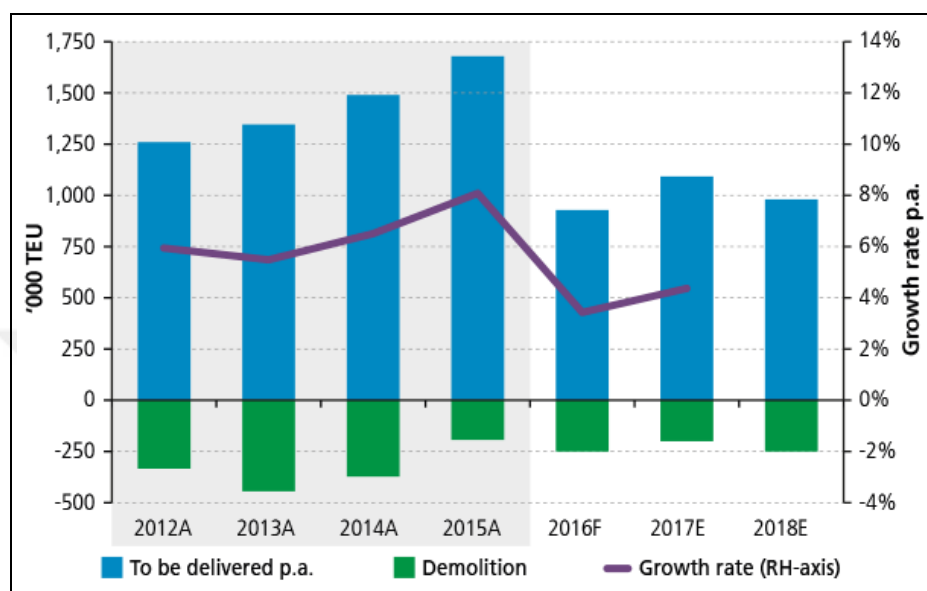


Figure 2.2.34. Container Supply Growth

(BIMCO & Clarksons 2016)

Container market is generally expected to growth for further years, however, it is very important to diverse the fleet not only depending on one size such as feeder or ULCV. The second issue for the further years is decision-making of container shipping companies on merging or conducting agreements for the same routes. Both strategies keep significant role on the development of container market competitors.

2.3 Trade Indicators Affecting Maritime Transportation

Globalization process have dependently increased maritime transportation since the countries became opened up to World trade. With the liberalization of trade, numerous companies began actively exploring cost-effective methods of production and product delivery to meet consumer demands. As a result, companies recognized the importance of engaging in this evolution to sustain their operations and maintain competitiveness in the global trade arena (Li, 2014). Within the globalization process, maritime industry has been placed one of the most affected sectors due to intra-

industrial trade activities. In this section, variables which might have effect on shipping trade activities have been summarized whether can be added into the regression analysis in this study or not. The indicators of affecting maritime transportation can be ordered without limited to liner shipping connectivity index (LSCI), commodity rates, import and export volumes/rates, GDP/GNP including per capita values, national and beneficial fleet capacities, economic openness indices, technological developments and innovations of the sector, new shipping trade routes and bunker/oil prices. The whole scope of this study is limited to these following factors in which can be also widened.

2.3.1 LSCI

The study introduces the Liner Shipping Connectivity Index (LSCI), which aims to evaluate a country's integration into the global liner shipping network by assessing its liner shipping connectivity. The LSCI serves as an indicator of a country's accessibility to international trade. Higher LSCI values indicate easier access to a well-developed global maritime freight transport system with high capacity and frequency. Consequently, higher rates indicate more effective participation of countries or ports in international trade, making the LSCI a measure of both maritime shipping connectivity and trade facilitation. The index reflects the strategies employed by container shipping lines to optimize revenue through market coverage. It is calculated based on four main components: containership deployment, container carrying capacity, the number of shipping companies and vessels, and average/maximum vessel sizes. Containership deployment and deployment per capita are influenced by the number of ship calls at a country's ports, which may include imports, exports, or transshipment activities. However, when a significant level of transshipment occurs, the number of ship calls alone may be misleading as an indicator of a country's connectivity to global trade. Instead, it indicates the presence of a transshipment hub system, whereby maritime services remain accessible for importers and exporters. The number of services connecting a country's ports with other countries is also taken into account. Therefore, this figure has been normalized per capita due to the fact that countries which have high populations are most likely to have more port calls of ships rather than having smaller populations (Hofstra, 2016).

Another contributing factor to the calculation of the Liner Shipping Connectivity Index is container carrying capacity. While the previous measure

focuses on the frequency of services, incorporating the total capacity of these services establishes a relationship between port calls and physical capacities. Ports with higher capacities indicate greater potential and are more capable of handling trade activities in global markets. The data includes not only the capacity available for imports or exports but also the normalization of capacity per capita, taking into account the number of shipping companies, liner services, and vessels per company. This data is also related to the number of shipping companies that contribute to a country's trade development through port calls, as well as the number of scheduled services that benefit the country's global trade. It is important to note that the companies providing services to a country's ports do not necessarily need to be operated or owned by nationals of the same country. In most cases, a country's trade is predominantly handled by foreign companies, and major carriers generate most of their revenue from transporting imports and exports of third countries. The more carriers compete for a country's trade, the greater the choices available and the lower the freight rates are likely to be. The total number of ships deployed on services to and from a country's ports does not necessarily indicate a high frequency of services. However, a larger number of vessels generally implies better connectivity.

Lastly, the average and maximum vessel size is another factor that influences the Liner Shipping Connectivity Index. It refers to the size of the largest ship deployed for services to and from a country's port, measured in Twenty-foot Equivalent Units (TEU). This factor serves as an indicator of economies of scale and infrastructure. Ports must have suitable equipment, such as ship-to-shore gantry cranes, and maintain dredged access channels to accommodate large container ships. The ability to handle containers over 8,000 TEU in ports is limited to certain countries, which results in a higher connectivity index compared to countries with lower capacity. This factor is particularly significant as it is associated with lower shipping costs per TEU. It is important to note that various alternative and more comprehensive methods can be employed to create an "index" for measuring liner shipping connectivity. These methods could include more detailed information on service frequencies or the connections established with other countries through direct services. While data on such information may be available for specific regions or years, the decision was made to prioritize resource allocation (work time) against the potential improvements to the index. Despite the incorporation of more

comprehensive measures, the final rankings and trends of countries did not significantly change. Presently, the LSCI is increasingly being used in research on trade competitiveness and is included in other extensive databases and indexes, such as the World Bank Development Indicators, Tradingeconomics, and the World Economic Forum (UNCTAD, 2016).

The United Nations Conference on Trade and Development (UNCTAD) introduced the liner shipping connectivity index in 2004, establishing it as the base year for subsequent calculations. The above defined factors are calculated within the basis of 2004 and further years' value is calculated by dividing the current value to the highest level of 2004 value and average value is calculated for each country applicable. The calculated amount is multiplied with coefficient of 100 and the highest value of 2004 is accepted as the 100 basis (World Bank, 2015).

The nations with the highest values on the Liner Shipping Connectivity Index (LSCI) demonstrate significant engagement in international trade. Specifically, China and Hong Kong, known for their export-oriented economies, hold the top positions, followed by Singapore as a prominent transshipment hub. Major trading nations like the United Kingdom, Germany, South Korea, the United States, and Japan also feature among the top 15. Additionally, countries such as Malaysia, Spain, the United Arab Emirates, Egypt, and Oman achieve high rankings due to the crucial transshipment role played by their ports (UNCTAD, 2015). Therefore, the liner shipping connectivity index would be a very good indicator in order to conduct estimations for the quantitative analyses, particularly when analyzed along with countries' ship investment and ownership conditions.

2.3.2 Commodity rates

The prospects for maritime trade appear bleak due to mounting debt burdens, aging populations, low investment levels, and the potential risk of deflation in several major economies. The previous robust demand for resources in countries like China and other emerging markets, which had been driving the global commodity price surge, is now showing signs of slowdown as efforts to rebalance the Chinese economy curtail growth momentum. The decline in industrial commodity prices has been widespread and significant. This price drop has had varying impacts, creating winners and losers. The most evident casualties are the commodity-exporting nations heavily

reliant on commodity revenues to support government expenditures, including social programs and transfers. Conversely, certain countries and industries have benefited from this situation. Commodity-importing economies such as Europe, Japan, China, and India have gained from cost savings resulting from lower import prices. However, a significant proportion of developing economies are commodity exporters and are consequently experiencing the adverse effects.

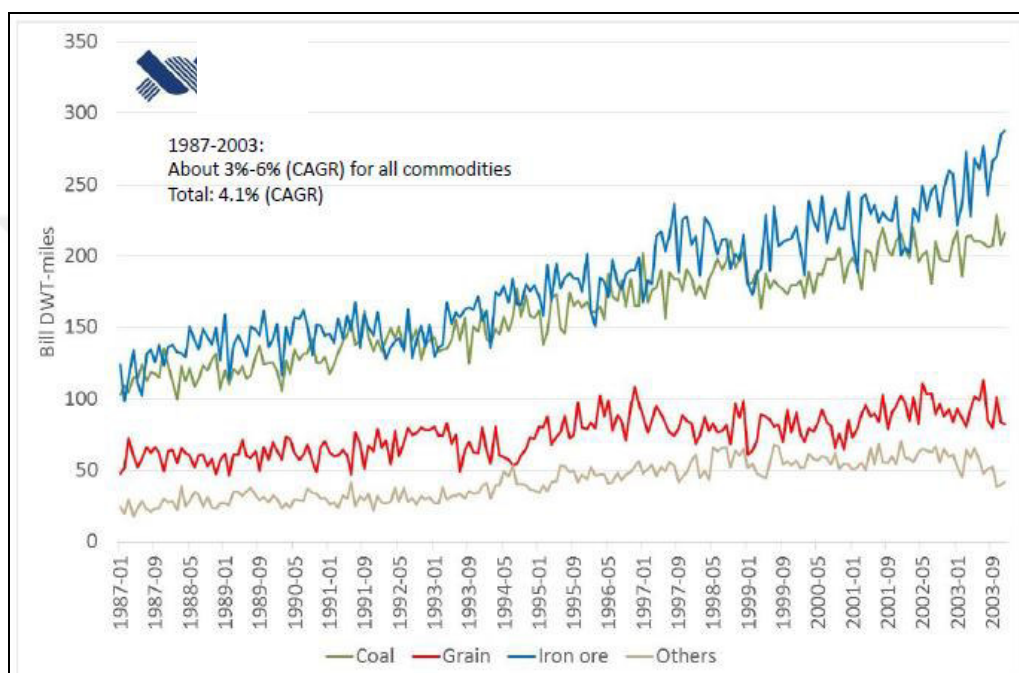


Figure 2.3.21. Global Dry Bulk Demand with Annual Growth Rates as per Commodities between 1987-2003

(Fearnresearch, 2016)

Before 2003, iron ore prices were in an increasing trend as like the coal prices were nearly had the same rates either. For grain prices, previous years were in a stable trend along with not having the top and edge values as prices. However a tough volatility in all commodity types can be seen as per Figure 2.3.22.

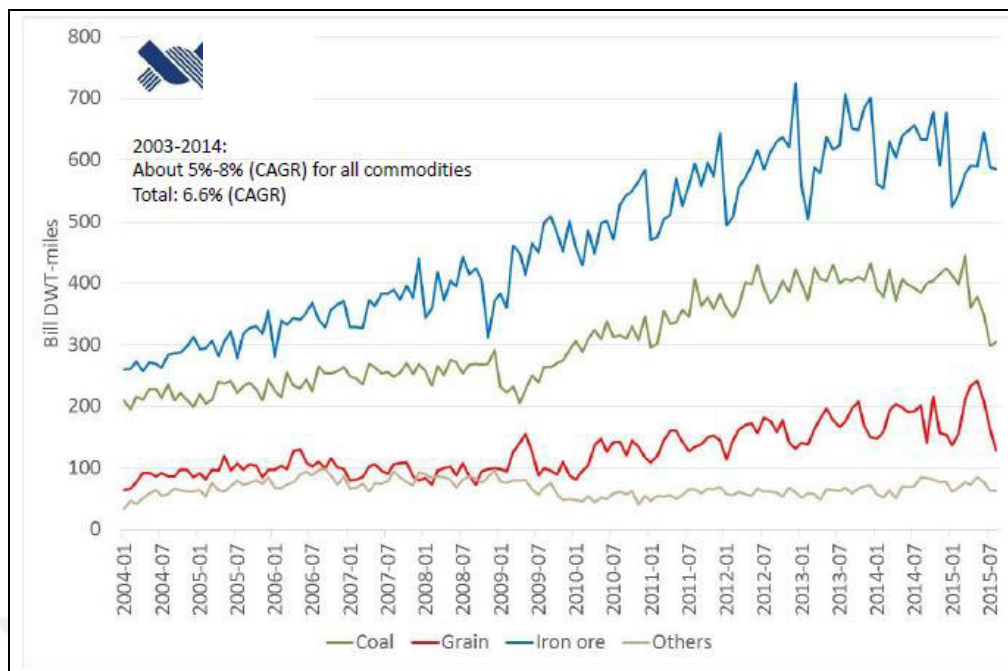


Figure 2.3.22. Global Dry Bulk Demand with Annual Growth Rates as per Commodities between 2004-2015

(Fearnresearch, 2016)

Between 2004 and 2008 the coal prices were in a firm volatility while the iron ore had a deeply activated volatility inside. Especially in the first and last quarter of 2008 global financial crisis occurred and the prices were collapsed as well as the shipping freight market. After 2009, iron ore prices increased within a semi-volatile trend until the second quarter of 2011 which would also again commence to decrease in the same period of 2012. This fall can be explained with varying in a seasonal trend however it is not fully recognized as it is. In 2013, iron ore prices also had quick falls however the whole graph seems the prices are in an increase which means the world's demand to iron ore is visibly increasing. Additionally, 2015 was a very different year which almost made the grain and coal rates down as in 2008 crisis. This was mostly caused by China had limited its coal import due to internal investment activities. The deepest coal prices of the last 10 year affected maritime transportation as the bulk carrier and general cargo vessels at the highest.

When looked at the future of commodity prices, it is expected to stay low for the near future as already affected the year of 2016 and will likely to continue in 2017, until the first quarter of 2018. It is evident that lower commodity prices are

providing some support to the economic conditions in regions that import these commodities. However, considering the overall pessimistic global environment in which this shock has occurred, it is challenging to accept the notion that a sudden decline in global demand for primary sources of income in many non-Asian emerging economies has anything more than a partially positive impact. When looking at the bigger picture, it is hard to overlook the fact that the efforts to rebalance the Chinese economy have significantly reduced the momentum in the world economy and global trade, which was largely driven by China and its neighboring Asian countries. Considering that a global oversupply typically takes longer to resolve than a price cycle driven by demand, it is expected that global prices of industrial commodities, including oil, will likely remain low both this year and next.

As general review of countries' commodity trade activities as of May, 2017, it is seen that Russia's State Transport Leasing Company (STLC) has signed an agreement with global commodity trader Mercuria to cooperate on a project to construct a coal terminal in the Murmansk region in Russia's far northwest. The Lavna coal terminal, to be built on the western shore of Kola Bay, will have an annual capacity of 18 million tonnes and the project will also include a railway line from the Lavna station to the coal transshipment facility. The project is part of the comprehensive development of the Murmansk Transport Hub and will be implemented through a private-public partnership. No details on when the project might start were given. According to a European ship operator, the new terminal with its 18 million t/year capacity will definitely have an impact on vessel flow. It is likely to impact the flow of Panamax or Supramax vessels and also possibly the flow of Capesize and Handysize ships for various destinations such as continental Europe, the Baltic and Asia. In may export of grain to Turkey returned to the previous (before the introduction of the March limit) level After the lifting of restrictions introduced by Turkey on 15 March, Russia began to supply previous volumes of grains on Turkish market, have returned to the former volume, after the removal of the old restrictions, and ship actively. Russia is contemplating the provision of a substantial quantity of grain, amounting to several hundred thousand tons, as a component of its fresh humanitarian aid shipments to Syria. Previously, Syria was capable of meeting its own wheat production needs; however, persistent conflicts in the primary grain-producing regions, coupled with inadequate rainfall, resulted in a 50% reduction in

the nation's harvest last year to a meager 1.3 million tons, the lowest output recorded in 27 years.

With only a limited number of import scrap deals heard in May 2017, the import scrap market in Turkey has made a very quiet start to the current week. Many uncertainties prevail in the Turkish market and Turkish steel producers are waiting for these uncertainties to come to an end before deciding their scrap purchase strategies. As a result of the rises in domestic rebar prices in May, construction contractors in Turkey requested a corrective measure from the Turkish authorities. The request was successful, with Turkey's Ministry of Economy announcing in the last days of May that the customs duty for import rebar will be reduced. Although Turkish mills' sought the removal of VAT instead of a reduction in import duty – with a latter expected to exacerbate the already wide gap between supply and consumption in the domestic market. Meanwhile, the cutting off the diplomatic relations with Qatar by seven countries, together with the announcement of trading sanctions by these countries against Qatar, has deepened the uncertainties in the rebar market. Although market sources believe this crisis will be resolved in the short term, no positive development has been heard yet. Having terminated their rebar purchases from Qatar with this boycott, Saudi Arabia, the UAE, Yemen and Libya may turn instead towards Turkish mills for their rebar purchases. Meanwhile, Turkish steel mills are in no rush as regards concluding new import scrap deals and are expected to shape their import scrap purchase strategies after the current situation becomes clearer.

Egyptian Cement is currently engaged in discussions to secure a loan of US\$221 million for the purpose of funding the construction of its inaugural cement plant in Sohag province within the Mediterranean trade. The company's cement division is in negotiations with a consortium comprising the National Bank of Egypt, Banque Misr, CIB, and Arab African International Bank. The projected cost for the construction of the new plant, which is expected to have an annual capacity of 2 million tons, is approximately US\$276 million. In 2010, Egyptian Group's CEO Ahmed Abu Hashima established Egyptian Steel. Meanwhile, in May 2017, U.S. stocks experienced a surge, reaching new record levels, driven by the rise in crude oil prices and a decline in the value of the dollar. This positive trend was also observed in emerging markets. However, subsequent political developments in Washington generated a climate of risk aversion in financial markets, resulting in a significant

decline in the S&P 500 index, the most substantial drop in eight months, leading to a surge in the volatility index and an increase in demand for safe-haven assets like gold. Nonetheless, stock markets have since recovered. Currently, there is minimal discussion regarding stimulus measures or tax cuts.

Simultaneously, China recently announced in mid-May its investment of over \$50 billion within the past three years to foster closer connectivity among Asia, Europe, and Africa through infrastructure initiatives commonly referred to as the "Silk Road" or "One Belt, One Road." In contrast, the United States witnessed a decline in its goods shipped to China, amounting to just \$42.4 billion during the first five months of the current year. This figure represents an 8% decrease compared to the previous year and a 13.8% decline from the peak export year of 2014. On a more positive note, Japan's economy experienced an acceleration in the first quarter, with a GDP growth rate of 2.2%. This sustained growth, under the leadership of Prime Minister Abe, marks the longest expansion of five consecutive quarters since 2006, suggesting a stable albeit unremarkable growth trajectory for Japan. The Wall Street Journal reported a recent global cyberattack that affected businesses, hospitals, and government agencies in over 150 countries, with the potential for further escalation due to its rapid transmission capabilities (Midship, 2017).

In Europe, the largest companies experienced their most robust quarter of profit growth in nearly seven years, instilling optimism that the region is on track to overcome the lingering impacts of the global economic crisis that emerged in 2008, which affected Europe for a longer duration compared to the United States and Asia. Conversely, Indian states, once financially sound, faced a decline in the quality of their bonds after the government provided guarantees, resulting in their bonds being classified as close to "junk" status. Meanwhile, recent developments in Latin America unveiled a significant rise in the Brazilian Real by 20% over an 18-month period, accompanied by a surge of 42% in the Ibovespa stock index. However, Brazilian markets experienced a downturn due to President Temer's troubles, leading to an 8% plunge in the Real and a 10% slide in stocks, thus creating a risk-averse environment for assets. On another note, the United Kingdom anticipated a relaxation of monetary policy in August, while the impact of Brexit on the United States remained limited.

As per the latest commodity report of brokers as of June 2017, it is seen that most of the wet commodities have been in a decrease. In contrast, bulk commodities

such as wheat, corn and rice keep their increase due to continuous growth of world demand. The below order shows the breakdown of each commodity's unit and the table shows the weekly changes and latest statuses of the commodities.

- *Crude Oil: Quoted in U.S. dollars and cents per barrel, with each contract representing 1,000 barrels. One barrel is equivalent to 42 U.S. gallons, 158.98 liters, or 0.13642565 metric tons.*
- *Brent: Quoted in U.S. dollars and cents per barrel, with each contract representing 1,000 barrels. One barrel is equivalent to 42 U.S. gallons, 158.98 liters, or 0.13642565 metric tons.*
- *Gas Oil: Quoted in U.S. dollars and cents per metric tonne, with each contract representing 100 metric tonnes. It refers to 10 parts per million (ppm) diesel, having a density of 0.845 kg/litre in vacuum at 15 degrees Celsius.*
- *RBOB Gasoline: Quoted in U.S. dollars and cents per U.S. gallon, with each contract representing 42,000 U.S. gallons or 136.42 metric tonnes.*
- *Natural Gas: Quoted in U.S. dollars and cents per 1 million British Thermal Units (BTU), with each contract representing 10,000 million BTU.*
- *Wheat: Quoted in cents per bushel, with each contract representing 5,000 bushels, approximately 136 metric tonnes.*
- *Corn: Quoted in cents per bushel, with each contract representing 5,000 bushels, approximately 127 metric tonnes.*
- *Rice Rough: Quoted in U.S. dollars and cents per hundredweight, with each contract representing 2,000 hundredweights, approximately 91 metric tonnes.*
- *Soybeans: Quoted in cents per bushel, with each contract representing 5,000 bushels, approximately 136 metric tonnes.*
- *Soybean Meal: Quoted in U.S. dollars and cents per short ton, with each contract representing 100 short tons, approximately 91 metric tonnes.*
- *Sugar #11: Quoted in U.S. dollars and cents per pound, with each contract representing 112,000 pounds or 50.8023 metric tonnes.*
- *Gold: Quoted in U.S. dollars and cents per troy ounce, with each contract representing 100 troy ounces. One troy ounce is equivalent to 31.1034 grams.*
- *Silver: Quoted in U.S. dollars and cents per troy ounce, with each contract representing 5,000 troy ounces. One troy ounce is equivalent to 31.1034 grams.*

- *Copper: Quoted in U.S. dollars and cents per metric tonne, based on the 3-month buyer's price, with each contract representing 25 metric tonnes.*
- *Aluminium: Quoted in U.S. dollars and cents per metric tonne, based on the 3-month buyer's price, with each contract representing 25 metric tonnes.*

Table 2.3.21.

Commodity prices and changes in percentage (Mid-Ship, 2017)

Commodity	Period	Exchange-Unit	Actual last	%weekly	%4 weekly
Crude oil	Aug'17	NYMEX – (USD/Barrel)	44,74	-2,38%	- 11,11%
Brent	Jul'17	ICE EU – (USD/Barrel)	47,37	-1,62%	- 11,64%
Gas oil	Jul'17	ICE EU – (USD/MT)	423,00	-0,94%	- 10,71%
RBOB Gasoline	Jul'17	NYMEX – (USD/US Gallon)	1,45	-3,12%	- 11,95%
Natural gas	Jul'17	NYMEX – (USD/1 mio BTU)	3,04	-0,07%	-6,73%
Wheat	Jul'17	CBOT – (USD Cents/Bushel)	466,00	-4,54%	7,00%
Corn	Jul'17	CBOT – (USD/Bushel)	379,75	-2,06%	1,95%
Rice	Jul'17	CBOT –	11,40	0,71%	5,26%

		(USD/Hundredweight)			
Soybeans	Jul'17	CBOT – (USD Cents/Bushel)	943,12	0,18%	-1,05%
Soybean meal	Jul'17	CBOT – (USD/Short ton)	300,90	-1,63%	-1,99%
Sugar	Jul'17	ICE US – (USD/Pound)	13,41	-6,03%	-18,13%
Gold	Aug'17	COMEX – (USD/Troy ounce)	1256,50	-1,17%	0,23%
Silver	Jul'17	COMEX – (USD/Troy ounce)	16,66	-3,26%	-0,80%
Copper	(3 months)	LME – (USD/MT)	5663,00	-2,43%	-0,33%
Aluminium	(3 months)	LME – (USD/MT)	1867,00	-2,10%	-3,94%

In the first quarter, total household debt in the United States increased by approximately 14%, equivalent to \$149 billion, compared to the previous quarter, reaching a total of \$12.725 trillion. This amount accounted for about 85% of the country's GDP. According to the Congressional Budget Office (CBO), it is projected to rise to 122% by 2040. Despite this, consumer sentiment, as measured by the University of Michigan (UoM), improved to a level of 97.7. The White House has proposed a plan to balance the federal budget over the course of 10 years. The proposed policies include significant spending cuts of \$4.5 trillion from programs such as Medicaid, food stamps, disability benefits, and student loans, along with tax

reductions and increased revenue of \$1 trillion. However, the proposal is expected to face challenges, particularly in the Senate, due to divisions within the party. The assets of the Federal Reserve currently amount to \$4.5 trillion, a significant increase compared to less than \$1 trillion a decade ago. Some investors express concern that reducing the size of the Fed's balance sheet could disrupt the markets and the still-fragile economy, given its substantial role as a major trader. In April, industrial production experienced a notable surge of 10%, the largest increase in over three years. However, housing starts declined by 2.6% to an annual rate of 1.172 million, and permits also fell by 2.5% to a pace of 1.229 million. Additionally, purchases of new homes dropped by 11.4% in April to an annual rate of 569,000. Despite this decline, the housing market is generally strong, with sales of newly built and previously owned homes near a 10-year high, and economists expect the positive momentum to continue throughout the year (Midship, 2017).

Meanwhile, in this section oil prices are not included as the commodity which will be explained more briefly with bunker prices in 2.3.9 of this study.

2.3.3 Import/Export rates

The deceleration in international trade has been influenced by two main factors: cyclical and structural. The cyclical element pertains to the enduringly feeble import demand observed in developed economies. On the other hand, the structural aspect primarily revolves around the maturation of existing global value chains, with the absence of substantial new chains being established. An analysis of worldwide import and export flows is crucial for gaining insights into accurate predictions regarding global trade. For this clarification below time series data has been collected from UNCTAD database (Figure 2.3.31.):

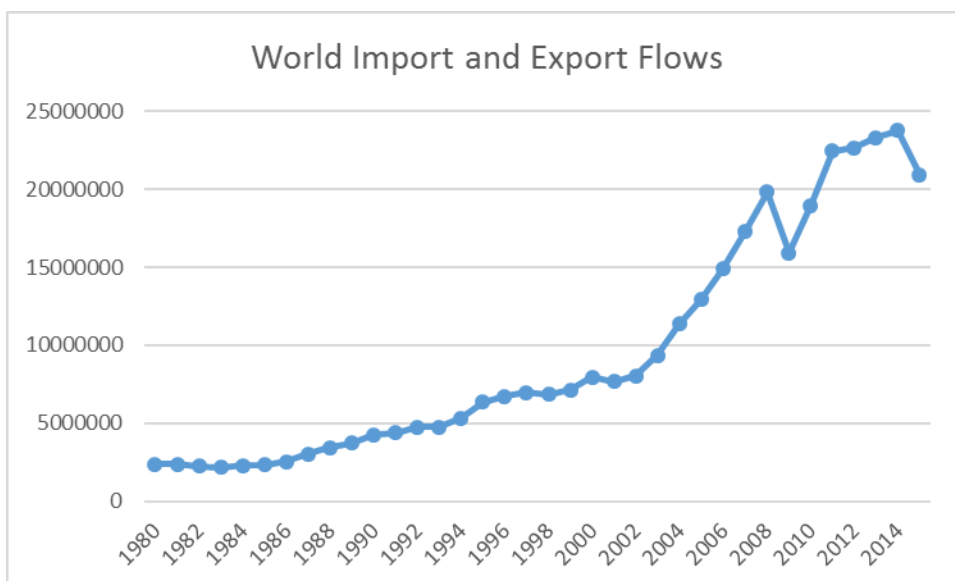


Figure 2.3.31. World Import and Export Volumes' Flow
(UNCTAD Database, 2016)

World import and export had faced nearly stable years between 1980 and 1993 which were not become in sudden changes either on increase or decrease side. As by 1996, import and export activities in global trade had commenced to visibly increase which is mostly enwidened by the trade agreements between countries as well as the European Union. Between 2002 and 2008, import and export rates had increased in an unrestrainable way which had been signalling to collapse in somewhere. 2008 global financial crisis caused a deep collapse and affected maritime transportation due to the low import and export rates that countries worried about to invest in new technologies or any kind of trade. Between 2009-2011 years, a rehabilitation period was existed until in 2013 China decided to slowdown imports due to internal investments. 2013 and 2015 period was slow however, it was relatively in an increase when the deep collapsed rates were considered. However, this increase again collapsed as of the last quarter of 2014 which had caused the worst freight rates of Baltic Exchange ever which almost caused a bulk carrier vessel to earn 1500 USD per a day for a time charter despite the fact that the running cost rates are scaled as 4000-5000 USD as minimum. This situation has caused many ship owners and operators to go to bankruptcies and sell their ships to big competitors. It was like an elimination of the small sized companies from the shipping market.

On the contrary to the recent decline in the global trade market, there has been a noticeable shift in the composition of global demand, moving away from goods that heavily rely on trade and towards services. This means that world trade has become less responsive to changes in global GDP due to the slower expansion of global supply chains and the increasing demand for services. As a result, the previous correlation between world trade growth and global GDP growth, which existed before the financial crisis, is not expected to be restored. Going forward, world trade is anticipated to grow in tandem with or at a slower pace than global GDP. In fact, seaborne trade volumes might stabilize or even decrease in the short to medium term. The primary reason for this skepticism lies in the absence of a clear replacement for China's previous import demand, which is crucial. While this concern is supported by the modest growth in recent import volumes for container and dry bulk vessels, it may be more challenging to recognize for tanker owners. Although there has been a period of relatively strong trading activity in certain segments, which has boosted freight rates and secondhand values throughout most of the first three quarters of 2015, it is important to note that this does not reflect strong global end-user demand. The increased trading activity in crude and product tankers is influenced by various factors such as low oil prices, arbitrage trading, new refineries ramping up production, inventory build-ups, and regional discrepancies in refinery configurations. However, it does not indicate robust underlying global demand.

2.3.4 Gross Domestic Product (GDP)/Gross National Product (GNP)

Several shipowners are placing their emphasis on GDP generation and the traditional link between GDP and trade expansion. Nevertheless, it should be noted that GDP growth alone does not guarantee a corresponding growth in trade. For instance, the anticipated economic growth in China is projected to be primarily driven by the service sector. However, since services are not typically transported via sea, this growth will contribute minimally to seaborne trade expansion. We are witnessing a future scenario where technological advancements provide localized or regional solutions to meet demand, which previously relied on seaborne trade. This transformation is expected to have a disruptive impact on various sectors of the shipping industry.

Upon reviewing the projected GDP outlook for the future, it becomes apparent that global economic growth is expected to continue at a moderate pace in 2016 and the following years. However, the short- to medium-term prospects remain uncertain and are subject to various downside risks. These risks encompass factors such as moderate global demand growth, the fragile recovery in Europe, geopolitical tensions, the potential for a more rapid slowdown in developing economies, and notably, the implications of China's deceleration. In the second quarter of 2016, the International Monetary Fund (IMF) published an updated World Economic Outlook, highlighting the urgency for an immediate and proactive response to address the bleak future economic prospects. It is apparent that a more robust policy mix, comprising fiscal and monetary measures, along with structural reforms, is required to reverse the current situation. The IMF proposes a coordinated effort among nations worldwide to foster continued development. In this regard, initiatives supporting revenue generation and spending that are conducive to growth should take center stage. Evaluating the extent to which the downturn in emerging economies is connected to the initial interest rate hikes by the United States (US) central banks proves challenging. The US reduction in quantitative easing had a significant adverse impact on capital inflows into investments in emerging economies. According to the latest IMF report from 2016, the projected GDP growth rate is expected to be 3.2%, down from 3.4%. Despite the headwinds faced in 2015, emerging markets and developing economies stand out as growth stories. The anticipated growth rate for 2016 is 4.1%, followed by 4.7% in 2017. The IMF currently estimates that global GDP will expand by 3.2% in 2016 and increase to 3.5% in 2017, which represents a downward revision of 0.2 percentage points for both advanced and developing economies. Below figure shows the world growth expansion as well as expectations (Figure 2.3.41.):

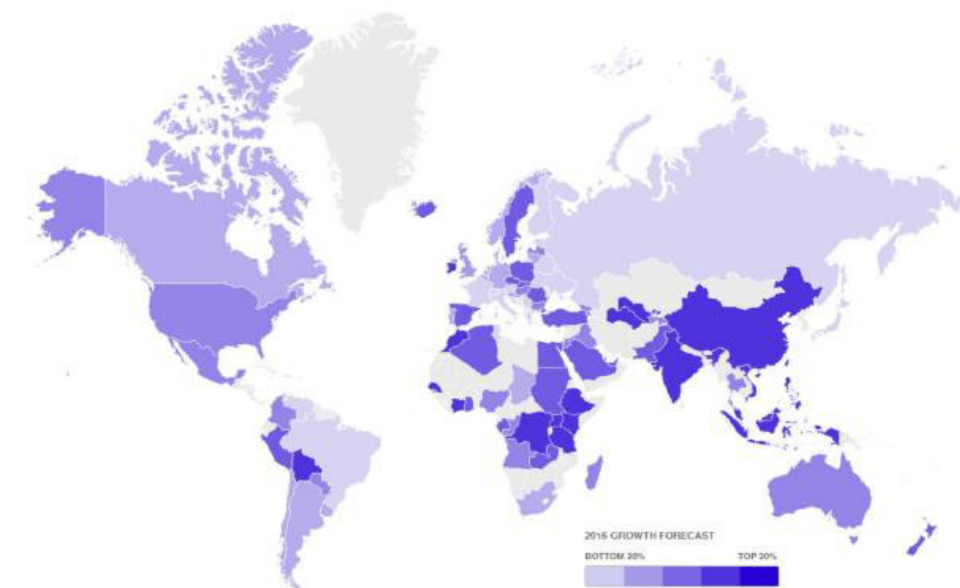


Figure 2.3.41. World Growth Estimation for 2016 and 2017

(Bloomberg & IMF, 2016)

In terms of prominent nations, the United States (US) continues to maintain its position as a global economic powerhouse and has made significant strides in its recovery, although challenges persist. Notably, US industrial production has experienced a decline for seven consecutive months in a year-on-year comparison, which can be attributed in part to the slowdown in the energy sector. Specifically, the subsectors of "utilities" and "mining" witnessed a decline of -9.3% and -9.9% respectively in February compared to the previous year, while manufacturing saw a modest increase of 1.8% during the same period. The struggling mining industry has had adverse effects on the dry bulk shipping sector. In 2015, total seaborne US coal exports witnessed a drop of 20.6 million tonnes (-25%), and it is projected that they could further decline by another 14 million tonnes (-23%) in 2016, according to the latest market report by Simpson Spence Young Research (SSY, 2016).

Although job creation in the United States (US) has consistently shown strength in the past year, wage pressures that contribute to higher inflation rates have only recently started to emerge. In 2015, US inflation averaged at 0.7%, but it has shown signs of picking up in the first quarter of 2016. The unemployment rate in the US stands at 4.9%, which is approximately half of the rate in the European region. On the Asian side, the overall GDP growth for emerging markets and developing

economies continues to experience a volatile recovery, according to the International Monetary Fund (IMF). China's GDP growth estimate has increased by 0.2 percentage points, India and the ASEAN-5 remain unchanged, while Japan's 2016 growth estimate has been halved to 0.5% compared to the previous year. Growth and inflation in Japan are weaker than anticipated, as indicated by data showing poor private consumption. Earlier this year, the Baltic and International Maritime Council (BIMCO) suggested that Japan could surprise everyone with growth after a challenging 2015, but it now appears that the opposite may be true. The Tankan index for large manufacturing companies in March reached its lowest level since mid-2013, highlighting the economic challenges. In China, there are early signs of stabilization in some sectors of the economy. The official manufacturing Purchasing Managers' Index (PMI) increased from 49.0 in February to 50.2 in March, influenced by government stimulus. Notably, the Caixin manufacturing PMI, which focuses on private small and medium-sized enterprises, improved from 48.0 in February to 49.7 in March, marking the best reading in over a year driven by domestic and foreign demand. In Europe, the recovery is progressing at a slow pace. Although there are some improvements in indicators other than overall GDP growth figures, the unemployment rate in the Eurozone has decreased for three consecutive years, but remains high at 10.3% in February. This indicates that the European Central Bank (ECB) is not receiving support from the labor market to boost inflation. The inflation rate in March stood at 0.0% compared to -0.2% in February. Despite the ECB's commitment to stabilizing prices, which it has communicated for several years, the slow pace of economic activity undermines its impact. The Eurozone has experienced negative interest rates for nearly two years, but this has not encouraged banks to increase lending; instead, commercial banks have significantly increased their deposits with the ECB, amounting to about 85% of the monetary expansion since February 2015. This implies that the real economic effect of ECB actions is limited. BIMCO expects the economic situation in Europe to gradually improve, despite the IMF's downward revision, as it aligns with the overall trend across all advanced economies (BIMCO, 2016).

2.3.5 National/Beneficial Fleet Capacity

The global fleet's performance is measured by the ClarkSea Index, which indicates that the world fleet continues to surpass demand. Since 2009, the average

freight rate has decreased by almost half compared to the period between 2000 and 2008, highlighting the underutilization of the world fleet. In 2015, the ClarkSea Index showed an average increase of 24%, while bunker costs were roughly halved compared to the average levels of 2014. These trends have greatly enhanced shipowners' ability to generate positive cash flow from operations. Additionally, the average secondhand value of vessels increased by 4% in 2015. However, there are disparities among different segments of the shipping industry. Tanker segments have performed well, benefiting from high trading activity driven by various factors such as low oil prices, arbitrage trading, and refinery-related dynamics. On the other hand, segments like Containers, Dry Bulk, and Offshore vessels are struggling due to a substantial influx of new vessels amid weakening demand. Most ship segments face uncertain prospects as the demand outlook remains fragile, the orderbook is large, and few viable candidates for scrapping are available. Currently, only 9% of the world fleet is 20 years or older, while the orderbook represents 17% of the fleet, totaling more than 4,700 vessels. Premature scrapping is increasingly being employed in segments with inadequate demand to accommodate the influx of vessels. If demand remains at current levels, nearly all vessels older than 15 years would need to be scrapped within the next two to three years. While variations exist between segments regarding fleet age distribution, orderbook delivery schedules, and demand outlooks, this general scenario holds true (Clarksons, 2016). Below Figure 2.3.51. shows a breakdown of latest orderbooks in the world fleet:

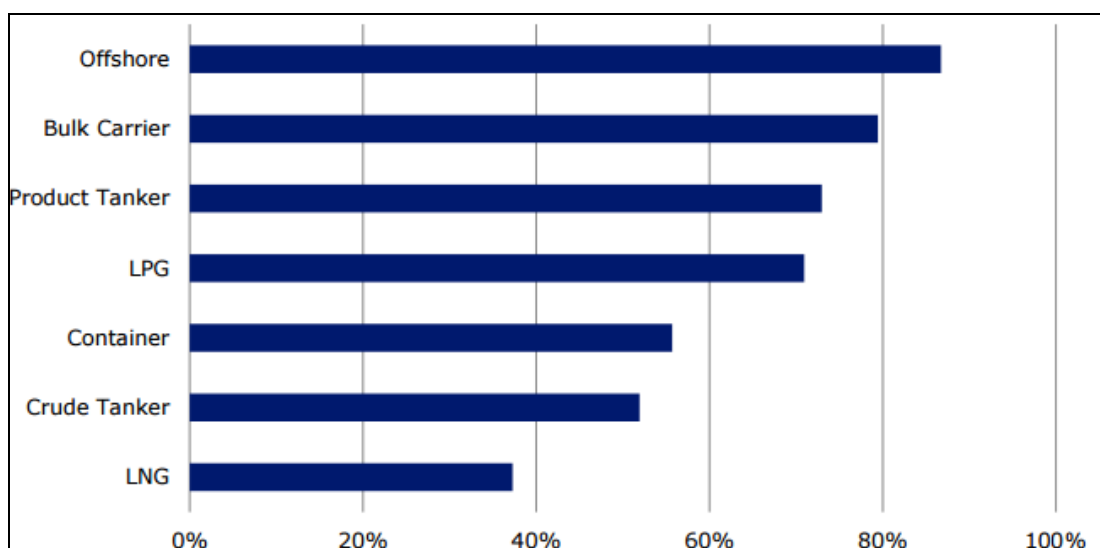


Figure 2.3.51. Share of Order Book Scheduled for Delivery within October 2015 and December 2016

(Clarksons & Danish Ship Finance, 2016)

There is still a significant influx of vessels entering the market, and the delivery schedule of the orderbook presents more concerns than its actual size. If the orderbook were distributed evenly over the next three years, it would be more manageable to accommodate the new vessels. However, the orderbook is heavily weighted towards early deliveries. In fact, more than 70% of the orderbook is scheduled to be completed before the end of 2016. In recent years, there has been an increase in orders that are not being delivered on time. On average, one out of every five orders is delayed by a year, and approximately 5% of the registered orders are ultimately canceled.

On average, the vessels currently under construction are approximately 60% larger in size compared to those built two decades ago. Generally, larger vessels offer cost advantages per unit transported and are preferred for long-distance trades. However, the benefits of economies of scale diminish if the vessel is not fully utilized. Therefore, it is crucial to maintain an average vessel size in line with global demand. Given the global economic landscape, where emerging economies with large populations but limited disposable incomes are gradually replacing the traditional growth powerhouses, the size of the existing fleet and the vessels on order are more reflective of the past rather than the future world.

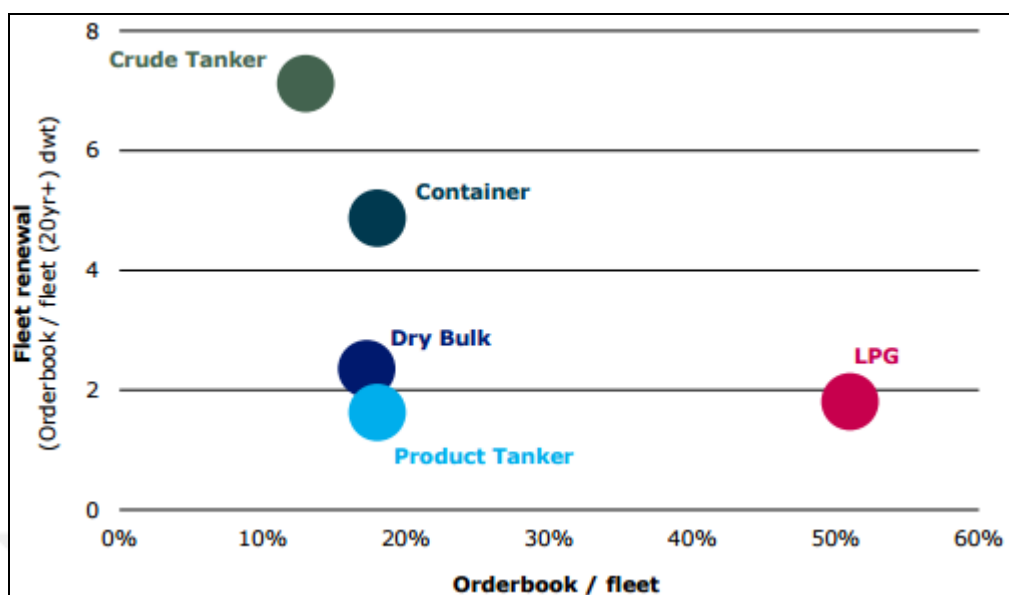


Figure 2.3.52. Orderbook and Fleet Diversity as Separated by Different Segments of Ships

(Clarksons & Danish Ship Finance, 2015)

One of the main conclusions drawn from our analysis of global demand indicators is that seaborne trade volumes are projected to remain stagnant or potentially decline in the upcoming five years. In the meantime, the world fleet is becoming increasingly young day by day and ships are more going to scrap due to their high running costs caused by the technical aspects. As per Danish Ship Finance 2015 report, the deadweight and ship type breakdown can be seen in following figure as percentage of fleet.

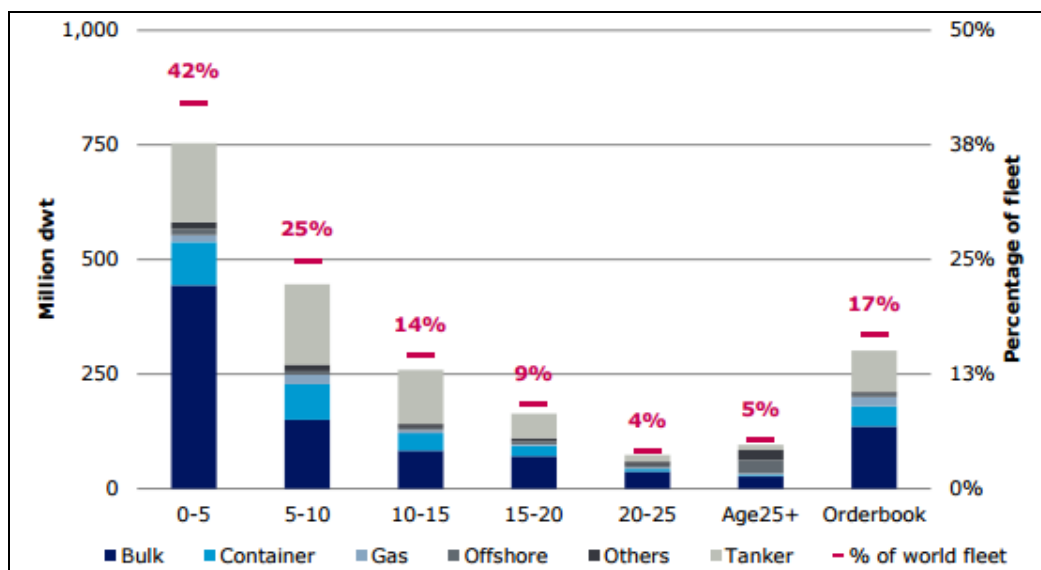


Figure 2.3.53. World Fleet Breakdown by Different Segments of Ships as Percentage

(Clarksons & Danish Ship Finance, 2015)

2.3.6 Economic Openness

Economic openness or trade openness of countries is calculated as the sum of the total export and import volumes of the countries by dividing the sum value to country's Gross Domestic Product (GDP) and this value shows how much a country is open to international trade activities also how much a country is addicted to global trade (Dar & Amirkhalkhali, 2002). In previous literature, we can see that many studies have been conducted to measure the intensity of trade openness in which the most popular methodology is absolutely to rate total trade volumes of countries by dividing it to total GDP (Winters A., et.al, 2004). According to Lane, economic openness index has been formulated as per below (Lane H.D, 2007):

$$f(X) = \text{Export volume (1)}$$

$$f(M) = \text{Import volume (2)}$$

$$\text{Participation of countries to international trade} = f(X) + f(M) \quad (3)$$

$$\text{Economic openness index} = f(X) + f(M) / \text{Gross Domestic Product (GDP)} \quad (4)$$

“Open economy” is defined as a research in which include a study regarding the positive and negative effects of interaction in global macroeconomic systems, real processes and nations on to the society, people and the world. National economies come into more open status while the common trends become more open to

international trade. Openness to economic development assists countries to follow up which strategies and how to set up their strategic steps in order to protect economic welfare and national benefits of the countries. Openness also can be defined as a scope which includes foreign trade activities. Economic openness or closeness both are related to the selection process of the countries between a strategy of economic isolation or to participate in more contributonal activities in order to have more developed and thriven economy. Therefore, technologic developments and general economic condition of the countries also affect their economic openness as well as the political decisions and ideologies. While some countries continue to follow a protective policy during the opening process of the national economy to global side as a sustainable trend, other countries choose a more 'open' strategy on their economy and increase the openness of country by assuming the world economy a contributonal piece of the global economy. The most important point in open and protective situations is to indicate how much a country is open to global economy or keeps protective strategy (Iliev & Marinov, 2008). Hence, the level of economic openness is directly linked to safeguarding the social well-being of the society and promoting domestic production (Lloyd, P.J. et al., 2000).

It is observed by the many researchers that international trade has positive effects on gross domestic product (GDP) and gross national product (GNP) per capita of a country. Within this regard, economic openness has a two-way effect on to collect the new technologies which people produce by the role of a capital and to spread these technologies to global world. Therefore, economic openness and export activities facilitate to adapt and accommodate new technologies which are produced in foreign countries (Reinert, 2012). Towards to these explanations, open economies, cover the countries which have high degree of economic openness index while the closed economies cover the countries which have relatively less degree of economic openness index. Accounting and financial activities between service and goods trade and also capital flow on stocks and security cause a fluctuation in global economy (Choudri & Cohen, 1980). Thus, activity in stock market exchange, economic interdependance which covers interest and economic growth rates within a wider scope, can be considered to involve the studies and analyses along with various independent indicators to establish a sustainable economic policy and to contribute the economic growth of the country (Li L., et al., 2011).

2.3.7 Technological changes

Fundamentally, technological innovation revolves around enhancing efficiency by accomplishing tasks in a more intelligent manner, minimizing resource usage, and reducing waste generation. Its focus lies in augmenting the energy efficiency and environmental sustainability of buildings, transportation, manufacturing, and infrastructure. As the global economy undergoes transformation, trade patterns and transportation distances will inevitably shift accordingly.

Technological innovation extends beyond the mere optimization of resource utilization in performing tasks. It encompasses the application of novel solutions to address long-standing challenges. Such innovation introduces fresh business models that foster growth, often at reduced costs. Presently, various innovations are concurrently maturing, and their combined influence is anticipated to profoundly transform the global economy, leaving a lasting impact on the shipping sector. The manufacturing industry, for instance, is experiencing disruption through the integration of advanced robotics and 3D printing. Large-scale automation and the substitution of workers with robots are becoming prevalent for cost-effective mass production. Conversely, 3D printers enable localized on-site production of smaller quantities with higher value. These developments are gradually projected to significantly alter the demand outlook for larger container vessels. Moreover, the demand for fossil fuels is being challenged by remarkable advancements in solar power, wind energy, energy efficiency, and energy storage technologies (e.g., batteries). While fossil fuels will remain a prominent energy source for several decades, the more efficient use of energy and the opportunities associated with decarbonizing the energy supply through new technologies will diminish the medium- to long-term demand prospects for crude tankers, product tankers, gas carriers, and, in terms of coal transportation, dry bulk vessels. These developments will intersect multiple industries concurrently, delivering substantial enhancements and novel alternatives to existing business models.

It is crucial to grasp the key insights conveyed in the aforementioned example. Firstly, the expansion of the sharing economy at both regional and sectoral levels is exerting downward pressure on the demand prospects not only for directly involved industries like car manufacturers but also for entire supply chains. The diminished end-user demand permeates through various industries and raw material suppliers,

including the petrochemical industry, causing ripple effects. Consequently, the demand outlook for the merchant fleet is expected to be influenced through multiple channels. This underscores the clear message that technological innovation represents a disruptive force for the shipping industry. Secondly, in the digital era, data can hold immense value comparable to the underlying assets themselves. Uber, for instance, has effectively harnessed data on local transportation patterns, gaining insights into user preferences regarding destinations, timings, and modes of travel. Leveraging this data, Uber has expanded its services. Similarly, for the shipping industry, embracing alliances, pools, and capacity-sharing agreements marks a starting point. While collective efforts among ship owners to reduce costs and enhance vessel utilization have proven fruitful, the trade data derived from these operations could possess even greater value. Envisioning a scaled-up shipping equivalent of Uber, encompassing global seaborne trade volumes for a specific segment or the entire world fleet, illustrates the potential significance of such extracted data. Technological innovation has already initiated or is currently driving significant structural changes in the global economy, reshaping world trade patterns.

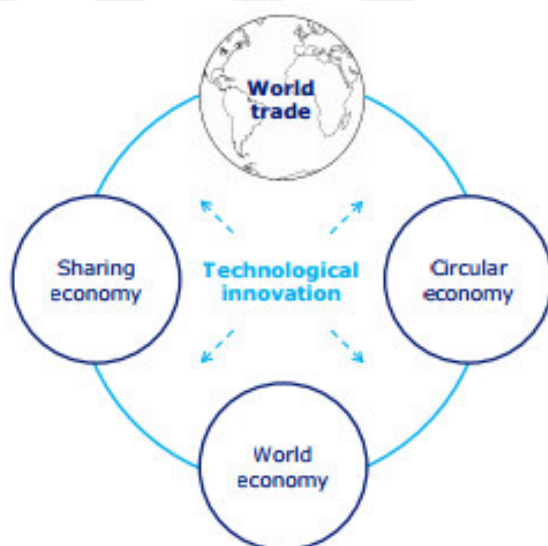


Figure 2.3.71. Cycle of Technological Innovation Change in World Trade

(Danish Ship Finance, 2016)

While the initial impact of emerging technologies may seem modest, it is important to recognize that many of these innovations follow an exponential growth pattern. Exponential technologies can be deceiving because they start off slowly but then experience sudden acceleration. To illustrate, consider a nascent technology that doubles its market share annually. Starting from a mere 0.01%, it would take seven years to reach a 1% market share. However, in theory, it would only require another seven years to achieve full market penetration, reaching 100%. Hence, when an exponential technology, such as solar energy, attains a 1% market share, it may already be on the verge of establishing a solid position within the industry it is disrupting. This insight is supported by the Danish Ship Finance Market Outlook in 2016 (Danish Ship Finance, 2016).

2.3.8 New Shipping Routes

As the world trade activities becoming more widened and economies becoming more open, new shipment relations also appear in the market which cause a necessity to new shipping routes in global maritime market. Especially, for the last years Trans-Atlantic and Trans-Pacific voyages have been a big topic to be searched for the efficient routes to reach the ports. As an example, China is actively exploring the utilization of the Northwest Passage, a legendary shortcut connecting the Pacific and Atlantic oceans. The Chinese government, being the world's largest trader of goods, has even published a shipping guide specifically for this route. The seaway located north of Canada has long been sought after by European explorers, including the ill-fated Franklin expedition in 1845, due to its potential to provide a faster journey from China to the US East-Coast compared to the Panama Canal or Cape Horn. While the passage remains ice-covered for a significant portion of the year, the effects of global warming and the retreat of Arctic sea ice are gradually increasing its accessibility. China perceives this development as an opportunity to redefine the patterns of global trade.

The Chinese government, through its Maritime Safety Administration, has released a comprehensive guide in the Chinese language that includes nautical charts and detailed information about ice conditions for the Northwest Passage. According to the China Daily newspaper, which is affiliated with the government, Chinese

authorities anticipate the future navigation of ships bearing Chinese flags along this route. They believe that once this passage becomes commonly utilized, it will fundamentally transform global maritime transportation and exert a significant impact on international trade, the world economy, capital flows, and resource exploitation. Notably, in a previous announcement, the Chinese shipping company COSCO revealed its intentions to establish regular services between Europe and the Arctic Ocean via the "Northeast Passage," an alternative Arctic shipping route situated north of Russia. COSCO vessels have already traversed that route in 2013 and 2015. Furthermore, COSCO, which is state-owned, has undergone a merger with another company, China Shipping Group. Numerous countries have recognized the economic and strategic value of Arctic Ocean routes. While China does not have a direct territorial claim or a border with the Arctic, it joined the Arctic Council as an observer two years ago. Experts suggest that Beijing acknowledges the region's potential for scientific research and its strategic significance.

There are limited indications of significant changes in trade patterns and travel distances for tankers and dry bulk vessels over the next five years. However, for container vessels, we anticipate that the shift in trade patterns and travel distances may begin to occur within the next five to ten years. By 2030, container trade patterns could resemble those observed in the product tanker market, which primarily consists of short-haul regional trades rather than long-haul overseas trades. In the short term, dry bulk vessels may experience a decline in transport volumes before witnessing alterations in travel distances and trading patterns within the next five to ten years. The future of tanker vessels, including LPG, largely hinges on the pace of technological innovation, particularly in renewable energy, energy efficiency, energy storage, and the transition towards a more circular economy.

2.3.9 Bunker/Oil Prices

The exercise of control over bunker and oil prices is primarily carried out by a multinational organization called the Organization of the Petroleum Exporting Countries (OPEC). OPEC was established during the Baghdad Conference held from September 10-14, 1960, with five founding members: Iran, Iraq, Kuwait, Saudi Arabia, and Venezuela. Subsequently, ten additional countries joined OPEC, namely Qatar (1961), Indonesia (1962, with periods of suspension and reactivation), Libya

(1962), United Arab Emirates (1967), Algeria (1969), Nigeria (1971), Ecuador (1973, with a period of suspension and reactivation), Angola (2007), Gabon (1975, with a period of termination and rejoining), and Equatorial Guinea (2017). While initially headquartered in Geneva, Switzerland, for its first five years, OPEC moved its headquarters to Vienna, Austria, on September 1, 1965. The primary objective of OPEC is to coordinate and harmonize petroleum policies among its member nations. This is aimed at ensuring equitable and stable prices for petroleum producers, facilitating an efficient, economic, and regular supply of petroleum to consuming countries, and providing a reasonable return on investment for industry participants (OPEC, 2017).

During the early years of the decade, the oil market faced a significant risk from the global economy. Uncertainties in the global macroeconomic landscape and heightened risks related to the international financial system had a substantial impact on economies. Additionally, escalating social unrest in various regions of the world influenced both the supply and demand dynamics in the first half of the decade. Despite these challenges, the market managed to maintain a relatively balanced state. From 2011 to mid-2014, prices remained stable until a combination of speculation and oversupply led to a decline in 2014. Trade patterns continued to undergo transformations, with Asian countries experiencing further growth in demand while the demand in OECD countries generally contracted. The world's attention increasingly turned towards multilateral environmental concerns, anticipating the formulation of a new climate change agreement led by the United Nations. In its pursuit of market stability, OPEC remained committed to enhancing its dialogue and cooperation with both consumers and non-OPEC producers.

With the oil price appearing to have reached its lowest point, the world must now prepare for a different future, one that may involve greater volatility in oil prices compared to the continuous decline experienced from mid-2014 to January/February 2016. Currently, WTI and Brent crude oil prices stand at around USD 40-45 per barrel, a notable increase from the previous USD 30 per barrel. Consequently, bunker prices are expected to rise as well. Between 2014 and 2015, average bunker prices witnessed a significant 50% drop. In light of this, prudent owners who possess a substantial cargo book and significant future affreightment commitments may opt to mitigate risks by hedging their expected bunker consumption at the prevailing fuel

price level. Following figure shows the volatility of bunker prices by segments for the last 10 years which available in the database (Figure 2.3.91.):

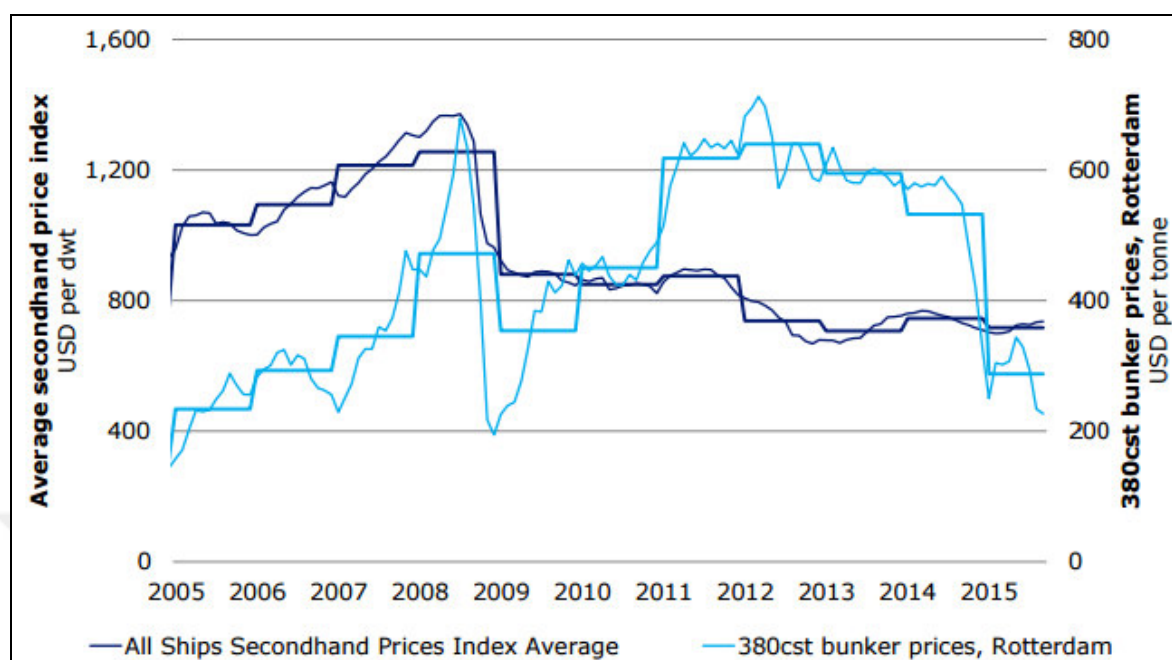


Figure 2.3.91. Bunker Prices' Evolution since Last 10 Years

(Danish Ship Finance, 2016)

The uncertainty surrounding "Brexit" presents a significant amount of uncertainty that ultimately benefits no one. Due to this uncertainty, crucial policy actions are being delayed as central banks and governments aim to preserve their resources to tackle potentially greater challenges in the future. If the United Kingdom does decide to leave the European Union as a result of the June 2016 referendum, and this coincides with a more pronounced economic slowdown in China and increased economic turmoil in Brazil, institutions may find themselves to blame if they exhaust their resources in the midst of the battle. It is evident that immediate action is necessary for the global economy. Failing to take action now will only contribute to the likelihood of encountering more substantial troubles later on. Many countries heavily reliant on commodity exports continue to face difficulties as the decline in oil and gas prices, along with lower prices for other key commodities, have placed significant strain on public finances. This has a profound impact not only on the export capacity of these nations but also on their overall economic growth, resulting in reduced imports and ultimately affecting global growth and the shipping industry negatively (BIMCO, 2016).

When a quick outlook to bunker market as of May 2017, it is seen that oil prices rose on Wednesday with the WTI July contract settling down \$0.20 at \$51.27 and the Brent July contract settling down \$0.19 at \$53.96. Oil prices remained relatively flat after a 4.43-million-barrel draw in crude inventories as reported by the EIA on Wednesday morning. The crude draw was accompanied by a draw in gasoline inventories of 787k barrels and a draw of 485k barrels in distillate inventories with refinery run rates up to 93.50 percent. The US saw an increase in crude imports of 159k barrels. Despite OPEC announcing a continuation of their production cuts for the next 6 months, oil prices are off sharply today as there was an expectation that there would be additional cuts announced. It appears that there is a position sell-off in the market today basis this news. Presently WTI is trading at \$49.62, down \$1.72 per barrel and Brent is trading at \$52.25, down \$1.71 per barrel.

Table 2.3.91.

Latest reported bunker prices in hub ports as of June 2017 (Mid-Ship, 2017)

Main Bunkering Hubs	380 CST Fuel Oil Price (USD/ton)	Marine Gas Oil Price (USD/ton)
Rotterdam	305.5	457.5
Singapore	323.75	323.75
New Orleans	296.05	296.05
Houston	304.0	557.0
Fujairah	304.0	557.5

As the regional side, in the Europe, Rotterdam still stays healthy on all products and Antwerp has tightness during the last month. In Hamburg, it is seen that barging still keeps tight and 0.1% Sulphur content bunkers can become available upon request. In the Far East, most of Singapore suppliers stayed tight on avails until the end of May 2017 and Japan also kept the tight navigation through Tokyo, Yokohama, Kawasaki, Chiba and Kimitsu bunkering areas. As tightness continues in Far East side, the other part of the world South America keeps the similar tightness too.

Panama seems having enough bunker capacity and barging facilities during May 2017 as well as the same is seen in Rio de Janeiro and Venezuela either. In Ecuador and Peru bunker stocks are very low and firm inquiries are not requested by the bunker suppliers as the same is also occurring in Peru since tightness still existing in the area. On the other hand, North America region also seems keeping tight rates. In San Francisco, prompt requirements cause tight prices and Portland region also seems not having enough bunker capacity but expecting an increase in stocks for the further days of 2017. Los Angeles and Lake Charles regions also do not have enough bunker stock at the moment till end of May 2017 however, the fourth quarter of 2017 seems will have more stocks due to the increasing vessel and cargo traffic till new year. On the other hand, Houston is the best place to perform bunker supply since has the most stock in all the United States ports. Above mentioned table shows the bunker prices as of end of May 2017 and beginning of June 2017 as in the main bunker hubs (Mid-Ship, 2017).

When we look at the tanker market in general, we see that the rent rates have fallen compared to the past year, and the asset values of crude oil vessels are decreasing in proportion to this. The crude oil market has been exposed to significant gear changes over the last two years. The fact that rock gas caused confusion in the main production and consumption regions and OPEC's "Let's open the taps" agreement, which has been implemented since 2014, is beginning to change the supply-demand balance drastically.

In the last three years, we can say that we are entering a new import trend even more. Especially in recent times as the main crude oil importers, Asia and the Far East have already begun to take over the throne of America and Europe. Looking ahead, there is a notable projection for a substantial increase in China's oil imports, positioning it as an increasingly influential player in the global market and potentially surpassing other countries to become the largest crude oil importer in the world. When we look at the monthly charts in 2015 and 2016, we see that the increase is gradual rather than abrupt and rapid. According to the last 7 months of 2017, it left behind all other import products and settled first place in product imports. Behind this gradual rise we can list the "developmental factors" that we think are influential because of the "running games":

➤ *Undeniable superiority of rock gas in America as a new source of energy*

- *The continual and substantial increase in China's oil refiners on the Asian side*
- *China's decline in domestic crude oil output*
- *The Chinese government's strategic volume increase in reserve volumes*
- *Gradual increase in China's domestic consumption*

When examining the production of American shale oil and gas, it becomes evident that the reduction in US imports has been largely influenced by the significant volume of imports from China. Given the rise in strategic reserves, it is antagonizing as a pressure on the global market. Briefly, when we look back, we saw that most of the countries stocked low oil prices with the opportunity to supply crude oil to the market later. However, we can say that this is because the reserves that can be stocked are limited, so it can be said that it has the effect which can keep the market relatively under control by staying in a certain level.

On the other hand, China has helped pull up the general demand in the region to be in a significant increase in oil refineries. In addition to that, it is also a fact that they will advance to the point where they will be able to hold on to the product hand produced in excess capacity without further infrastructure investment. The gradual decline in domestic crude oil output also increases the need for imports while at the same time the need for strategic reserves also has an increasing effect. This double rise is also a symptom of the fact that the most significant increase in China's overall import volume is oil. As previously highlighted, the primary determinant for the market's long-term expansion is the increase in China's domestic consumption. The fact that consumption is above the last two years we are passing may be a reporter who is hopeful for crude oil trading in the next period. Assuming that China's per capita oil consumption is also on the rise, it is time for the final values to turn into a flag race that will also be consumed in America and Europe. However, if we look at the latest situation, there is a tendency towards domestic consumption, even though there is even less increase in import volume compared to the same period of last year. As the positive momentum captured is not within the sustainable growth in imports and uncertain growth in consumption, it is now confronting the "*Weak point*" of the market.

2.3.10 Political Issues

The most important political occurrence of 2017 was absolutely the Qatar crisis since it has been directly affecting the ships calling Qatari ports. We have witnessed several diplomatic problems during 2017 put forward the support of terrorism by Saudi Arabia, United Arab Emirates, Bahrain, Qatar and Egypt. In addition, Qatar has been exposed to various constraints and economic isolation that will affect air, sea and land travel and trade. Although Trump identifies Qatar as a strategic partner, the supportive attitude of Saudi Arabia affects the shipping industry in the Middle East in general and the maritime industry, one of the largest channels of foreign trade, directly. The United Arab Emirates, Saudi Arabia and Bahrain prohibited the entry of vessels of flagged or Qatar-owned shipowners into the inland waters and ports of their countries. Along with that, it also brought a ban on foreign flagged ships coming from Qatar ports or going to Qatar. At this point the restriction is only applied to the last port of Qatar. There are currently no restrictions imposed on ships arriving or transiting in transit from a third country such as Kuwait or Oman. In addition, Saudi Arabia has banned the release of all products originating from Qatar at its ports. Egypt has also suspended all its diplomatic relations and airspace sharing with Qatar, but there is currently no case to affect the transit of Suez Canal and the deliveries of Qatar flagged and owned vessels. Judging from the recent situation in Qatar ports, a contrary restriction to Qatar's ships going to Saudi Arabia, the United Arab Emirates and Bahrain has yet to be announced.

Further, the United Arab Emirates is buying a third natural gas from Qatar via Dolphin Energy pipeline. Qatar's trade with Saudi Arabia is worth \$ 2 billion, with the United Arab Emirates at \$ 7 billion and Bahrain at \$ 500 million. Qatar's exports to these countries are significantly more than imports. The presence of Saudi Arabia in Qatar banking sector is around \$ 30 billion while the presence of the United Arab Emirates still sees the same rates. According to recent reports, some Saudi, UAE and Egyptian banks have taken a decision to suspend their relationship with Qatari banks until they receive a second instruction from central banks.

Qatar is the largest intensified gas exporter in the region, and this embargo could have an impact that would make it difficult to buy Qatar oil and gas. Restrictions on sailing to or from Qatar can put those who trade for goods in this area in search of a new commercial structure. According to recent reports, the LNG loaded

Zarga and Al Mafyar vessels loaded from Qatar prefer to roam the Cape of Good Hope as an alternative rotation instead of going to Europe from the Red Sea and Suez Rotations. In addition, vessels operating in the continuous bay area are expected to be affected by fuel purchases at ports such as Fujairah. Finally, it was also reported that the immigration office of Fujairah port did not allow staff change from Qatar or to vessels to Qatar. It is thought-provoking how long this can last so long as Qatar and its neighbors are thought to have a strong cultural bond and family relationships. According to these conditions, there is no prediction as to when the situation will be alleviated. There may be a decline in prices though not so much in the short term. But if this conflict continues in this way, Qatar will have to find new alternative channels to compete with its neighbors in economic and socio-political terms. It is also interesting that this is a time when global energy prices are declining, and the Gulf economies are already suffering from low oil prices. Obviously, the effect of the sanctions against Qatar is not as clear as we can say, but we will be able to see the effect more clearly when the issue begins to be resolved (Intermodal & Fearnleys, 2017).

The ongoing conflict between Russia and Ukraine has created political tensions in Europe, and these tensions are expected to have an impact on the maritime industry in the coming years. The ongoing Russia-Ukraine conflict has resulted in the shutdown of multiple ports, notably Sevastopol and Kerch ports located in Crimea. The closure of these ports has disrupted shipping lanes in the Black Sea and the Sea of Azov, affecting the movement of goods and products. The ongoing tensions have also led to an increase in naval patrols and inspections, leading to longer wait times for vessels and higher shipping costs. The closure of Ukrainian ports and the disruption of shipping lanes have had a significant impact on global trade. Ukraine is a major exporter of grain, and the closure of ports in the region has led to a reduction in grain exports, affecting the global food supply chain. The situation has also affected the export of minerals and other products, leading to higher shipping costs and delays. The tensions in the region have also led to an increase in piracy and hijacking incidents. The Sea of Azov, in particular, has seen an increase in piracy and attacks on vessels. The increase in piracy has led to increased insurance costs for shipping companies and has also endangered the lives of crew members. The ongoing tensions between Russia and Ukraine have also led to the imposition of sanctions by the European Union and the United States. The sanctions have targeted key individuals,

companies, and sectors of the Russian economy, including the maritime industry. The sanctions have led to increased costs for shipping companies and have also led to a reduction in Russian exports, affecting the global supply chain. It is crucial for shipping companies to monitor the situation closely and adapt their strategies accordingly to minimize the impact on their operations.

3. INVESTMENT IN SHIPS

3.1 Ship finance and financial evolution of shipping

Shipping of goods and services intra-industries creates a more volatile market for shipping companies including an effect of finance positions in maritime trade. Ship financing arises as a subsequent concern for ship owners, operators, and managers when resources are required for ship investments. It involves the acquisition of funds while minimizing risks through the utilization of diverse collateral forms, with charter fees serving as the primary means of repayment (Mizuho Bank, 2015).

Ship finance revolves around the fundamental premise that a bank or another lender provides financial assistance to a ship owner for various purposes, such as constructing a new vessel, purchasing a used ship, undertaking ship conversions, repairs, or alterations, or refinancing existing debt secured by a ship. Since the shipping is a cyclical and uncertain industry, ship finance issues on banks and ship owners' side became more sophisticated in global maritime industry (Harwood S 2006). In most maritime advanced countries such as Netherlands, Germany, Denmark, United States and newly; China and South Korea as emergent side, have their own financial ship funding systems as being private and/or government supported corporations. However, as opposite in Turkish maritime industry, ship investments are mostly financed by foreign banks or financing corporations due to Turkish banks' perception on Turkish ship owners as with their high risky rates. Volatility of shipping market causes some difficulties on the ship owners and investors' side due to tightness of global demand. In response to increasing cost pressures and service requirements, ship owners and financiers are strategically collaborating to pool resources and information, aiming to achieve economies of scale (Akca, 2007). However, for Turkish ship owners or investors, there is a "*Self-Dealing*" position

against possible crises and most of Turkish ship investors who are to be ship owners tend to lend money from foreigners and therefore a huge amount of cash flow in ship investment are remitted into foreign banks or funds as re-payments. Financial strategy plays a crucial role in shipping companies as capital payments significantly influence their cash flow. Consequently, decisions regarding financial strategy hold great importance for company executives. This underscores the significance of ship finance in the field of shipping economics (Stopford, 1997). The operation of commercial ships is reported to contribute approximately \$380 billion to global freight rates, representing around 5% of total world trade. This substantial amount should not be overlooked, particularly when considering the economic growth of Turkey (UNCTAD, 2014).

Upon examining various ship finance systems worldwide, it becomes evident that multiple models are available to facilitate ship financing. These models are tailored to suit the specific needs of financing ships and can be structured through various entities such as ship mortgage banks, finance houses, commercial banks, investment and merchant banks, leasing companies, brokers, and shipbuilding credit schemes (Akca, 2007). In this chapter, the most popular ship finance systems in the world will be addressed and explained within whole good and bad sides. This chapter will be based on the main components of merchant shipping trade such as time charter rates and ship values' descriptive analyses within the possible effects of global shipping crises. As specific to financial development, the countries have been selected from worldwide which most are maritime advanced countries and their fleet capacities have also considered in order to search for the determinants of the model. By the aim of the research, special characteristics of Turkish shipping and finance will be explained with supportive analyses so that the best role model can be determined for Turkish shipping market.

Due to the substantial capital requirements and the high level of investment involved, ship financing plays a crucial role in determining the long-term sustainability of the shipping industry, which is renowned for its unpredictable earnings and volatile vessel prices (Stephen et al., 2013). When examining the financing options available to small and medium-sized shipping enterprises, bank loans emerge as the most significant source, providing these companies with prompt and flexible access to capital while allowing them to retain full ownership of their

business (Mao et al., 2012). Furthermore, it is evident that various institutions provide loans to the shipping industry, resulting in loan portfolios ranging from \$1 billion to \$20 billion (Stopford, 2002). Below figure shows the main phases of ship finance (Figure 3.11.):

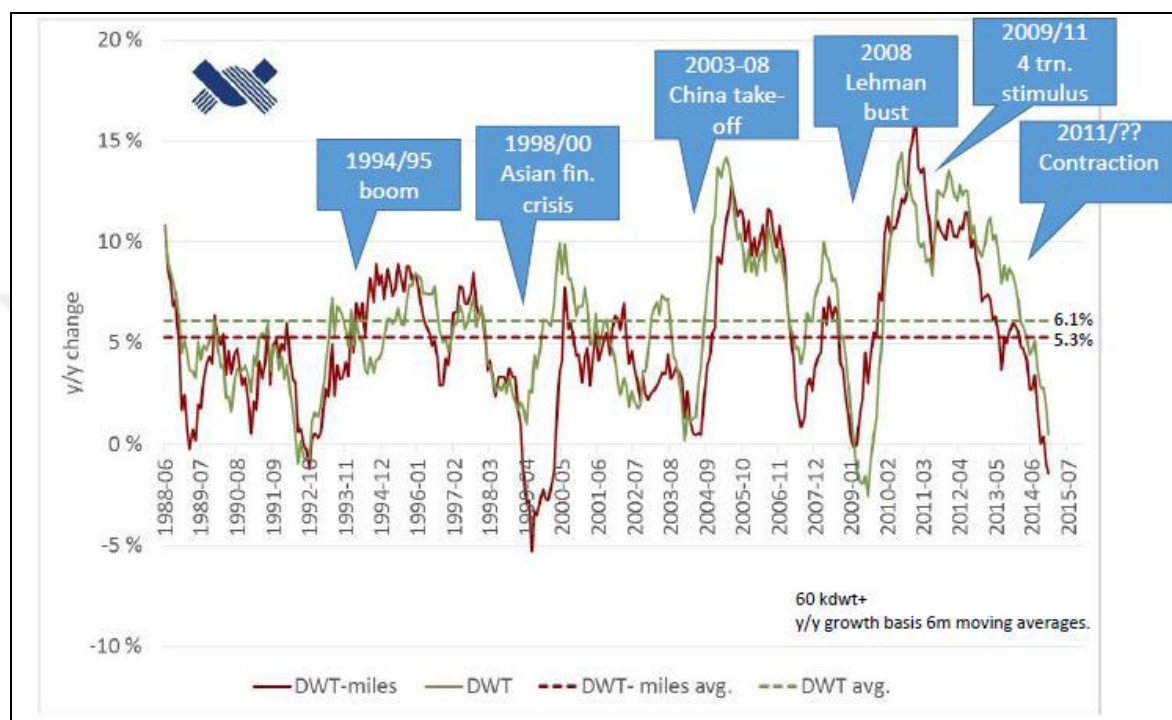


Figure 3.11. Phases of Ship Finance: Global Dry Bulk Demand & Annual Growth Rates

(Source: Fearnleys, 2015)

Based on the provided data, the evolution of finance in the maritime sector can be observed through the world demand for cargo ships and the corresponding world fleet size over the years. During the early stages of the cash period, there was an abundance of available cash in the market, eliminating the need to borrow from any authority. However, the challenge at that time was to identify profitable investments. In the charter back period, large corporations experiencing growing cargo volumes required larger ships and were willing to enter into long-term charters to acquire them. Independent ship owners utilized these charters as collateral to secure financing for new vessel construction, often registering them under cost-effective flags of convenience. Taking advantage of the expanding Eurodollar market, bankers were

eager to provide substantial loans based on the security of a time-charter agreement and ship mortgages. By the late 1960s, approximately 80% of the independent tanker fleet operated under time charters and carried significant leverage. In the bubble phase, owners commenced ordering ships on their own accounts in order to get profit from volatility of the spot market. Nevertheless, bankers deemed ship mortgages as satisfactory collateral and paid little attention to time charters. This approach adopted by banks disrupted the connection between supply and demand in the shipping industry. In 1980's which is called distress period, the world bank took shipping risk into account and changed the perspective. In the last phase which is convalescence, bankers and owners had to practice "rehabilitation" and it becomes unknown where it is needed for new investments in this high volatile market. (Stopford, 2002).

3.2 Achievement & failure stories of global ship financing

Ship finance is a truly global endeavor, extending beyond national borders. It involves banks from various countries financing the acquisition of large seafaring vessels, with ownership not limited to the borrower's home country. In fact, when it comes to larger ships and owners, it is common to see scenarios where, for instance, an American bank, operating through its London branch, provides funds to a shipping company controlled by Greeks and secures its position using a ship registered under the Liberian flag. While there may be some sense of loyalty to one's country, ship owners, who are accustomed to conducting international transactions in their daily operations, are unfazed by engaging with foreign lenders if they offer more favorable terms (French, 2006).

As per described in introduction section, many of countries have different types of ship finance systems, the most known funding system is German "*KG System*" which is partly supported by government but managed as a private corporation. German KG funds currently possess a fleet of approximately 1,700 vessels, with a significant portion comprising container ships that are leased to major shipping companies like Maersk Line of Denmark and Mediterranean Shipping Company of Switzerland. However, the economic downturn of 2008 resulted in a sharp decline in capital inflows to these funds. Ship managers were compelled to lay up numerous ships owned by KG funds and turned to investors for assistance in covering the storage costs. In Germany, ship-owning enterprises are predominantly

family-owned private businesses, similar to the situation in Turkey. These companies primarily oversee the day-to-day operations of the ships on behalf of KG funds, with their ownership stake in each fund being relatively small. In return for their management services, they receive a fee (Wright, 2011). One of the other popular funding system is Danish Ship Finance which is semi percently supported by government and keeps its successful position in such volatile sector with comprehensive policies covering more than 500 vessels in its loan (Danish Ship Finance 2014). In China and South Korea also governments support to ship funding with incentives, however management is performed by financial institutions (Maritime Advocate, 2013).

To handle our research problems, the study will be carried out among all those funding systems behind the research questions for Turkish maritime industry's development. Since there are no ship finance companies either private or government supported in Turkey, there are no previous studies in literature for Turkish ship finance. Comparing of all financial systems will provide a role model to Turkish government and Turkish ship owners or not limited to ship management, also for shipyard investment. However, by the evaluation of whole systems there will be some derivatives to make the market more certain in crisis situations. Future risks such as freight rate, operating and counter party will be effective to determine a ship investment as specific to Turkish ship owners' perception. A new follow-up model that will also continue after loaning such as management strategies, time charters of vessels and aggregation of high risky companies under one management, can be a future construction of shipping in Turkey. We aim that this study will complete the lack part of establishing Turkish ship finance system and will also take place a new model in ship finance literature.

3.2.1 German Kommenditgesellschaft (KG) funds

A significant form of shipping finance that is specifically associated with Germany is the limited partnership structure known as KG (Kommanditgesellschaft). The KG model was established in Germany during the 1970s as a means of raising private equity for financing various projects. KG funds operate as tax-driven entities in the form of German limited partnerships, attracting investments from private individuals who participate in single-purpose companies and leverage bank loans.

Due to its exemption from corporate tax, the KG structure is considered a more cost-effective financing option compared to traditional bank loans. KG financing encompasses diverse assets, including ships, real estate, aviation, renewable energy, natural resources, infrastructure, containers, life insurance policies, films, and media rights. The KG structure consists of two types of shareholders: the "Komplementar" (general partner) and the "Kommanditist" (limited partner). The general partner assumes unlimited liability for the KG's actions and undertakes management responsibilities, while the limited partner is solely an investor with liability limited to their share amount. There is no minimum capital requirement for KG partnerships. In the shipping industry, KG financing is used to acquire specific vessels, primarily containerships, which are then chartered to German owners. German banks provide debt financing for these acquisitions. Typically, in a KG financing arrangement, a ship owner will sell or assign the vessel to a KG fund or a special-purpose company, which will possess the vessel throughout the duration of the charter agreement. The fund, in its role as the facilitator, will engage in negotiations with banks and offer shares to a consortium of private German individuals who can use the investment to minimize their tax liabilities. The facilitator oversees the transaction and disperses dividends to individual investors. Following the sale of the ship, the fund or dedicated entity is then dissolved. The favorable tax incentives initially made this scheme highly popular, with estimations suggesting that around one-third of the world's container ships were financed through KG partnerships. However, the prolonged downturn in the shipping industry has severely impacted the KG system. In 2012, more than 150 single-ship funds declared bankruptcy, and an additional 500 to 1,000 funds are at risk of insolvency. As a result, investor confidence in the current KG financing model for shipping investments has waned, prompting shipping companies to explore alternative types and resources of ship financing. (KPMG, 2012).

The KG funding of shipping in 2006 was comparable to the previous year, although there was a greater diversification away from containerships. The primary factors impacting the KG market are changes in German tax legislation rather than shifts in the shipping industry. To ensure sustained investor interest and mitigate risks during market downturns, it is crucial to focus on high-quality transactions that yield good dividends. The current stagnation in the KG market stems from a lack of attractive investment opportunities rather than a scarcity of liquidity. The future outlook for KG financing appears promising, albeit with potential modifications to

time charter arrangements, including shorter initial charters and increased involvement in the spot market. KGs have a positive outlook as investors have achieved favorable returns. Present-day investors are more astute than when KGs were predominantly motivated by tax incentives; they now prioritize the underlying assets and market conditions rather than solely focusing on tax deductibles. For large liner companies, the choice between capital costs and the most cost-effective structure remains a determining factor (Matthews, 2006).

KG funds, which have historically focused on containerships, are now exploring alternative sectors such as tankers and bulkers. Additionally, a noteworthy development is the emergence of a secondary market for KG shares. Previously, these shares had limited options for sale, but they can now be traded. Currently, there are several platforms available to investors for trading KG shares (Macqueen, 2006).

3.2.2 Danish ship finance system

Danish Ship Finance operates as a ship finance institution, employing a straightforward and efficient business model centered around financing vessels through a primary mortgage. The company is under the supervision of the Danish Financial Supervisory Authority. Danish Ship Finance offers financing services to carefully chosen Danish shipowners as well as selected non-Danish shipowners. Additionally, the company engages in ship financing activities in the global market, as long as such operations do not unduly restrict its activities within Denmark. It caters to the funding needs of shipowners at various stages of the shipping cycle, providing both short-term and long-term financial solutions. Danish Ship Finance aims to establish itself as a reliable and capable business partner for its customers, financial counterparts, and other stakeholders.

Danish Ship Finance adheres to the balance principle, which requires that any potential shortfall in liquidity must not exceed the total capital available. This principle ensures that the company maintains sufficient liquidity to support lending activities over the entire loan duration, eliminating the need for constant refinancing of existing loans. By following this principle, Danish Ship Finance aims to become the foremost and reliable provider of financing solutions for esteemed shipowners, with a strong emphasis on stability (Danish Ship Finance, 2014).

Providing an overview of its financial structure, Danish Ship Finance reported its financial figures as of December 31, 2014. The company held loans amounting to DKK 43,347 million, with total assets reaching DKK 69,374 million, and equity standing at DKK 11,146 million, including proposed dividends for the fiscal year. Danish Ship Finance held first mortgages on 538 vessels. The company achieved a profit after tax of DKK 1,568 million for the year, marking a significant increase compared to the previous year's profit of DKK 477 million. This notable profit growth was primarily attributed to the reversal of prior-year loan impairment charges, which is deemed highly satisfactory. As of December 31, 2014, the capital ratio stood at 16.4% after accounting for proposed dividends. The tier 1 capital ratio also stood at 16.4%. The solvency need ratio of the company was 8.5% at the end of 2014, resulting in a solvency need buffer of 7.9 percentage points. Loans provided to Danish shipowners represented 32% of the total loans, excluding impairment charges. Loans to foreign shipowners were distributed among 58 shipowners across 20 countries. Danish Ship Finance maintained a favorable liquidity position, supported by bond issues and a liquid bond portfolio, ensuring sufficient coverage for all existing loans and loan offers until their maturity. The company experienced strong investor interest in its bonds, allowing for funding to be secured on competitive terms. Dividends totaling DKK 1,181 million are expected to be paid to shareholders, with Den Danske Maritime Fond receiving DKK 83 million.

Below figure shows the loaning portfolio of Danish ship finance by mortgaged percentage of total lending (Danish Ship Finance, 2014):

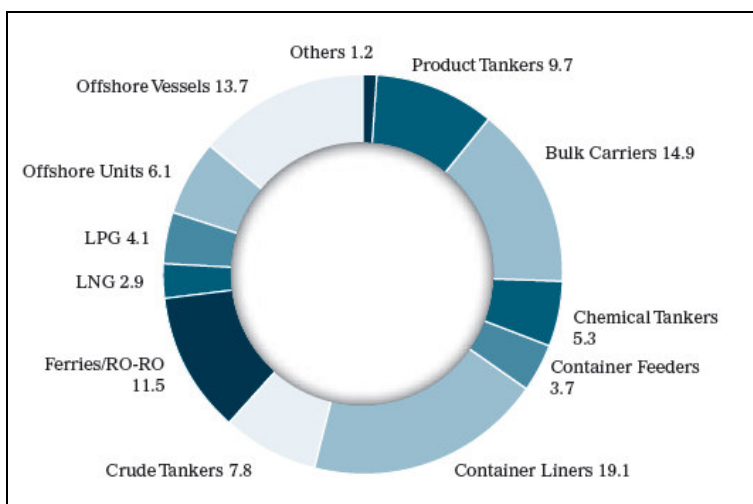


Figure 3.2.21. Loan Portfolio by Mortgaged Vessels Percentage of Total Lending

(Source: Danish Ship Finance, 2014)

It is seen that offshore vessels become having more ratio with their nearly value to bulk carrier types. Container vessels, crude tankers and product tankers have the biggest ratios after bulk carriers. This means container and liner shipping will be very important with the high demand of the market. It is also expected that crude tankers' percentage may increase in 2015 due to the decreasing oil prices in worldwide with a high demand to these types of vessels. However, LPG and LNG demand seem that it will not be increasing as much as crude vessels due to having more specific operating circumstances.

3.2.3 Other private equities, export-import banks and credit agencies

The decline in traditional bank lending has amplified the significance of export credit agencies and export-import (Exim) banks in the shipping industry. These agencies have strengthened their programs to support vessel financing, aiming to stimulate sector growth and facilitate deals. Notable credit and guarantee agencies involved in financing activities include Japan, the Republic of Korea, Brazil, Germany, and Norway. Between January 2012 and April 2013, these agencies collectively financed deals amounting to \$19.8 billion (Lloyd's List, 2013c). Conversely, the Export-Import Bank of China has allocated a larger portion of its resources to ship finance in order to assist shipowners in navigating the ongoing

crisis. With a shipping portfolio of \$12 billion in 2012, the bank is expected to increase its investment by 20 percent in 2013 (Barry S, 2013). Furthermore, it actively seeks partnerships with other ship financing banks to expand its exposure to syndicated shipping loans. The bank has also implemented a policy to promote funding for orders placed by foreign owners in Chinese shipyards, thereby supporting the shipbuilding industry. This approach was demonstrated through the contracts entered into in May 2013 with three Greek maritime firms: Diana Shipping, Angelicoussis, and Dynagas. These agreements involved the provision of financial assistance for the construction of advanced ships at shipyards in China (Chinadaily, 2013).

Private equity typically involves investing in the stocks of privately held companies. In addition to providing capital, investors actively participate as owners and offer strategic and managerial support to enhance the company's value, with the intention of selling it at a higher price. The core principle of value creation in private equity revolves around achieving growth and operational efficiency within the acquired companies. Given the challenging conditions in the shipping industry, numerous private equity funds have taken advantage of the restricted credit markets and historically low vessel values by investing in ships and shipping companies. These investments can take various forms, as outlined in the table below 3.2.31:

Table 3.2.31.

The Type of Investments in Shipping

1	Direct investment in companies by acquiring equity ownership
2	Provision of bridge financing and mezzanine financing to shipping companies that require short-term liquidity
3	Purchasing debt from operators or acquiring portfolios of vessels through debtor in possession arrangements
4	Engaging in sale-leaseback transactions, where shipping companies sell their vessels to leasing companies for a significant cash inflow and then lease the vessels back to continue their operations.
5	Establishment of joint ventures to acquire, manage, and eventually sell shipping businesses.

(Maritime Briefing, 2013)

Private equity interest in the shipping industry initially gained momentum at a slow pace, as numerous funds recognized the potential but opted to wait for the opportune moment to invest, aiming for the market's lowest point in the cycle. Due to the sector's cyclical nature and volatile charter rates, it does not conform to the typical targets of private equity investors. They perceive the sector as unattractive due to its inherent volatility and downside risks. However, recent developments, including a decline in asset prices, an array of investment opportunities, portfolio sales, limited availability of finance, and the belief that the market has reached its lowest point, have enticed a significant number of private equity firms to enter the industry. It is estimated that private equity investments accounted for approximately 2 percent of shipping companies' enterprise value in 2013. If alternative funding markets remain restricted, this figure could potentially double by the end of 2014 (Financial Times, 2013).

Significant advancements have been observed in shipping finance, particularly in 2013, with the expansion of private equity involvement and increased participation from institutional investors within the shipping industry. Private equity funds have shown keen interest in capitalizing on opportunities arising from tight credit markets, investing in shipping companies and vessels that have experienced historically low

prices since the global economic downturn (Arnsdorf and Brautlecht, 2014). These funds aim to sell or float their investments once the market rebounds. In 2013, private equity investments played a crucial role in the shipping industry, filling the void left by limited traditional bank financing available for select transactions. Notably, private equity firms engaged in purchasing shipping loan portfolios from banks, amounting to approximately \$5 billion (Arnsdorf and Brautlecht, 2014). For example, the Royal Bank of Scotland sold shipping loans worth hundreds of millions of dollars to hedge fund Davidson Kempner Capital Management, as well as private equity firms Oaktree Capital Management and Centerbridge Partners, all based in the United States (Financial News, 2014). Similarly, Germany's Commerzbank AG eliminated \$383 million in nonperforming shipping loans by selling 14 chemical tankers to a fund managed by Oaktree Capital Management (Arnsdorf and Brautlecht, 2014). Private equity and hedge funds have pursued various investment strategies, including direct vessel acquisitions and joint ventures with shipping experts. Oaktree Capital Management, for instance, partnered with Navig8 to establish a joint venture and order new vessels, recognizing the attractive prices of modern and fuel-efficient ships as valuable investment opportunities. The company placed an order for six chemical tankers from a shipyard in the Republic of Korea, scheduled for delivery in 2015. Other notable equity investments include Apollo Global Management's collaboration with Hamburg-based ship manager Rickmers Group to invest up to \$500 million in container vessels, and York Capital Management's joint venture with Greek shipowner Costamare Inc. to acquire five container ships for over \$190 million (Arnsdorf and Brautlecht, 2014). However, the growing interest of equity funds in the maritime sector may have significant implications for the industry. While the influx of finance has created new opportunities for shipowners, shipyards, and trade, it has also disrupted the fundamental dynamics of the market. With support from private equity and hedge fund financing, shipping companies have placed numerous orders, driven by the low cost of new vessels and the introduction of more efficient and cost-effective ships. However, once this additional capacity is delivered, it could disrupt the balance between supply and demand, posing risks to the industry's future prospects, especially considering the current fragile economic recovery and persistent oversupply of shipping capacity. A further imbalance in supply and demand would impact freight rates and increase volatility, as shipping companies would need to manage the new supply capacity in line with trade demand across various routes,

placing strain on their earnings. A similar scenario was observed during the ship ordering boom in the mid-2000s, which resulted in overcapacity following the severe impact of the global financial crisis on demand and trade flows. On the other hand, private equity may face challenges when exiting the shipping sector if it becomes less profitable and pessimistic. Nonetheless, appropriately targeted private equity investments present an opportunity for the shipping industry to enhance efficiency and for shipping companies to improve their financial stability, especially during times when cash is scarce or expensive (UNCTAD, 2014).

The expansion of private equity can have various implications on the shipping industry. In 2012, around \$65 billion in new equity and debt was needed to cover the orders of new ships, as well as sales and purchases of existing vessels. The gap increased to \$101 billion in 2013 and \$83 billion in 2014, which can be filled by private equity funds estimated to be worth \$1 trillion. This can help the industry create economic growth and jobs. The entry of private equity investment may lead to further consolidation in the industry. Due to the current challenging circumstances, carriers are struggling to make profits owing to an overcapacity of vessels, low demand, and high operating costs. Private equity investors may seek market consolidation to control the tonnage supply and costs, thereby achieving price discipline and economies of scale. Additionally, private equity funds may consider vertically integrating their investments into the shipping sector. This strategy could help them gain competitive advantages and control in a highly specialized maritime transport sector by integrating all parts of the transport value chain and logistics. Private equity funds that already have investments in several related activities could merge them into a capital-intensive industry like shipping.

3.3 Sensitivity of models against crises in global maritime economy

Official agency-supported financing has served as a reliable and consistent funding option for the shipping and offshore sectors over the years. However, since the financial crisis of 2008, the assistance provided by official agencies, particularly export credit agencies (ECAs), has become crucially important. Recent significant debt financings, including those for tankers, drilling rigs, and floating production, storage, and offloading units, have heavily relied on ECA support. Financing sources have experienced volatility in recent years, with the European debt crisis disrupting

capital markets, and banks adjusting their impact on to the shipping sector due to the financial crisis and evolving regulatory environment. In this context, ECAs have emerged as stable and dependable partners for shipyards and ship owners. Banks view the increased involvement of ECAs in shipping-related finance as a valuable risk mitigant, considering the capital-focused structure of the sector, and as a beneficial element in clients' overall debt structure. ECAs operate as economic policy tools with a mandate to support exports. They have dedicated teams of shipping and offshore experts who work in the best interest of the state while maintaining a commercial mindset and a deep understanding of industry dynamics and challenges across various shipping and offshore segments. Importantly, ECAs play a countercyclical role and tend to increase their activities during times of economic strain. Given the combination of economic uncertainty and changes in the financial sector, ECAs are now regarded as an indispensable funding source for the shipping industry. The proportion of shipping and offshore-related debt finance involving ECAs has risen from around 10% before the financial crisis to over a third of all current financing, with annual volumes reaching approximately US\$15 billion. Traditional key players in the shipping and offshore sectors, such as South Korea, China, Norway, Japan, and the Nordic countries, have largely maintained their dominant positions through the support of these government and quasi-government organizations.

Moreover, in the year 2000, publicly traded tanker companies had a market capitalization of a mere \$2.5 billion; however, presently, the figure exceeds \$21 billion. The stock market value of bulk carrier operators has skyrocketed from nearly zero to approximately \$6 billion (McGroarty, 2006). Shipping firms listed on the Nasdaq exchange successfully raised around \$1.7 billion through initial public offerings (IPOs) and \$328 million through secondary offerings in the past year. According to data from Lloyd's shipping economist, Asia boasted the highest number of listed shipping companies, with 77 companies, compared to 52 in Europe and 37 in the United States. The combined market capitalization in Asia stood at approximately \$60 billion, slightly lower than Europe's \$66 billion but significantly higher than the \$25 billion in the United States (Matthews, 2006). Over the recent years, private equity funds, newcomers to the industry, have displayed increasing interest and gained momentum in filling the void left by traditional bank financing. Between 2011 and 2012, private equity funds supported no fewer than 22 shipping transactions

totaling over \$6.4 billion in value (Maritime Briefing, 2013). This fresh source of capital is warmly welcomed by the sector, which has been grappling with stricter credit markets, low charter rates, and substantial losses since the economic and financial crisis.

On the other hand, to Danish and German “KG” fund system, “KG” system has been approved that it would be affected very much when a governmental control is not included in the financial system. Danish ship finance system is a good example that government controls all the financing process against a cause of possible crisis in shipping market of the country. Both systems can be used with a “*Win-win*” motto by the owners and financiers’ side; however, the mortgages of the ship investments will be well evaluated according to market risks.

Financial institutions utilize derivatives in specific sectors to mitigate the risks associated with the volatile shipping market. The market risk policy outlines the authorized types of derivatives that the company can employ and the intended purposes. These transactions are executed to hedge risks related to funding and lending, as well as to support investment activities. The derivatives are very significant for a financial company’s side so that they can evaluate the risks of each ship owner or operator according to volatile market. Hence, the presence of a loan agreement serves as a crucial connection between the bank and the borrower, who is often a ship owner. Achieving a mutually satisfactory agreement can be challenging, as loan officers and borrowers often hold divergent perspectives and conflicting interests.

3.4 Strategic ship investment

Investment strategy of a shipping company includes decision-making and to indicate the time and the method of purchasing new vessels and to increase number of vessels in the fleet. This decision-making involves the determination of available tonnage and when and how to sell the available capacity or purchase the new vessels as per market conditions by making the maximum profit in financial background (Revenko & Lapkina, 1997). Investors operating in shipping markets consistently encounter challenging and significant decision-making processes regarding the timing of investments and divestments. This complexity and volatility inherent in the shipping industry have led to a considerable focus on analyzing the dynamic behavior

of ship prices and their associated conditional volatilities in maritime economics literature. Previous studies in this field have predominantly relied on traditional approaches, employing general and partial equilibrium models that establish structural relationships among various variables, including orderbook, newbuilding deliveries, scrapping rates, freight rates, and bunker prices (Strandenes, 1984; Beenstock and Vergottis, 1989; Tsolakis et al., 2003).

The shipbuilding industry holds significant importance in ship investment. Over the years, this industry has undergone a process of adjustment. The industry is experiencing a rapid shift as the presence of relatively low-cost secondhand vessels exerts pressure on new construction prices. While certain shipyards are strengthening their positions, a substantial number of yards are struggling to secure new orders and maintain their operations. Approximately 20% of the global capacity, predominantly concentrated in China, is expected to be fully utilized within a year. Chinese shipbuilders, in particular, anticipate delivering 74% of their existing orders by the end of 2016. Consequently, the shipbuilding sector is anticipated to face challenges, especially during the years 2018 and 2019. It is estimated that the number of active new construction sites could decline to as low as 900 meters by the end of 2017, representing a significant reduction from the levels observed five years ago. This reduction in global capacity, amounting to approximately 20%-25%, is expected to exert downward pressure on new construction prices in the upcoming years (Danish Ship Finance, 2015 & 2016). On the other hand, there is an age profile which deals with the risk of trading volume remaining on several vessels in any region by regular dismantling of old ships. If the future demand fails to improve the supply-demand balance, it is almost inevitable that the vessels should be removed and put into the early hours. Most ship segments are positioned for continuous growth in all but not all shipping volumes. However, the elimination of systematic premature scrapping can lead to improvements in freight rates, ultimately establishing a new equilibrium between supply and demand. This approach seems to be the only viable option for gradually recovering capital without significantly devaluing young vessels due to the prevailing low freight prices.

Ship investment and decision-making are placed at the most strategic stage of ship owning, operating and management companies. There have been many variables which are depending on specific to segments of maritime transportation on the ships'

prices side. Some companies become successful and while some get failed. It is mostly seen that the companies which have an exact strategy on ship investment and managing cost efficiency have become more successful competitors in maritime transportation (Stopford, 2002). Strategic ship investment policies when the ship prices and freight market rates get decrease keep an important role on development of a company. On the operational side investment also gets help to increase shipbuilding market, flagging issues and cash flow between countries (Shneerson, 1983). There are specific segments such as bulk carriers, product tankers, chemical tankers, crude-oil tankers, LPG/LNG tankers, general Cargo vessels, container vessels, heavy-lift ships, Ro-Ro vessels and supply vessels as well as all constitute different market rates. The size and frequency of the fluctuations in the ships' sale/purchase and chartering market suggest that investment decisions of the companies have visibly influenced from the international trade market such as grain, industrial and petroleum production (Cullinane, 1995). Therefore, difference between market rates within different type of ships creates more volatility and the risk of companies increases. Numerous studies in maritime economics literature have explored the dynamic nature of ship prices and their conditional volatilities. Traditional methodologies for modeling ship prices have focused on analyzing the relationships among various factors, including newbuilding vessels, order volumes, scrapping rates, freight values, and bunker prices (Strandenes, 1984; Tsolakis, Cridland, Haralambides, 2003). However, management strategies are not calculated in previous studies as specific to ship types which are mostly owned vessels like tankers, general cargo, container vessels and bulk carriers.

Whereas the global side is so complicated, local ship owning and managing companies also are affected from this volatility due to the fact that the shipping is international. Providing the analysis based role model will help to develop shipping companies not to be entitled as "*Fish owners*" instead of "*Ship owners*" (Stopford, 1997). It is very easy to fail in shipping while becoming successful is very hard going. Therefore, this study reveals the need for a specific management strategy for ship owners, managers and operators including review of current market reports and analyse them in a simple methodology. Overall aim of the study is to maintain an illuminative process in order to make global maritime companies more competitive in global maritime industry.

3.4.1 Sell & Purchase Activities

The key factors influencing the decision-making process in ship buying and selling revolve around various indicators, including the technical and operational condition of the vessels, age management, projected lifespan, operating expenses, ship value, availability of financial resources, cash flow requirements, and the presence of bank credits and loans with their repayment schedules. Additionally, the anticipated cost of acquiring a new ship and the expected operating income over a specific period will also play a significant role in determining the buying and selling activities (Revenko & Lapkina, 1997). As a reference below table shows the ship prices as breakdown of diverse types of vessels as of August 2017 which may be indicative for the rest of 2017 as ship prices (Table 3.4.11):

Table 3.4.11.

Average Sale and Purchase Ship Prices Built in Far East (Fearnley, Intermodal & Allied Shipping, 2017)

Ship Types	Ship Tonnage	August/2017/ Ship Prices (Mil USD)	Lowest Price of 2017 (Mil USD)	Highest Price of 2017 (Mil USD)
VLCC	300'dwt	81.00	81.00	82.00
Suezmax	150'dwt	54.00	53.00	54.00
Aframax	110'dwt	44.00	44.00	45.00
Product	50'dwt	33.00	32.00	33.00
Capesize	180'dwt	44.00	41.00	44.00
Panamax	82'dwt	25.00	23.00	25.50
Supramax	64'dwt	23.00	21.00	23.00
LNGC	170'cbm- MEGI	184.5	184.0	184.5

In order to maintain operational stability, it is crucial for the company to procure a modern fleet and secure profitable contracts for its operations. The success of the latter is heavily reliant on effective managerial decision-making. The availability of tonnage is subject to natural aging, necessitating timely and efficient fleet renewal. Shipbuilding serves as the sole industry responsible for fleet rejuvenation. This industry involves substantial capital and labor investments, characterized by lengthy production cycles that bind resources for extended periods. Financing shipbuilding projects is a risky venture, demanding significant safeguards to safeguard both clients and banks against various risks throughout the construction phase. At this step, sale and purchase reportings keep utmost role to determine the market's course and the future. The below is an example of a weekly market report in sale and purchase field (Intermodal, 2017):

“The bulker bonanza continues in the SnP market, with candidates of the sector nearly monopolizing any buying interest out there, while prices for second hand prices are already reflecting the firm activity, with modern vessels enjoying most of the upside compared to average August prices. On the tanker side we had the sale of the “ORIENT SUNSHINE” (45,994dwt-bl’t ‘08, Japan), which was sold to Greek owner, Product Shipping & Trading, for a price in the region \$15.2m. On the dry bulker side we had the sale of the “ATLANTIC MOON” (82,100dwt-bl’t ‘12, Japan), which was sold to Norwegian owner, Songa Bulk, for a price in the region of \$20.5m.”

As seen above, market reports sometime may include the names of vessels which are sold or purchased with depending on the owners’ permission. Since there are many different tonnage of vessels trading in global seas, it is important to mention the tonnage of the vessels including the agreed and average selling price of the vessel. Additionally, vessels’ building places keep significant role, too. For instance, a Chinese vessel is relatively has less price than a Japanese vessel due to the constructional quality and engineering technologies. Ship owners must follow and well evaluate the latest condition of the market before stepping up to a new investment as selling second hand ships.

3.4.2 New Building Ships

New building ships also keep important role on ship investment and ship-building industry. Investing on new building vessels mostly shows the good condition of the market since owners tend to purchase new vessels rather than second hand vessels due to the high freight earning rates. Within considering over all, new building market must be also followed up by the owners or other investors as additional to the current market condition. According to the latest market outlook in the newbuilding sector, there has been a recent resurgence in firm newbuilding activity, particularly in the dry bulk sector. Dry bulk ordering has once again dominated the newly signed contracts. In addition, there has been an increase in orders for very large crude oil carriers (VLOCs), driven by long-term employment contracts with Vale. These recent VLOC orders bring the total number of such vessels ordered in the past few months to thirty. The increase in newbuilding activity presents potential challenges for the

Capesize market in the future. Currently, Capesize rates are at levels that discourage significant demolition activity, leading to expectations of minimal scrapping in this segment. Combined with a growing orderbook, this could potentially lead to an oversupply issue resurfacing in the near future. In terms of recent deals, Interocean, an Indian owner, has placed an order for one firm and one optional Kamsarmax vessel (82,000 dwt) at Yangzijiang shipyard in China. The price of the firm order is estimated to be around \$24.5 million, with delivery scheduled for 2018. As last, it seems further days will be very competitive for the bulk carrier investment in new building due to the increasing rates. However, tankers and containers also keep the moderate levels on the investment either.

3.4.3 Demolition/Scrapping Activities

Contrary to expectations of a correction in demolition prices, there hasn't been any significant decrease, and recent deals have been concluded at relatively high levels. There is even speculation that prices could further increase. Several factors contribute to the ongoing rally in demolition prices. The local currencies in the Indian subcontinent have remained stable, as have scrap steel prices. Additionally, cash buyers in the region have maintained their strong interest, particularly evident in Pakistan, where demolition prices have been climbing for the second consecutive week. While India and Bangladesh have not yet raised their bids, it is anticipated that they may need to align their prices closer to Pakistan's in order to maintain their market share. This adjustment is likely to occur once the tanker market reopens in those regions, assuming the price difference does not narrow. This week, average prices for tankers ranged from \$270 to \$430 per lightweight displacement ton (ldt), while dry bulk units received prices of approximately \$260 to \$405 per ldt.

3.4.4 Role of Government on Ship Investment

In previous literature, there seems a similar study has been carried out regarding Korean shipping policy years by years by Woo Lee. Woo Lee investigated the growth of Korean shipping within the scope of governmental incentives and policies as well as the systems. Throughout Korea's history, numerous investments have been made in the shipping industry. These initiatives include the establishment of a national shipping corporation in 1950, the implementation of the waiver system

in 1965, the establishment of a jointly funded Shipping Information Centre in 1962 by the government and shipping companies, as well as the provision of tax allowances. It is also seen that Korea has prepared 'development plans' as special to maritime and shipping industry in every five year (Woo Lee, 1990).

In developing countries, State intervention in shipping activities primarily stems from the financial fragility of the private sector, which hesitates to participate in an industry expected to yield low returns on investment. Given the capital-intensive nature of shipping and its modest profitability, private operators are drawn to more lucrative opportunities, leaving governments with the responsibility of providing adequate funding to ensure the viability of the sector. Recognizing the significance of shipping in the national economy, governments are compelled to intervene in order to stimulate economic activity. The extent and rationale behind government involvement in shipping may vary, but the overarching objective remains the promotion of economic growth.

The involvement of government in the private sector has consistently been a critical concern in fostering its development. Despite the fact that some researchers consider the government's role on shipping as an intervention, however there are also defenders of the idea of that shipping sector gets developed if well assisted by the government. By considering the overall, it is very clear on that governments keep the major role in shipping freight market. In contrast, numerous freight carriers face unequal competition due to the substantial subsidies provided by governments. For instance, in the realm of ocean freight, the Taiwanese government possesses a stake of over 30% in the vessel operator Yang Ming. The Chinese government exerted significant influence in the merger of Cosco Group and China Shipping Group, while South Korea's government recently declared its intention to extend \$5.7 billion in assistance to the nation's shipping companies through a state-backed vessel financing enterprise.

It is also seen the same situation in airlines. Etihad Airways is under the ownership of the government of Abu Dhabi, whereas Emirates is owned by the Dubai government, and Aeroflot is owned by the Russian government. Additionally, numerous post offices remain under government jurisdiction. With the decrease in mail volumes, post offices are facing growing competition in the parcel sector due to

the expanding influence of e-commerce, which is gradually encroaching on traditional retailers and other market participants.

The freight market poses significant challenges for competition due to uneven playing fields. However, it is important to acknowledge that governments play a crucial role in creating opportunities for freight carriers. They facilitate the opening of new trade routes and geographical areas, enhance infrastructure, and lower import/export expenses, thus contributing to the growth and development of the industry.

3.5 Maritime market practitioners

The international dry and wet cargo shipping market comprises individuals with diverse nationalities, knowledge, and backgrounds, mirroring the wide range of commodities, ship types, and sizes within the industry. However, it is possible to categorize these individuals into the following groups with a higher degree of certainty.

3.5.1 Charterers

Charterers are individuals or entities that engage in the chartering of ships for the transportation of commodities (ICS, 2012). The charterer category encompasses a wide range of entities, from individuals running small businesses focused solely on the transportation of specific commodities, to large international trading companies for whom involvement in the global dry and wet cargo markets represents only a small fraction of their overall operations. As a result, some charterers are involved in various aspects of global trade, including the purchase, sale, and transportation of diverse goods such as grains, fertilizers, minerals, crude oil, and more. These charterers may also have affiliations with industries such as manufacturing, mining, agriculture, shipping, or acting as receivers or shippers for specific commodities or geographic regions.

3.5.2 Shipowners

Ship owners are who purchase different kind of vessels and mostly set up their own fleets as well as manage all them. Ship owners mostly prefer to purchase second-hand vessels since the investment value is relatively less than in new-built vessels.

New-building vessels in nowadays usually constructed in Far Eastern ship yards such as China, South Korea and Japan. In previous years of shipping, European ship-building market was one of the key players in the sector, however, this perception has been changed due to cheaper prices of new-built vessels in Far Eastern shipyards. Particularly, most of the Turkish ship owners prefer second hand vessels or to built in Far Eastern shipyards, too. But, some of the ship owners in Turkey already have their own shipyards mostly in Tuzla region in Istanbul and trade their own-built vessels in worldwide.

From a different standpoint, a ship owner is an individual or entity that possesses the maritime asset. Ownership can range from single-ship owners to those with extensive fleets. Some ship owners are under state control or operate their vessels under the flag of their residing country. Alternatively, they may choose to register their ships in offshore jurisdictions known as flags of convenience. Flags of convenience refer to vessel registries provided by nations that offer registration services to ship owners who meet local requirements, irrespective of their nationality or place of business. Flags of convenience have attracted considerable criticism from various organizations both within and outside the shipping industry. While it is true that certain substandard vessels operate under flags of convenience, it is important to note that vessels flying national flags can be equally subpar. One common accusation against flags of convenience is that they permit ships to disregard international regulations. However, it is worth considering that every resolution and convention of the International Maritime Organization (IMO) requires the support of a specific number of nations representing a certain percentage of the global fleet for it to become legally binding. Without the backing of prominent flags like Panama, Liberia, Cyprus, and Malta—all of which are flags of convenience—none of the conventions would ever become enforceable. This highlights the significant proportion of the fleet registered under flags of convenience, particularly in terms of adhering to IMO regulations (IMO, 2016).

3.5.3 Operators

Operators typically consist of individuals or organizations with extensive knowledge and experience in the shipping market and its operations. Their primary objective is to generate income through the trading of ships and cargoes. Some

operators specialize in securing ships on charter from ship owners, aiming to lease the vessels to other charterers at higher freight or hire rates to generate profits. On the other hand, other operators focus on obtaining contracts for cargo transportation by chartering external ships at lower freight rates, enabling them to fulfill their commitments to the original charterers while also making a profit for themselves.

Some operators engage in simultaneous trading of both ships and cargoes by entering into medium or long-term charter agreements for vessels. This type of operation necessitates a high level of skill and accurate market forecasting for companies to optimize potential returns by making accurate predictions about the future market conditions. It is evident that being an operator entails a high-risk business environment where both profits and losses can be incurred. Despite the fact that many operators perform their undertakings perfectly well, it is also possible for other some to become bankrupt or being unable to lose their commitments.

Operators who engage in the practice of employing a ship and subsequently chartering it out for further business or in a different capacity are commonly referred to as "Disponent Owners" or "Timecharter Owners" (BIMCO, 2016). A disponent owner is a party that assumes the role of the shipowner through a timecharter agreement, thereby gaining control over the vessel. Some operators, after securing a vessel for a specific period, may fortuitously witness a substantial increase in freight rates that works to their advantage. In such cases, these operators may choose to re-charter the vessel to another charterer or operator, thereby ensuring a profitable outcome for the remaining duration of their commitment to the original shipowner.

3.5.4 Shipbrokers

Shipbrokers, operating within a diverse market of charterers, shipowners, and operators spanning various corporate sizes and nationalities, play a vital role in facilitating transactions between these parties. They serve as intermediaries, effectively identifying and matching the supply and demand for ships and cargoes. By doing so, they assist the key stakeholders in securing suitable cargoes for their ships and finding appropriate ships for their cargoes. In another definition, ship owners can be explained as the real estate brokers which integrate the house holders and the customers or a lubrication system that enables the market mechanisms to function.

Certain ship brokers are employed directly by shipowners or charterers with the specific task of arranging the appropriate tonnage or cargoes on their behalf. But, most of the brokers are separately working as exclusive or semi-exclusive basis which is totally called as exclusive brokers. Since brokers earn money from the commissions on the freight and tonnage of cargo that loaded/carried, competitive brokerage keeps very important role for the companies and brokers always try to fix new other vessels. In the event that negotiations do not result in a successful agreement, shipbrokers typically do not receive any payment despite the effort and expenses involved. Therefore, shipbrokers have a strong incentive to secure vessel fixtures, particularly with exclusive accounts. Exclusive brokerage arrangements allow brokers to fully utilize their professional expertise by providing continuous market information and expert advice. However, some principals may try to limit brokers to a purely dealer role when competing in the market. Although relying solely on exclusive accounts may not be feasible for most brokers, they often compete with others to generate additional income. In summary, the responsibilities of a ship broker encompass faithfully drafting the charter party to accurately document agreed-upon terms, handling any subsequent modifications or additions to negotiations between owners and charterers, managing communication between both parties, and facilitating financial transactions such as freight payments, voyage balances, hires, and laytime calculations.

3.6 Turkey's Perspective

Despite the fact that the export and import of the country is an influential factor in the economy in good terms, there is a need for infrastructure in terms of which logistics type the trade will be delivered to the final buyer. In recent years, innovative steps have been taken in our country with the strategy of "Master plan" regarding maritime transportation, road and air. In this context, it is necessary to participate in a number of measures such as forecasting future investments, determining the priority order of the steps to be taken, budget and time planning, coordination, cooperation-communication and performance evaluation (Trakya Kalkınma Ajansı, 2015). In order to support the meaningful regression analysis in the study, the index data included in the analysis was also examined by the individual explanatory analysis method and it was seen that it contains an overall increasing graph for our country. The rise in export-driven trade has a beneficial impact on the

overall well-being of society, leading to an elevation in the per capita national income (GDP per capita) (Figure 3.71.).

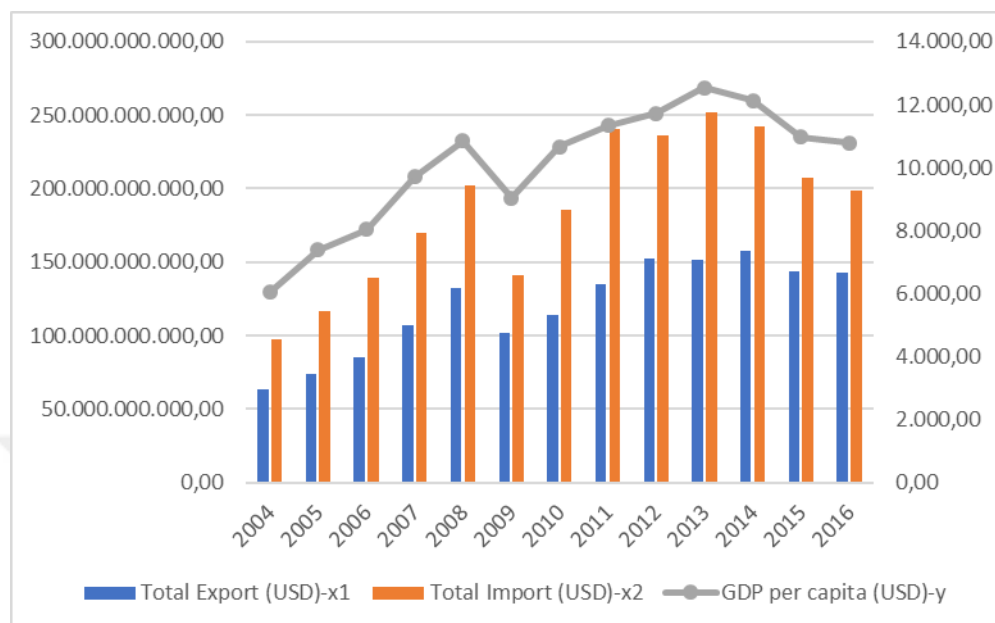


Figure 3.61. Total Export, Import and GDP per Capita Development (TÜİK & World Bank, 2015-2016)

Looking at the last 10 years, it is seen that the increase of linear exports and imports between 2004-2008 increased per capita national income. In this period, it is observed that the country is in a clearer economic policy with increasing export and import ratios. The global financial crisis that occurred in 2009 tended to decrease the foreign trade volume of Turkey as well as the world trade. It has been observed that maritime transport is the most affected by the global crisis and declining foreign trade, and that maritime freight rates have been at a relatively low level in 2008 since 2009, when many shipowners and operators declared bankruptcy (Clarksons, 2015).

On the other hand, past years have to be analyzed as a time series in a descriptive way, even though there is a meaningful relationship between the country of analysis and the economic openness of 2014 and the linkage of regular line transport. Firstly, the time series graph of the connection to the regular lines (LSCI) and the economic openness index calculated based on the 2004 annual data is as follows (Figure 3.6.1). According to this, although it is observed that the economic openness and the connection to the regular lines have increased in the period between 2005-2006, after the 2008 economic crisis which is the break point in the economy, it

is seen that both variables are in direct proportion to each other. The link to regular lines, which are in regular increase after 2008, has been affected by the decline in exports and imports in recent years, as seen in Figure 3.62. Establishing policies to increase foreign trade volume will ensure that the ports of the country are more connected to the regular transport routes as well as sea transport, and that the country's economy will be in a better position in such a cycle.

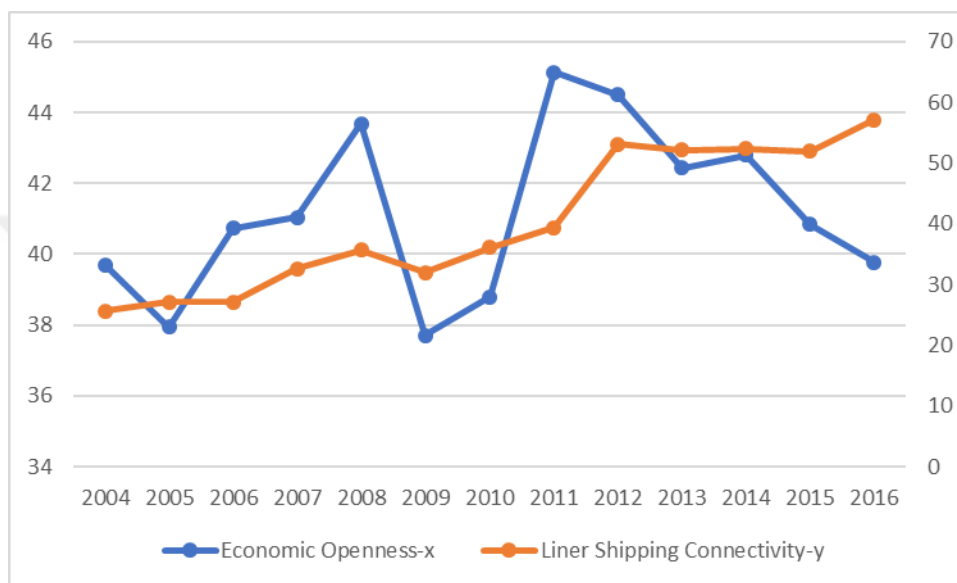


Figure 3.62. Economic Openness and Liner Shipping Connectivity of Turkey within Last 12 Years

(UNCTAD-World Bank, 2017)

Since the commencement of ship finance systems, Turkey could not have been a key player in shipping sector with its financial infrastructure. Increasing value of industrial production and demand to transportation bring out together the importance of shipping sector. In 1970s, there were “Cash-flow” ship owners in Turkey and the total assets were depending on the richness of that operator. By the 1980s and 1990s, a Turkish governmental ship owning company “*Deniz Nakliyat*” was the key player in worldwide maritime transportation and was being fully managed as a Turkish company. However, the world was changing in other hand. Industrialization became very important for a country and government could not handle to manage all fleet vessels by its own and specialization became necessary. Since 1990s, shipping market in worldwide became very volatile due to high value of import and export either for

Turkey. “*Deniz Nakliyat*” could not bear this volatility and sold many of their vessels to private ship-owning companies in Turkey (Biren F., 2004).

Since by the private shipping companies were arisen, there had been occurred a big opening to necessity of financial resources, too. Turkish flag ownership was become very difficult to handle high volume of taxes and lack of financial resources in Turkey and this made them to tend to foreign banks, equities and funding companies. Ship investments which are financed by foreign companies are still an unsolved problem for Turkish economy so that the money of Turkish shipowners go to a foreigner’s and this is an equivalent situation to import. When a ship investment’s value is considered, it is seen that ship prices are very high which are counted as million dollars. Some Turkish banks such as “Denizbank” and “Kocfinans” were financing Turkish shipowners new-building investments. However, due to bankruptcies of the companies or late payment backs of Turkish shipowners made these banks not to prefer Turkish shipowners for ship mortgages and credits. If a Turkish shipowner is only specific to ship owning operating and managing without any other related companies such as factories or shipyards, it becomes very difficult to stay on their feet against shipping market crises. Above restricted situation can be summarized in below figure 3.63.

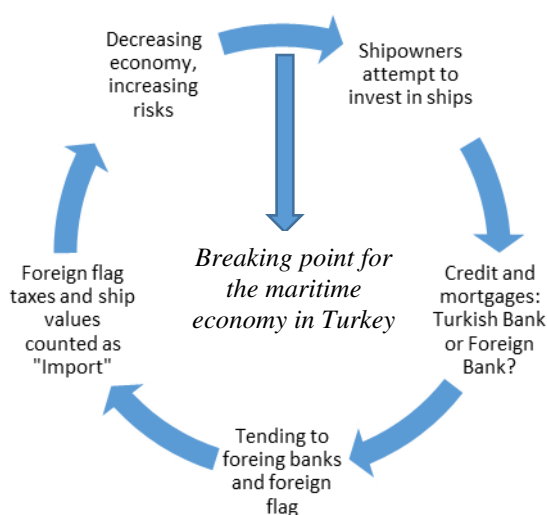


Figure 3.63. Cycle of Ship Investment and Market in Turkey

While the big fleet vessels owning companies are important, small shipping companies also very significant for especially liner sector. However, due to the over

numbered of these ship owning companies, make the increase of risks of back payments while a possible financial crises. Therefore, a collaboration of these companies under one hand management may decrease the risks and become on a very standing position in the economy even to the shipping crises. On the last few months, a new regulation has been approved by the government that small shipping companies which have old vessels and sailing in continental will have an incentive for scrapping their vessels and finance them for new-building vessels from Turkish shipyards to renew vessels and to improve the quality of the Turkish fleet. However, on the big size of vessels' owners' side especially for bulkers and tankers, still there is a lack of financial resources due to a lack of a governmental support and incentive. Rectifying of this absence will be explained in the following section as the conclusion of this study.

4. METHODS FOR ANALYZING SHIP INVESTMENT STRATEGIES

4.1 Methodology

As per reviewing the latest Maritime economics literature stated in introduction section, there have been found two basic methodologies to conduct economic researches between Maritime transportation indicators. One of them is fuzzy approach and the other one is statistical regression analysis. Since fuzzy approach is based on a qualitative methodology and restricted to make estimations on numeric values of shipping indicators, regression analysis which is based on quantitative technique has been selected as the main methodology of this study.

Regression analysis serves three primary purposes. Firstly, it is employed for prediction and forecasting, particularly when utilizing time series data. Secondly, it aids in modeling the correlation between various variables. Lastly, it facilitates hypothesis testing to determine the significance of relationships. There are many different types of regression analysis in the literature. Linear regression is one of the oldest types of regression which was designated almost 250 years ago. It can be used for interpolation with simple or multiple regression types as depending on the number of independent variables, however it is not suitable to make some predictions for future. Logistic regression is predominantly utilized in clinical trials, scoring systems, and fraud detection, particularly when the dependent variable is binary and can be

categorized as either "Yes" or "No". Ridge regression and Lasso regression analyses are more resistant than linear regression so that they put constraints on regression coefficients. Ecological regression involves conducting separate regressions within each stratum when data is divided into multiple large strata, groups, or bins. This method aims to identify causal relationships in a general sense. On the other hand, logistic regression is employed when all variables are binary, as in scoring algorithms. It is a more specialized variant of logistic regression that incorporates all variables in a binned format. As newly generated regressions, Bayesian, univariate and LAD regressions are more focused on error terms of coefficients however in practice they are not so useful as traditional regression analysis due to the fact that in this approach, prior knowledge is transformed into artificial priors (Vincent, 2014).

Since our data is defined as trade indicators as in Sec. 2.3 and all data is numeric, not binned; it is therefore the basis of what we will be talking in this study is multiple regression analysis which is a type of linear regression model. The model can be described as assuming "n" sets of observations $\{x_{1i}, x_{2i}, \dots, x_{pi}, y_i\}$, which constitute a random sample extracted from a broader population (Simonoff, 2011). It is presumed that these observations conform to a linear relationship expressed by the following equation (4.1.1):

$$(4.1.1) \ y_i = \beta_0 + \beta_1 x_{1i} + \dots + \beta_p x_{pi} + \varepsilon_i$$

By extending the concept of the two-variable population regression function, we can formulate a three-variable regression model in which Y represents the dependent variable, X₂ and X₃ denote the explanatory variables (or regressors), u_i represents the stochastic disturbance term, and i signifies the ith observation. It is important to note that the data in this context is not in the form of a time series, and the subscript t indicates the tth observation. Additionally, β_1 represents the intercept term. In the customary manner, the intercept provides the average impact on Y from all the variables that are not included in the model. However, its mechanical interpretation corresponds to the average value of Y when both X₂ and X₃ are set to zero (Gujarati, 2009). Please see below equation for the type of multiple regressions with two independent variables (4.1.2):

$$(4.1.2) \ Y_i = \beta_1 + \beta_2 X_{2i} + \beta_3 X_{3i} + u_i$$

There are of course many statistical analysis methods to indicate the effect of all variables on liner shipping connectivity index or fleet deadweight capacity. However, in this study, multiple regression analysis has been limited with two variables as first and conducted between all serial venue variables for 2016 as the latest reported year. Against the probability of multiple regressions' insignificance, also single regression combinations have been included into this study. In our analysis, the variables are indicated with different three combinations of simple and multiple regression analyses which have dependent and independent variables as follows:

Combination 1 (Multiple regression):

Y_i – Dependent variable / Liner Shipping Connectivity Index (LSCI)

X_{2i} - Independent variable / Economic Openness Index (EOI)

X_{3i} - Independent variable / Fleet Tonnage of Countries (Total Fleet)

Combination 2 (Simple regression):

Y_i – Dependent variable / Liner Shipping Connectivity Index (LSCI)

X_{2i} – Independent variable / Economic Openness Index (EOI)

Combination 3 (Simple regression):

Y_i – Dependent variable / Liner Shipping Connectivity Index (LSCI)

X_{2i} - Independent variable / Fleet Tonnage of Countries (Total Fleet)

In the following section, data types and their features will be explained more briefly before putting the combinations in multiple regression analysis. At this step, SPSS 23.0 has been used to determine the most suitable data as the selection process. This quantitative methodology will assist to find out the best ship investment model in global and also to find out the expectations of Turkish maritime sector. It will not be used for prediction however will assist to reveal some future suggestions which can be additional to support best ship finance and investment model for Turkish maritime industry.

4.2 Data

The data has been collected from UNCTAD database and selected between possible variables which may affect countries' national fleet capacity and their outlook to national shipping investment as well. According to Revenka & Lapkina

(1997), there are many factors while deciding the methodology on investment analysis. Fleet diversity and structure, cash flow, companies' governance and management performances and technological innovations affect the managerial decisions. In this study, the data has been selected between possible variables which may affect countries' national fleet capacity and their outlook to national shipping investment as well. Therefore, national fleet capacity of all countries in the World is selected as the first variable. As second, countries' connectivity into international shipping routes which was defined in section 2.3.1 with its calculation methodology as Liner Shipping Connectivity Index was selected as second variable. The third variable was the Economic Openness Index (EOI) which is a variable that includes total trade volume and total GDP value of countries. As additional to EOI, GNP per capita, total export and import values of countries were also selected for testing for normality to insert variables into a regression analysis as single and multiple. Beneficial ship ownership of countries also was tested to provide a different view to the research. All countries in the world which have all these defined variables' reports as of 2015, total 127 of them were selected including Turkey. As result of selection process, the data of nine different variables can be summarized as LSCI, EOI, GDP, GNP per capita, countries' ship total tonnage in deadweight, countries' beneficial ship ownership total tonnage in deadweight, total import, total export and sum of total export and import values were firstly tested in box plot graphics in SPSS 23.0 as first. In the countries' ship total tonnage in deadweight data some countries' values found very high and very low due to unusual flag regulations on owner taxes which is called "Flag of convenience" (Basak & Akkartal, 2015). The countries such as Panama, Marshall Islands and Malta mostly have the biggest tonnage at ownerships as foreign affiliates. For instance, Greek ship owners prefer to fly Marshall Islands or Panama flag instead of Greek Flag on their ships due to low ship owning taxes (Stopford, 1997). That is why, the biggest ship's register Marshall Islands was excluded from this study. As well as Marshall Islands, Sudan was also excluded from the study due to having the less value in fleet capacity as having almost zero. The values of variables did not include any percentage or volume ratios, all were numeric. However, when the distribution and extreme values difference between countries' LSCI, EOI, own and beneficial ship deadweight capacity are seen as not normal distributed, all data was decided to use logarithmic value based on 10 as napierian logarithm for all indicators in the hypothesis. By taking logarithmic values, data types were not

changed and still used as numeric type in SPSS 23.0. The application of natural logarithms to variables on both sides of an econometric specification is referred to as a log-log model. This particular model is beneficial when the relationship exhibits nonlinearity in parameters, as observed in our data log. By employing the log transformation, the desired linearity in parameters is achieved, resulting in similar outcomes. It is important to note that the log used in this context must be the natural logarithm based on 10. The practical advantage of using the natural log lies in the straightforward interpretation of the regression coefficients. The form of the log-log model can be summarized as below Eq. 4.2.1 (Pedace, 2015).

$$(4.2.1) \ln Y_i = \beta_0 + \beta_1 \ln X_i$$

In line with this model, the coefficients serve the purpose of assessing the influence of the independent variables (x) on the dependent variable (y), as customary. Within the log-log model, these coefficients represent the elasticity of the dependent variable within the context of linear regression. Specifically, the coefficient provides an estimate of the percentage change in the dependent variable corresponding to a unit change in the independent variable, or vice versa (Pedace, 2015).

Simonoff (2016) proposes that the log-log model captures a parabolic relationship between x and y , warranting an extension of the model to incorporate both linear and quadratic terms. The primary characteristic of this model is its multiplicative relationship, which aligns with proportional changes in the independent variable. Consequently, it enables the application of logarithms to both sides of the equation. Furthermore, the log-log model is suitable for analyzing monetary data or any data featuring extremely high or low values, as well as for investment analyses and estimating demand functions in trade. Calculus demonstrates that in the log-log model, the elasticity remains constant at β , earning it the moniker "constant elasticity model." Consequently, if constant elasticities are assumed, they can be estimated by the slope coefficient for price in a log-log regression model. Hence, a convenient interpretation of the slope in the log-log model is that, while holding all other factors constant, a 1% change in x corresponds to a $\beta\%$ change in y (Simonoff, 2016).

As the first step of our data interpolation, all variables' logarithm results have been descriptively analysed as box plot diagram in SPSS 23.0 and box plot graphs are as follows (Figure 4.21, 4.22, 4.23):

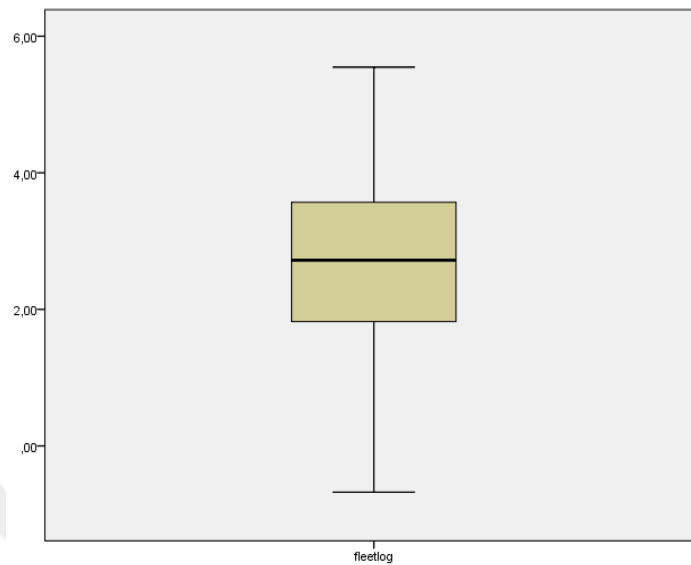


Figure 4.21. Box Plot Diagram of Merchant Fleet Capacities in 10 Based Logarithm

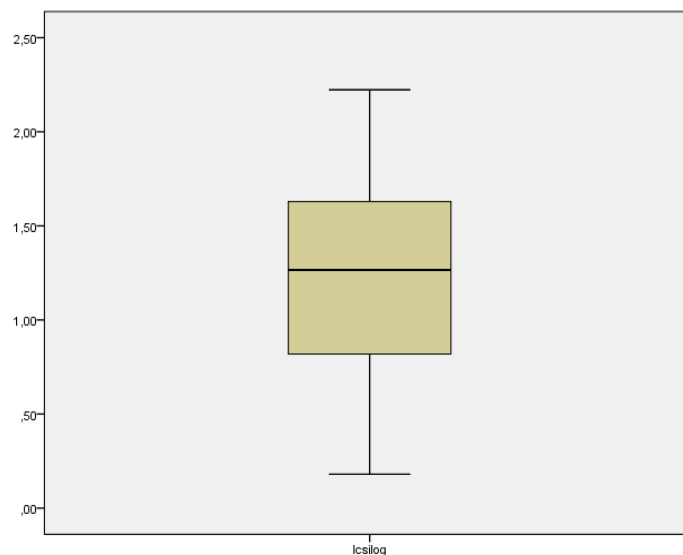


Figure 4.22. Box Plot Diagram of Liner Shipping Connectivity Index (LSCVI) in 10 Based Logarithm

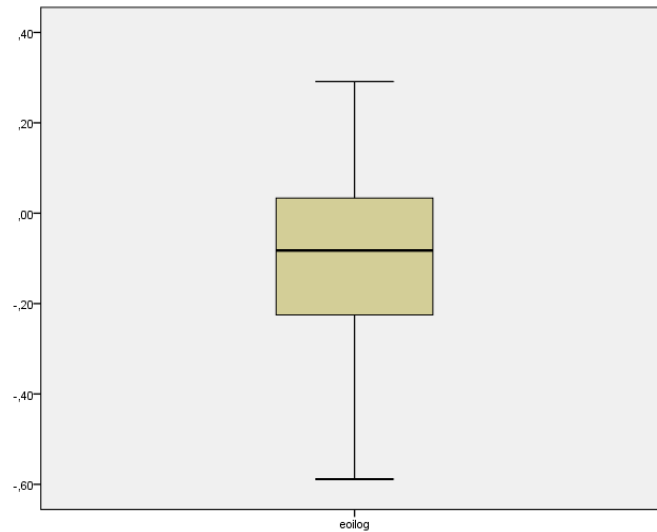


Figure 4.23. Box Plot Diagram Economic Openness Index (EOI) in 10 Based Logarithm

Above figures show that the log of fleet capacities, liner shipping connectivity and economic openness indices of 127 countries are placed within limitations and can be used for the further step as putting into regression analysis.

The logarithmic data have been analyzed in SPSS 23.0 with “Enter” method and regression analysis function has been used within a summary of analysis as in below tables 4.21, 4.22, 4.23 and 4.24:

Table 4.21.

Summary of multiple regression analysis

REGRESSION
/MISSING LISTWISE
/STATISTICS COEFF OUTS CI(95) R ANOVA COLLIN TOL CHANGE
/CRITERIA=PIN(.05) POUT(.10)
/NOORIGIN
/DEPENDENT lcsilog
/METHOD=ENTER fleetlog
/PARTIALPLOT ALL

Table 4.22.

Summary of simple regression analysis

REGRESSION
/MISSING LISTWISE
/STATISTICS COEFF OUTS CI(95) R ANOVA COLLIN TOL CHANGE
/CRITERIA=PIN(.05) POUT(.10)
/NOORIGIN
/DEPENDENT lcsilog
/METHOD=ENTER fleetlog
/SCATTERPLOT=(*ZRESID ,*ZPRED)
/RESIDUALS DURBIN.

Table 4.23.

Entered variables – multiple regression in SPSS 23.0

Variables Entered/Removed^a			
Model	Variables Entered	Variables Removed	Method
1	eoilog, fleetlog ^b	.	Enter

a. Dependent Variable: lcsilog

b. All requested variables entered.

Table 4.24.

Entered variables – single regression in SPSS 23.0

Variables Entered/Removed^a			
Model	Variables Entered	Variables Removed	Method
1	fleetlog ^b	.	Enter

a. Dependent Variable: lcsilog

b. All requested variables entered.

The results of regression analyses will be stated in 4.3 Testing Hypothesis section as including different types of test methods to be used in this log-log multiple regression analysis.

4.3 Testing Hypothesis

In the multiple and single regression analysis four different tests have been selected to be used. The main test is normality test which explains probability and

significance of the variables in the regression analysis. On the other hand, the model's multicollinearity, heteroscedasticity and auto-correlation tests also have been used and criterias, definitions and significance levels of these tests will be briefly included as sub sections of 4.3. Additional, the model's general regression results have been indicated as follows (Table 4.31) and test results of the regression will be defined as in separate sub titles.



Table 4.31.

Notes/results of multiple regression

Output Created	24-MAR-2016 22:27:45	
Comments		
Input	Active Dataset	DataSet33
	Filter	<none>
	Weight	<none>
	Split File	<none>
	N of Rows in Working Data	127
	File	
Missing Value Handling	Definition of Missing	User-defined missing values are treated as missing.
	Cases Used	Statistics are based on cases with no missing values for any variable used.
Syntax	REGRESSION /MISSING LISTWISE /STATISTICS COEFF OUTS CI(95) R ANOVA COLLIN TOL CHANGE /CRITERIA=PIN(.05) POUT(.10) /NOORIGIN /DEPENDENT lcsilog /METHOD=ENTER fleetlog eoilog /PARTIALPLOT ALL /SCATTERPLOT=(*ZRESID ,*ZPRED) /RESIDUALS DURBIN.	
Resources	Processor Time	00:00:01,25
	Elapsed Time	00:00:01,25
	Memory Required	2912 bytes
	Additional Memory Required for Residual Plots	288 bytes

Table 4.32.

*Notes/results of single regression***Notes**

Output Created		24-MAR-2016 22:12:39
Comments		
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	Weight	<none>
	Split File	<none>
	N of Rows in Working Data	127
	File	
Missing Value Handling	Definition of Missing	User-defined missing values are treated as missing.
	Cases Used	Statistics are based on cases with no missing values for any variable used.
Syntax		REGRESSION /MISSING LISTWISE /STATISTICS COEFF OUTS CI(95) R ANOVA COLLIN TOL CHANGE /CRITERIA=PIN(.05) POUT(.10) /NOORIGIN /DEPENDENT lcsilog /METHOD=ENTER fleetlog /SCATTERPLOT=(*ZRESID ,*ZPRED) /RESIDUALS DURBIN.
Resources	Processor Time	00:00:00,52
	Elapsed Time	00:00:00,50
	Memory Required	2448 bytes
	Additional Memory Required	8 bytes
	for Residual Plots	

4.3.1 Normality Tests

In the literature, various tests of normality are discussed, but for the purpose of this study, we will focus on three specific tests: the histogram of residuals, the normal probability plot (NPP), and the Jarque-Bera test. The histogram of residuals is a straightforward graphical tool used to gain insights into the distributional shape of a random variable. It involves dividing the values of the variable of interest into appropriate intervals on the horizontal axis and constructing rectangles with heights corresponding to the number of observations in each interval. Plotting the histogram of residuals is a widely accepted practice to conduct a preliminary assessment of the normality assumption. The normal probability plot, on the other hand, displays the values of the variable of interest on the horizontal x-axis and indicates whether the data follows a normal distribution or not on the vertical y-axis. Another approach, the Jarque-Bera test of normality, is a large-sample or asymptotic test that calculates measures of skewness and kurtosis for residual statistics (Gujarati, 2009). The normality test results are shown in below tables 4.3.11 and 4.3.12:

Table 4.3.11.

Residual statistics multiple regression

Residuals Statistics^a

	Minimum	Maximum	Mean	Std. Deviation	N
Predicted Value	,7272	1,6425	1,2270	,19916	127
Residual	-1,25270	,74540	,00000	,41978	127
Std. Predicted Value	-2,510	2,086	,000	1,000	127
Std. Residual	-2,960	1,762	,000	,992	127

a. Dependent Variable: lcsilog

Table 4.3.12.

*Residual statistics single regression***Residuals Statistics^a**

	Minimum	Maximum	Mean	Std. Deviation	N
Predicted Value	,7826	1,6296	1,2270	,18484	127
Residual	-1,24717	,68431	,00000	,42628	127
Std. Predicted Value	-2,404	2,178	,000	1,000	127
Std. Residual	-2,914	1,599	,000	,996	127

a. Dependent Variable: lcsilog

Table 4.3.13.

*Coefficients and significancies multiple regression***Coefficients^a**

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
1 (Constant)	,847	,082		10,289	,000
fleetlog	,134	,028	,392	4,822	,000
eoilog	-,373	,190	-,160	-1,967	,051

a. Dependent Variable: lcsilog

Table 4.3.14.

Coefficients and significancies single regression

Coefficients ^a					
Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	,875	,082		10,672	,000
fleetlog	,136	,028	,398	4,848	,000

a. Dependent Variable: lcsilog

Above results show that significance of logarithmic fleet capacity, constant and Liner Shipping Connectivity Index (LSCI) are below limits of 0.05 as per probability limit. However, logarithmic Economic Openness Index (EOI) is at the limit value of 0.05 by having a 0.051 significance level. In order to continue to the next step of the analysis testing, EOI must be excluded as a variable and the regression must be carried out between logarithmic fleet capacity and LSCI value. Therefore, normality test and the following tests will be performed according to simple regression analysis which is predicted to deem the best equation at all. This means our previous combinations which are described in section 4.1 is found as null and the combination 3 will be continued with analysis of LSCI and national fleet capacities in basis 10 logarithm.

Combination 3 (Simple regression):

Y_i – Dependent variable / Liner Shipping Connectivity Index (LSCI)

X_{2i} - Independent variable / Fleet Tonnage of Countries (Total Fleet)

Since normality tests of the variables have been described in the first part of this section, all data is found as significant to proceed with other regression tests such like multicollinearity, heteroscedasticity and auto-correlation which will be followed in further sections.

4.3.2 Multicollinearity

Multicollinearity refers to the presence of a "perfect" or exact linear relationship among one or more explanatory variables in a regression model. In a regression with k variables, denoted as $X_1, X_2, \dots, X_k$ (where $X_1 = 1$ for all observations to account for the intercept term), an exact linear relationship is considered to exist if a specific condition is met. Typically, if the variance inflation factor (VIF) of a variable exceeds 10, indicating that its corresponding R-squared value (R^2_j) exceeds 0.90, the variable is considered to be highly collinear (Ragnar F., 1934).

Table 4.3.21.

Multicollinearity coefficients of single regression

Model	95,0% Confidence Interval for B		Collinearity Statistics	
	Lower Bound	Upper Bound	Tolerance	VIF
1 (Constant)	,713	1,037		
fleetlog	,081	,192	1,000	1,000

a. Dependent Variable: lcsilog

In our single regression analysis, multicollinearity test results show that VIF value is 1.00 and under the limitation of 5.00 which is assumed as significant.

4.3.3. Heteroscedasticity

In the absence of any prior or empirical knowledge about the presence of heteroscedasticity, a common approach is to initially conduct the regression analysis assuming the absence of heteroscedasticity. Subsequently, a thorough examination of the squared residuals ($\hat{u}_i^2$) can be performed to identify any systematic patterns. Although the squared residuals ($\hat{u}_i^2$) are not equivalent to the original squared errors (u_i^2), they can serve as proxies, particularly when the sample size is sufficiently

large. By inspecting the patterns exhibited by the squared residuals ($\hat{u}_i^2$), potential indications of heteroscedasticity can be identified, as demonstrated in Figure 4.3.31 (Ragnar F., 1934):

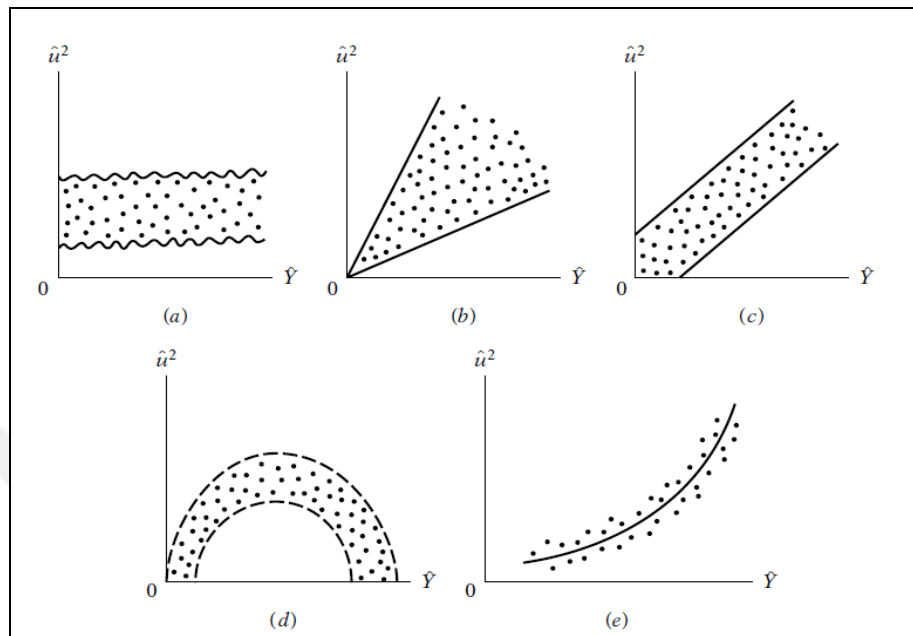


Figure 4.3.31. Heteroscedasticity Distribution and Shapes

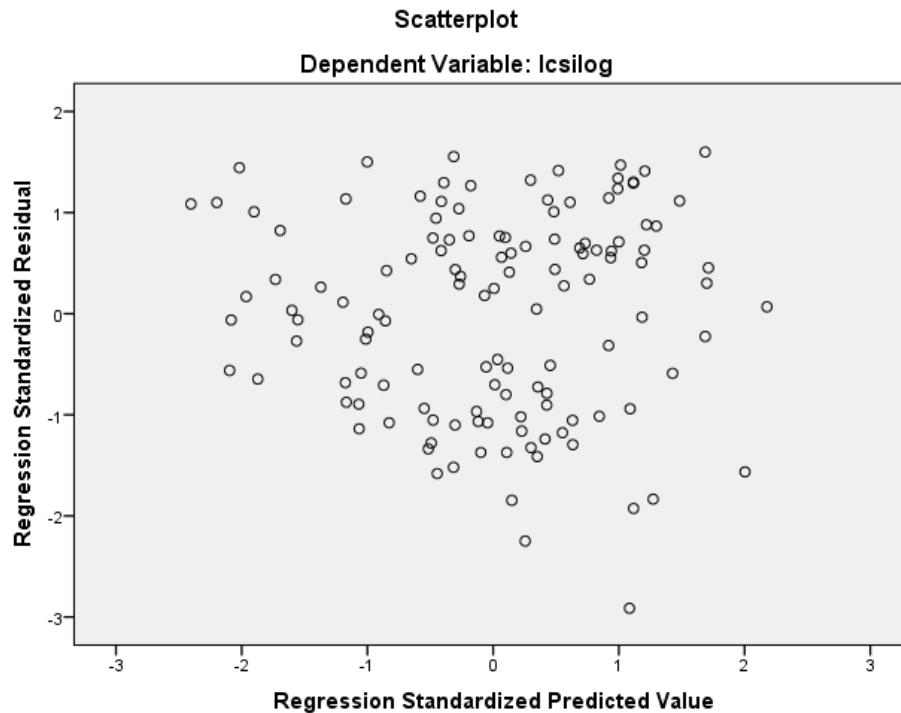


Figure 4.3.32. Scatterplot Diagram of the Model

In our scatterplot graph of regression analysis, it is found that the distribution of the data does not have a funnel type. Therefore, the data will be assumed as significant to proceed with further tests.

4.3.4 Auto Correlation

Autocorrelation refers to the correlation between consecutive observations in a time series or cross-sectional data. In the context of regression analysis, the classical linear regression model assumes the absence of autocorrelation in the error terms. A widely recognized test for detecting serial correlation is the Durbin-Watson d statistic, developed by statisticians Durbin and Watson. This statistic, defined as the ratio of the sum of squared differences in successive residuals to the residual sum of squares (RSS), is commonly used to assess the presence of autocorrelation. It is worth noting that the numerator of the d statistic considers $n-1$ observations due to the loss of one observation when taking successive differences. A major advantage of the d statistic is its reliance on estimated residuals, which are routinely computed in regression analysis. Consequently, it has become customary to report the Durbin-Watson d alongside summary measures such as R^2 , adjusted R^2 , t , and F . However, it is crucial

to acknowledge the assumptions underlying the d statistic despite its widespread usage.

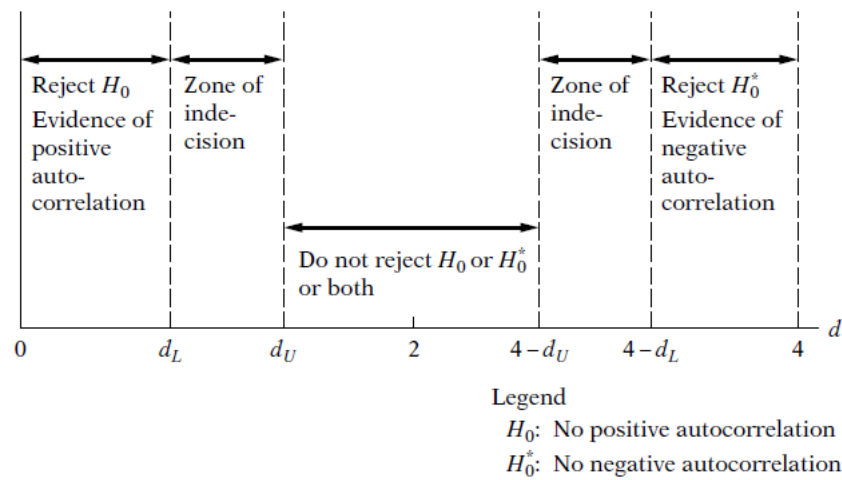


Figure 4.3.41. Significance Interval of Durbin-Watson Statistics

In Durbin-Watson test, the result has been found as 2.144 and placed as between the significance level of 1.80 and 2.30. Despite it is relatively near the value 2.30 rather than the least value of 1.80, in this study it meets the criteria and considered as significant to issue the model of the analysis.

Table 4.3.41.

Durbin-Watson test result of regression analysis

Model	Change Statistics			
	df1	df2	Sig. F Change	
1	1	125	,000	2,144

a. Predictors: (Constant), fleetlog

b. Dependent Variable: lcsilog

5. RESULTS AND RECOMMENDATIONS

As per model summary, R square ratio is also calculated as 16% and has a less value, however it can not be disregarded due to other tests' significance levels are well compliant with the whole model.

Table 5.1.

Model summary/significance results (R square)

Adjusted R Square	Std. Error of the Estimate	Change Statistics	
		R Square Change	F Change
,152	,42798	,158	23,501

Table 5.2.

Collinearity diagnostics breakdown

Model	Dimension	Eigenvalue	Condition Index	Variance Proportions	
				(Constant)	fleetlog
1	1	1,886	1,000	,06	,06
	2	,114	4,071	,94	,94

a. Dependent Variable: lcsilog

As seen in herebelow ANOVA table, the overall equation seems significant since it shows value of 0,000^a significance and null hypothesis is rejected for the equation.

Table 5.3.

ANOVA table

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	4,305	1	4,305	23,501	,000 ^b
	Residual	22,896	125	,183		
	Total	27,201	126			

a. Dependent Variable: lcsilog

b. Predictors: (Constant), fleetlog

It is already been summarized in section 4.3.1 with Table 4.3.14 for the analysis results of the coefficients of dependent and independent variables. Thus, the model of intended equation will be as in following for this study:

$$\ln(y_i) = \ln(0.875) + 0.136 \ln(x_i) + \epsilon_i \quad (5.1)$$

(0.082) (0.028)

The above model shows that deadweight tonnage of merchant fleet of countries can be used to predict the possible liner shipping connectivity of countries in a 10 based logarithmic scale. Countries and ship owners can use the basic regression model in order to estimate necessary investment and budget planning while maintaining development, investment strategies or master plans.

In this model, the coefficients play a crucial role in assessing the impact of independent variables (x) on the dependent variable (y) in the usual manner. The coefficients in the log-log model reveal the elasticity of the dependent variable within the framework of linear regression. Specifically, these coefficients indicate the estimated percentage change in the dependent variable given a proportional change in the independent variable, or vice versa (Pedace, 2015). According to Simonoff (2016), the log-log model elucidates a parabolic relationship between x and y, suggesting that the model can be enhanced by incorporating both linear and quadratic terms. The primary characteristic of this model is its multiplicative relationship, which aligns with proportional variations in the independent variable. Consequently,

the model allows for the logarithm of both sides of the equation. Moreover, this model is particularly suitable for monetary data, data with extremely high or low values, as well as investment analyses and the estimation of demand functions in trade. Calculus demonstrates that the elasticity remains constant (denoted as β) in the log-log model, earning it the moniker "constant elasticity model." Under the assumption of constant elasticity, the slope coefficient for price in a log-log regression model can be used to estimate elasticities. As a result, a convenient interpretation of the slope in the log-log model is that, with all other factors held constant, a 1% change in x corresponds to a $\beta\%$ change in y (Simonoff, 2011).

There have been variations between different kind of segments however the shipping industry is currently going in a downward trend. The log-log model shows there is a direct impact on liner shipping connectivity and the total national fleet capacities of countries and the governments should consider to provide incentives on the correct investment type for ship owners/managers. For instance, dry bulk sector has seen the deepest levels in 2006, however, owners still continued to invest in new dry bulk ships without analyzing the total national and beneficial fleet status, port capacities and also the liner shipping connectivity. Due to the fact that liner shipping is more likely related with container fleet development, the study can be widened with specifically to the other segments. In this study, inserting the whole tonnages of national and beneficial owned fleet will provide a global-based thought on fleet development of countries not by considering the only national development. The ship owners/managers which fly foreign flagged vessels and their participation in import and export activities from/to Turkish ports also keep significant role on development of liner shipping.

In the model fleet capacities which assumed as independent variable have a logarithmic value of 0.136 and show that the effect of the fleet capacities on to liner shipping is not too much, however it also can not be disregarded. Constant of the equation is also logarithmic based and has the value of 0.875 which reduces the errors of the model. To make further forecasts with the above model world fleet development, freight rates, time-charter rates, commodity/oil prices, import/export volumes, economic openness levels, GDP/GNP, existence of new shipping routes and technological changes also should be taken into account as the unknown assumptions of the model. Therefore, a deeply shipping fleet analysis is necessary to incite the

companies on investment or scrapping on the side of government. Maritime economy must be started as national strategy first and to be continued with global side. A brief overview of the global fleet development reveals that tanker segments have experienced favorable rates, while containers, dry bulk, and offshore vessels have encountered challenges in managing a substantial influx of new vessels amidst dwindling demand. Crude and product tankers have benefitted from heightened trading activity, influenced by various factors including low oil prices and the establishment of new refineries. However, concerns are emerging for other segments of the market due to the fragile demand outlook, a significant order book, and a limited number of apparent scrapping opportunities.

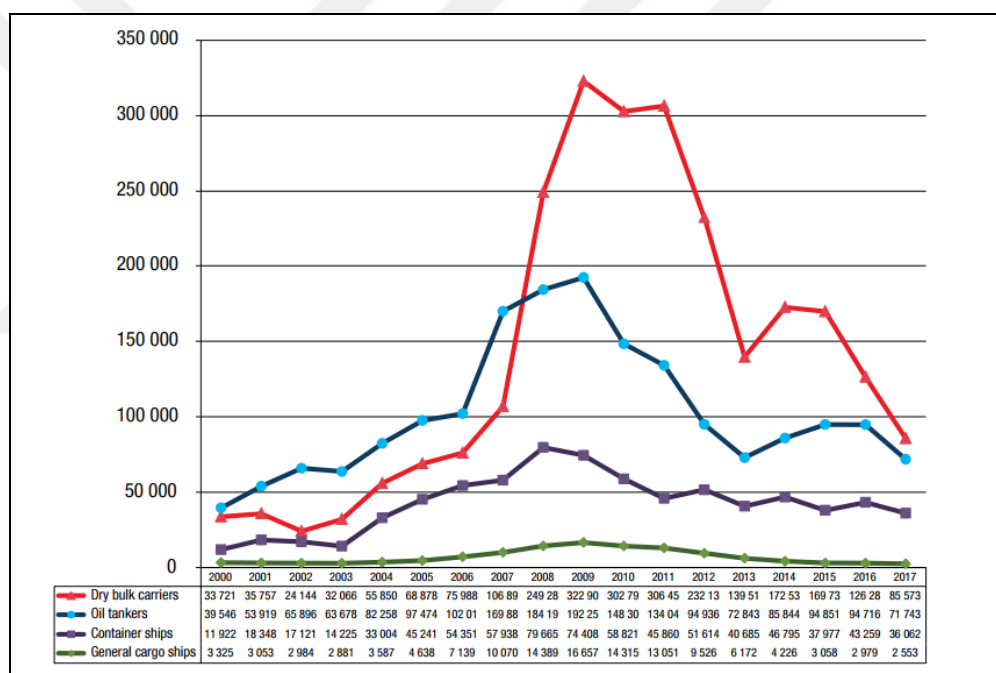


Figure 51. Ordered World Tonnage between 2000-2017

(UNCTAD & Clarksons, 2017)

The primary concern lies not only in the size of the orderbook but also in its delivery schedule. The orderbook is anticipated to be distributed evenly over the next three years, which would facilitate the integration of new vessels. However, the orderbook is heavily concentrated in the near term. In fact, more than 70% of the orderbook is slated for delivery before the end of 2016 (see Figure 51). Typically, larger vessels offer cost advantages per transported unit and are favored for long-

distance voyages. Nevertheless, economies of scale diminish if the vessel operates below its full capacity. Hence, it is crucial to maintain an average vessel size that aligns with global demand requirements. Considering the current global economic landscape, where emerging economies with large populations but limited disposable incomes are replacing previous growth powerhouses, we are apprehensive that the size of the existing fleet and vessels on order reflects outdated market conditions rather than future prospects. Our World demand indicators section emphasizes the expectation of stagnant or declining seaborne trade volumes in the next five years. Therefore, it is essential to consider new strategies to improve national fleets and manage the fleet distribution on a government supported strategic development.

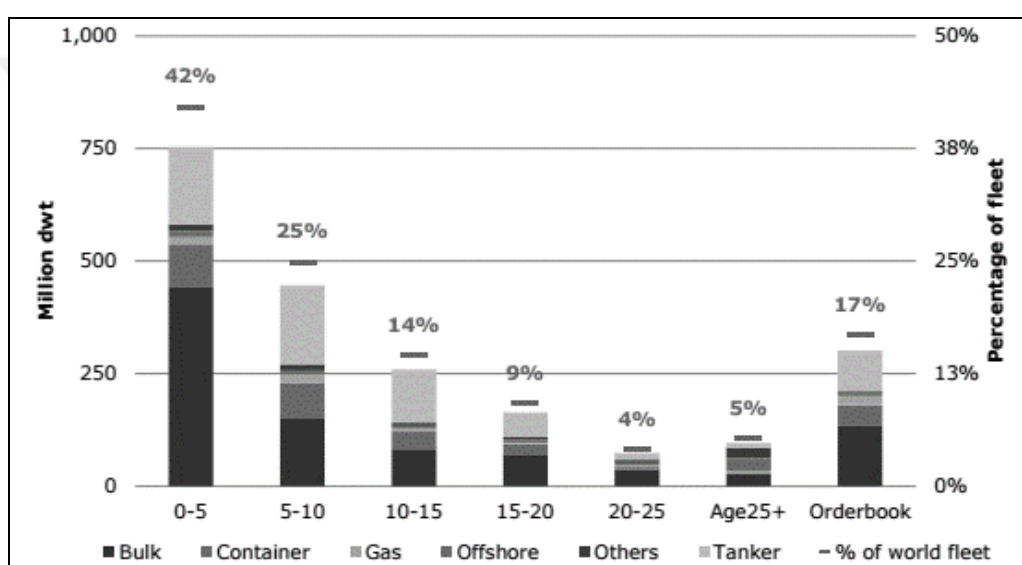


Figure 52. The World Fleet and Age Distribution

Sources: Clarksons & Danish Ship Finance, 2015

When an outlook to the worldwide fleet structure by ages, it is still seen that bulk carrier segment has the utmost ratio in global fleet even though the demand to bulk carrier ships still remains the same. 42% ratio of vessels have been found as between age of 0 and 5 which have relatively younger age. This means that almost half of the world fleet has younger ages than the remaining and this situation causes an increase on competition of young ships are alternative for charterers with their well based technical conditions. Therefore, our model can be specifically repeated according to the age scale of different kind of ships, for instance which type of and which age of ships mostly affect the liner shipping. Their participation to liner

transportation can be measured for further studies as additional to our mentioned model.

CONCLUSION

As a result, the field of shipping finance is experiencing ongoing expansion, driven by the growing demand for services within the global shipping industry. However, it is important to recognize that shipping markets are characterized by cyclical fluctuations and significant volatility, and the current exceptional market conditions are unlikely to persist indefinitely. In this context, the involvement of private equity funds and government-backed ship finance institutions plays a crucial role in fostering the sector's growth and can influence its trajectory in various ways, such as facilitating consolidation and vertical integration of transportation services. This necessitates efforts to enhance the sector's efficiency and promote the development of financially robust companies. While the investment horizon in foreign ship finance companies and/or banks is typically between three and ten years. Within the evaluation of worldwide ship finance systems and current market condition in Turkey, it has been found that it is necessary to provide incentives as governmental to shipowners in Turkey in order to increase economy level by decreasing the import rates which caused by foreign flagged ship investments. If Turkish maritime industry has its own ship finance system either government supported or private corporations, maritime economy would be more certain and powerful with national investors. National based ship finance might also increase Turkish flagged vessels in world merchant fleet and assist Turkey being a “*Reproducer*” country within world maritime activities. By the aim of this research, best model for Turkish economy is indicated as Danish system which is more useful by supportable positions of government via controlling the financial status. Also, a “*One-hand management*” policy can be developed and supported as specific to ship types, segments and their tonnages by gathering all small ship-owning companies under one management. Ship financing in Turkey must be evolved in order to adapt the current market conditions in worldwide. A new structure of mortgaging the ships can be constructed according to ship types and market statuses against possible bankruptcies of the companies. Further follow-up mechanism with special financial analyses must be also prepared to decrease high risks of volatile market and to prevent shipowners’ failure due to lack of knowledge. Competition within ten years’ period will increase rapidly as it has already

commenced by the end of 2014. Turkish shipowners' perception must be changed to more informative and technological solutions either with maritime authority in Turkey incentivized. As the shipping market is not smooth and becoming more volatile day by day, it is necessary to take an action for ship investments in Turkish maritime sector in order to be successful in world shipping.

On the other hand, the most important factor that provides countries well-known reputation in international trade is absolutely logistics and transportation. Developing standards for logistic networks have positive impact on economic activities as well as maritime transportation by the fleet expansion. Therefore, steps of development in maritime sector must be strategically planned. In this study, how much the total ship fleet capacity has impact on to liner shipping activities have been statistically researched. On the side of Turkey, it is highly important to increase port investment activities within a technologic and innovative infrastructure in order to contribute the development of national economy. There is a shift in growth as the industry transforming into services and consumer economy. Concerns have arisen regarding the potential limitations of outsourcing and globalization, as indications of near sourcing and nationalization are beginning to emerge. This represents a notable deviation from the previous norm in the shipping industry, characterized by restricted financing, asset deflation, and a shift in demand. These changes are expected to endure over an extended period of time, indicating a prolonged period of adjustment for the industry. Therefore, the governments are invited to generate new real-time models and strategies on maritime logistics and transportation particularly on investment side within cooperation philosophy. By considering the geopolitical status of Turkey, the regions where have potential to growth as infrastructural must be indicated and new investment methods must be generated. It is not only important; it is crucial for Turkish economy to determine a national fleet development based maritime strategy in order to become a leading economy in global trade competition. The model in this study is aimed to provide governments quantitative based methods to issue new development strategies. For further studies it is recommended that the more specific data can be used in regression analysis by upgrading the model to multiple regression analysis. Additionally, data is used in 10 based log-log format in this model. The logarithmic basis of the model can also be changed with appropriate values instead of 10 based and more significant results can be gathered by the

statistical analysis. The global economy is very tough to bear especially for developing countries. Therefore, Turkey is required to obtain a national development strategy on shipping to become a big competitor of the global trade as a developing economy.

In summary, it is evident that the role of shipping finance holds significant importance in the economy of Turkey. Given the volatility of commodity and freight markets, it is important for Turkey to adopt effective ship investment strategies. Turkey's position as a key player in the global economy depends on its ability to invest in shipping and maritime strategies. Therefore, it is imperative that Turkey continues to prioritize the development of its shipping industry, and works towards building a robust and sustainable maritime infrastructure. By doing so, Turkey can continue to grow as a global player in the shipping and logistics space, and reap the benefits of a thriving maritime industry for years to come.

ABBREVIATIONS

UNCTAD	United Nations Conference on Trade and Development
LNG	Liquefied Natural Gas
DRC	Domestic Resource Cost
DM	Decision Maker
QFD	Quality Function Deployment
SoQ	Ship of Quality
FAHP	Fuzzy Analytic Hierarchy Process
FAD	Fuzzy Axiomatic Design
VLCC	Very Large Crude Oil Carrier
PIMCO	Pacific Investment Management Company
BDI	Baltic Dry Index
BTI	Baltic Tanker Index
BCI	Baltic Container Index
BIMCO	Baltic and International Maritime Council
LR	Long Range Tanker Size
MR	Medium Range Tanker Size
LPG	Liquefied Petroleum Gas
VLGC	Very Large Gas Carrier
UK P&I	The United Kingdom Protection & Indemnity Club
OFAC	Office of Foreign Assets Control
VLOC	Very Large Ore Carrier
BCI	Baltic Capesize Index
BPI	Baltic Panamax Index

BSI	Baltic Supramax Index
BHI	Baltic Handysize Index
NFCI	Ningbo Containerised Freight Index
COSCO	China Ocean Shipping Company
OOCL	Orient Overseas Container Line
MSC	Mediterranean Shipping Company
OOCL	Orient Overseas Container Line
UASC	United Arab Shipping Company
MOL	Mitsui OSK Lines
NYK	Nippon Yusen Kaisha Line
ILWU	International Longshore and Warehouse Union
PMA	Pacific Maritime Association
CTS	Container Trade Statistics
TEU	Twenty-foot Equivalent Unit
ULCV	Ultra Large Container Vessel
GDP	Gross Domestic Product
GNP	Gross National Product
LSCI	Liner Shipping Connectivity Index
STLC	State Transport Leasing Company
VAT	Value Added Tax
UAE	United Arab Emirates
CIB	Commercial International Bank
US	United States
WSJ	Wall Street Journal

UK	United Kingdom
CBO	Congressional Budget Office
IMF	International Monetary Fund
ASEAN	Association of Southeast Asian Nations
GDP	Gross Domestic Product
PMI	Purchasing Managers' Index
ECB	European Central Bank
OPEC	Organization of the Petroleum Exporting Countries
OECD	Organisation for Economic Co-operation and Development
EU	European Union
WTI	Crude Oil Index
KG	Kommanditgesellschaft
DKK	Danish Krone
ECA	Export Credit Agencies
ICS	International Chamber of Shipping
IMO	International Maritime Organization
EOI	Economic Openness Index
VIF	Variance Inflation Factor

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APPENDIX

Model Summary^b

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics					
					R Square Change	F Change				
1	,429 ^a	,184	,171	,42315	,184	13,955				

Model Summary^b

Model	Change Statistics			
	df1	df2	Sig. F Change	
1	2	124	,000	2,157

a. Predictors: (Constant), eoilog, fleetlog

b. Dependent Variable: lcsilog

ANOVA^a

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	4,998	2	2,499	13,955	,000 ^b
	Residual	22,203	124	,179		
	Total	27,201	126			

a. Dependent Variable: lcsilog

b. Predictors: (Constant), eoilog, fleetlog

Coefficients^a

Model		95,0% Confidence Interval for B		Collinearity Statistics	
		Lower Bound	Upper Bound	Tolerance	VIF
1	(Constant)	,684	1,010		
	fleetlog	,079	,189	,998	1,002
	eoilog	-,748	,002	,998	1,002

a. Dependent Variable: lcsilog

Collinearity Diagnostics^a

Model	Dimension	Eigenvalue	Condition Index	Variance Proportions		
				(Constant)	fleetlog	eoilog
1	1	2,161	1,000	,04	,04	,07
	2	,726	1,725	,02	,03	,92
	3	,113	4,370	,94	,93	,01

a. Dependent Variable: lcsilog

Charts

