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ΝΑΥΤΙΛΙΑ

Investing: gut filling or scientific method?

Tools for selection of prudent criteria

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Διπλωματική Εργασία

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ABSTACT

This paper aims to deal with the inherent volatility that characterizes the dry bulk market. The thesis is looking at this problem in a twofold way: firstly, by extracting valuable information from major events occurring around the globe and secondly by scrutinising the economic and shipping indicators and extrapolating data that could reveal possible warning signs. The most important tools to in this endeavour will be the science of inferential statistics in conjunction with the common sense, as their ability for mathematic visualization is consider the most appropriate means to expose in the simplest way wring paths adopted by investors.

1. Chapter One: Introduction

1.1. General remarks

Shipping is undeniably one of the most fascinating industries in the world. It takes only a few minutes to look into the past and see the great boom of 2004, which swept the shipping industry from rags to riches in no more than a year, making its fortunate investors some of the wealthiest people in the world.

Unfortunately, some investors back in 2008 were not so favoured by fortune. There are numerous cases in which they saw their assets being devalued even by a percentage of 85% in a couple of days. This horrifying and at the same time exciting fact can only draw the interest to explore the mysterious nature of the shipping cycles. Indeed, shipping cycles are not only complex but also seductive because, somehow even if it sounds unpleasant, they control investors' emotions. As one ship-owner put it: "When I wake up in the morning and freight rates are high I feel good. When they are low I feel bad."¹

Since, unfortunately shipping cycles are inevitable to predict due to the inherent volatility that characterizes the shipping market and to a greater extent the global economy. As we shall see later in this thesis, the demand for the shipping transport is derived demand which means that the profitability of the shipping companies relies upon a simple mechanism, frequently used in economics, which is the equilibrium between supply and demand. Later on our analysis we will make clear how shipping cycles and the supply and demand mechanism interact with each other.

If any investor wants to do business in the shipping market and in order to make profit he must be aware that he needs, apart from good luck, not only skills but also the right information and in time. Professor Stopford successfully parallels shipping industry with a poker game which allures the most acute businessmen and the most powerful funds in the world.

¹ Quote from Stopford M. (2009) Globalization and the Long Shipping Cycle

1.2. Aims & Objectives

The aim of this study is to develop a “conscious path, which, hopefully, will be a helpful tool for prudent investors, with an object to avoid making erroneous investments.

The logic behind this aim is that there are currently in the market “amber alerts, which we believe can indicate the upward or downward tendency of the market at any given time. These alerts can be somehow inferred from a) the fluctuation of prevailing economic indicators used worldwide in all areas of trade and b) major global events having immediate and strong effect to the markets. We will explore whether the following proposition is or is not true: *when an indicator exceeds or falls below a certain threshold, it is a signal that certain investments will lead to bad results.*

The main focus of this study will be the dry cargo market and more specifically the Panamax vessels. The data to be used in this paper will be extracted from Clarkson’s SIN and other respected databases. The time span will be the last 15 years.

We will try to take part in this “big poker game” as a companion and simultaneously a consultant to those players-investors investing in Panamax Vessels.

Our most important assistants in this endeavour will be the science of inferential statistics and the common sense as well, two essential tools which are frequently ignored by the decision makers in the heat of the moment.

2. Chapter Two: Shipping Cycles & Maritime Economics Issues - Methodology

This Chapter deals with maritime economics and various issues that dominate the daily life of an investor. Firstly, the supply-demand mechanism and the key factors that influence it are presented. Then a basic introduction about shipping cycles follows, which gives rise to a lot of questions regarding the factors that determine its complexity and its fierce volatility. The different efforts to rein that volatility are presented. We lastly discuss the issue of their adequacy (or not) as reliable decision-making tool.

2.1. The Supply-Demand Mechanism

The supply-demand mechanism is widely accepted that it regulates the price of all the economic goods in competitive markets. This mechanism applies to shipping. Actually, it is a determinant factor that increases the volatility of the shipping industry which will be discussed in this section. Intended to be terse, the term ‘supply’ refers to the aggregate capacity of ships available for transportation while ‘demand’ is simply the demand for transportation.

2.2. Shipping Cycles

Many surveys have been conducted and many theories have been expounded by distinguished scientists over the years aiming to find a common pattern in the shipping cycles. The primary concern of those studies was to predict the trend line of those “waves” in order to minimize, significantly, the risks undertaken by the potential investors. *This high risk originated from uncertainty we shall hereinafter call ‘volatility’.*

Those studies and surveys have accepted in general, as a “rule-of-thumb” that shipping cycles have a standard deviation of 2.6 years and an average length of 7.7 years. The only thing, though, we can consider indisputable is that the fundamental mechanism of supply and demand sets the basis for the shipping cycles. Of course there are numerous other factors that affect the routine of these cycles, such as the “market sentiment,” a shipping term introduced by Grammenos (2010)², but,

² Grammenos, C. (2010) *The Handbook Of Maritime Economics and Business*

for the purpose of this paper, we need to keep this complex issue simplified for our convenience and understanding.

2.3. Key Stimuluses on Supply and Demand

No-one in the world may claim that knows everything about maritime industry. Even the most elaborate mind cannot handle the plethora of information that affect the supply and demand mechanism. So the first task is to draw our attention to those factors that are the most crucial, in order to make some initial conclusion for this matter.

The table below depicts the most influencing factors for demand and supply.

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

So we have the variables, even in a primary stage, that affect the above mechanism. The interesting point, though, is what is hiding behind this matter which is nothing else but the freight market which links demand and supply by regulating the cash flow flowing from one sector to another.

2.4. The Phases and Characteristics of the Shipping Cycle

Every shipping cycle has four phases: Trough-Recovery-Peak-Collapse and every phase has its own characteristics. In **Trough** for example there are clear signs of surplus shipping capacity queuing at loading points. This fact consequently ‘drives’ freight rates downwards forcing the least efficient ships into lay-up. We are on **Recovery** phase when freight rates finally surpass the operating costs and laid up tonnage falls. In this stage, usually, the first signs coming from the increment in second-hand prices. Afterwards comes the **Peak**; the demand for shipping services is

enormous and the ships to serve it are limited. During this period everything moves with frenetic rhythm, the vessels speed up, the banks are racing to lend against strong assets, the yards are stressed by the owners to deliver their ships faster and generally everyone is trying to exploit the time and the good market sentiment. Exactly the opposite occurs when we are in the **Collapse** phase; here we **commonly** see that the delivery of vessels ordered at the peak of the market create once again a surplus in shipping capacity, something which is reinforced by the unwillingness of ship-owners to scrap their vessels acknowledging that the peak is over.

2.5. A step closer

In our attempt to define the 4 phases by presenting some of their characteristics we stumbled across some that would lead us to the point of the paper. These underlying characteristics, that explain these ‘ups and downs’ in shipping cycles and are constantly appearing throughout the decades, can be summarized as follow:

- Queue at load ports or shipyards
- Laid up ships
- Second hand prices
- Low steaming/speed up
- Major events with economic impact (e.g. Lehman Brothers)
- Easy / hard financing
- Placement of new orders
- Scrap value/ demolition market

But once again, when we add to the equation the occurrence of major external events such as financial crises or wars the analysis and the examination of these factors alone cannot provide accurate results in order to rein the volatility.

2.6. Factors that further exacerbate volatility

Unfortunately, the occurrence of major external events, listed above, is not the only stumbling block for an accurate prediction regarding shipping cycles. Considering all these factors which

take part in the formation of shipping cycles we can identify specific characteristics which further intensify the uncertainty in the sector.

- **Time lag:** Is the lead time between the placement of an action and its actual realization. In logistics this is one of the most commonly used terms which describes the difference between a placement of an order and its delivery. Pretty much the time lag problem occurs in many businesses and if disregarded can create a lot of irregularities.
- **Mass psychology:** Many investors nowadays react in a way perfectly described by Pigou 1927³ “*People tend to imitate others when they are in periods of uncertainty or optimism, creating trends that enhance the fluctuations of the economy system*”. The placement of hundred orders at the end of 2007 couldn't be a better example for this, as it describes in its entirety the imitating moves of some investors. Professor Martin Stopford vividly writes in his book “*By the time the farmer arrives at market with his pig and finds that all the other farmers have bred pigs it's too late.... The smart farmer saw what other farmers were doing and switched to chickens...The successful shipping company must know when to steer clear of pigs.*”⁴
- **Zero memory of market participants:** The 'zero memory' of ship-owners was first introduced by Zanetos (1964)⁵ and it is one of the paradoxes of the shipping industry that further exacerbate the consequences of the shipping cycles. Third or fourth generation ship-owners make the same mistakes over and over again by not considering the underlying reasons that led to the last slump. They order new vessels during the boom phase of the market and they take deliveries when the market has crashed or they are forced to face decreased freight rates due to the oversupply of ships that they had actually created by ordering new vessels.
- **Other important factors:** In addition there is a number of other factors having considerable implications in the market such as major policy makers (e.g. IMO) constantly changing regulations (low sulphur case), sensitivity to geopolitical upheavals and exogenous factors (BREXIT, terrorism) and of course the evolution of technology.

³ Pigou, A. (1927) Industrial Fluctuations. *The Economic Journal*

⁴ Stopford, M. (2009) *Globalization and the Long Shipping Cycle*.

⁵ Zanetos (1964) “Zero memory”

The relations among these factors is extremely complicated and highly unpredictable, while the analysis is an overwhelming obstacle.

2.7. Methods used so far to rein the Volatility

Researchers on the field of shipping market analysis and forecasting have widely used, during the past decades, econometric models and statistical methods like VECM, VAR and GARCH. They were all trying either to model the volatility of the market or to find a method to forecast the future freight rates and asset values. More specifically, Veenstra and Franses (1997)⁶ revealed the existence of co-integration relationship between time series of different freight rates. Byoung-Wook (2011) dissolved the freight time series of the bulk shipping market into two components, the first one which is the wider consisted of a long-term trend and the second one is a temporary component with a random model. Kavussanos and Alizabeh-M (2001)⁷ studied the seasonal volatility taking into account the different vessel sizes, market conditions (booms and busts) and contract duration (spot, time-charters). **The important outcome is that the results revealed the inadequacy of log-linear model as a method to forecast and analyze bulk shipping market. The main reason for the noted weakness is the existence of spurious regression while the analysis of time series with the aforementioned characteristics using econometric models has been proven particularly challenging (Zeng and Qu, 2014).**

Here, it is appropriate to stress that the methods above provide valuable results when we deal with linear price series for both the forecasting and analysis of the shipping market. The problem lies on the fact that nonlinearity exist in almost every aspect of life and the same is valid for the shipping markets where non-stationarity is also observed and must be added on the general problem⁸ (Goulielmos and Psifia 2009).

In order to solve the aforementioned problem, scholars went a step further employing nonlinear and artificial intelligence methods. These methods include: nonlinear regression, artificial neural

⁶ Veenstra, A. and Franses, P. (1997) A co-integration approach to forecasting freight rates in the dry bulk shipping sector

⁷ Kavussanos, M. and Alizadeh-M, A. (2001) Seasonality patterns in dry bulk shipping spot and time charter freight rates

⁸ Goulielmos, A. and Psifia, M. (2006) Shipping finance: time to follow a new track?

networks (ANN) and support vector machines (SVM), which are used as analysis tools of the shipping market as well as for forecasting. For instance, Duru, Bulut and Yoshida (2012)⁹, trying to make a tool for market analysis, constructed a model with multiple variables employing a fuzzy logical method. Nonlinear models and neural networks were also the subject of research of Goulielmos and Psifia (2009)¹⁰ and Leonov and Nikolov (2012)¹¹ respectively. Zeng and Qu (2014)¹² developed a method based on Empirical Mode Decomposition (EMD), first proposed by Huang et al. (1998)¹³, in order to analyse and understand the volatility of the Baltic Dry Index (BDI) and consequently the volatility that is inherent in the bulk shipping market. The findings are described as satisfactory and the proposed method as “a potentially efficient method”. He also points out two key points that are considered important. First of all, he recognizes the need to combine his model with other methods in order to enhance the accuracy of the results and, he highlights the necessity for empirical studies, which he considers essential to confirm the applicability and reliability of his method (improved EMD model).

Again, uncertainty is welling throughout the studies and researchers are sceptical regarding the efforts to forecast and rein the volatility of the shipping market. In shipping all the attempts to forecast the future have fallen into the void (Goulielmos, 1998)¹⁴ and that rule is further supported in periods that major events broke out. Additionally, even if the forecast is in the right direction, a small error of 1% can lead to huge differences on e.g. the amount of ships that are required to serve the demand with destructive results for the ship owners that invested in the particular field.

2.8. Thesis’ methodology for the overcoming weaknesses

The purpose of the paper is to identify if there are indeed warning signs, in a particular section of the dry bulk market, that could be proven useful in order to avoid non-beneficial investments. The

⁹ Duru, O., Bulut, E., and Yoshida, S. (2012) A fuzzy extended DELPHI method for adjustment of statistical time series prediction

¹⁰ Goulielmos, A. and Psifia, M. (2006) Shipping finance: time to follow a new track?

¹¹ Leonov, Y. and Nikolov, V. (2012) A wavelet and neural network model for the prediction of dry bulk shipping indices

¹² Zeng, Q. and Qu, C. (2014) An approach for Baltic Dry Index analysis based on empirical mode decomposition

¹³ Huang, N., Shen, Z (1998) The empirical mode decomposition and the Hilbert spectrum for nonlinear and non-stationary time series analysis

¹⁴ Goulielmos, A. (1998) *Shipping Finance*.

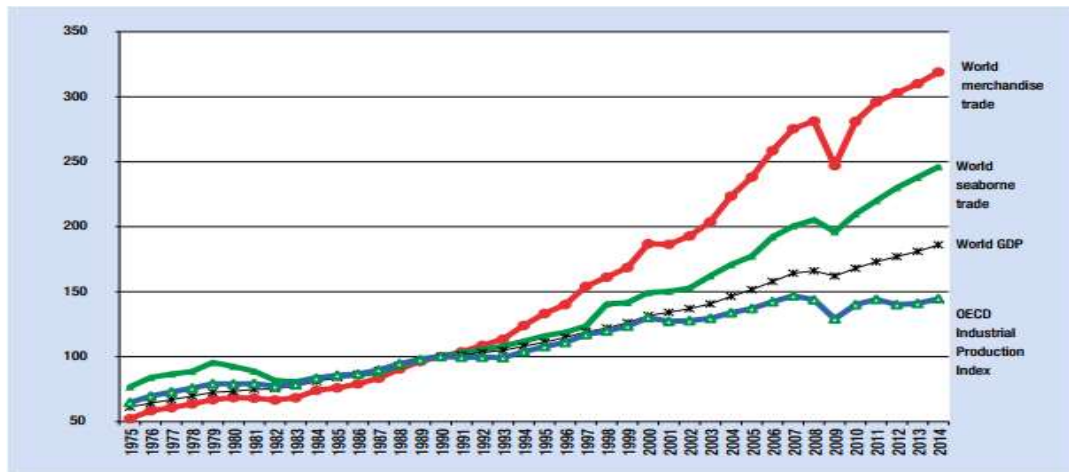
author will try to make small logical steps aiming to extract those indicators that reflect those warning signs. This effort is made in the hope that this pattern of thinking will be useful to potential investors as they will find in it an effective decision making tool.

The methodology section will depict the rational steps that are going to be followed so as the purpose of this thesis to be achieved. It must be pointed out that the particular approach is attempted for the first time so difficulties are anticipated to be faced.

But what is the difference between the aforementioned approaches and the approach of this study? While all these efforts are trying to identify all the different factors that play a role in the observed volatility and then they explore the relationships among them in order to develop a decision-making tool, this thesis does not focus on the relations of the components (that are myriad) but on the actual changes. More specifically, it focuses on ‘great changes’ in order to extract the warning signs. The particular approach will be thoroughly discussed in the methodology chapter.

3. Chapter Three: Global events in international shipping

In this chapter we will examine major events that have a serious prospective impact in the shipping sector from the international perspective. These have the potential to disturb the economic status quo and therefore be used as a rough “guideline” for investors in their analysis of the market trend. Also a brief description of important key-points is included in this chapter.



Sources: UNCTAD secretariat, based on OECD Main Economic Indicators, June 2015; United Nations Department of Economic and Social Affairs, 2015; LINK Global Economic Outlook, June 2015; UNCTAD *Review of Maritime Transport*, various issues; WTO, appendix table A1a, World merchandise exports, production and gross domestic product, 1950–2012; WTO press release 739, 14 April 2015.

Figure 1: World merchandise trade

It is a well-known fact that the business of shipping involves the transportation of commodities and passengers from supply ports to demand ports and all the additional activities required to facilitate such movement¹⁵. Marine transportation has always been a substantial sector of the economy and well-being of all the nations in the world, whether they have easy access to sea or not, and it is generally accepted that the transportation of goods by ship is the economic lifeblood of many states¹⁶. As three-quarters of the Earth’s surface is covered by water, marine transportation is the backbone of international trade. This is being reiterated by the fact that year by year the volume of maritime transportation is growing rapidly and is expected to continue growing in the foreseeable future. “Some key characteristics of the particular field establish it as the most rational

¹⁵ Branch, 1981

¹⁶ Kendal and Buckley, 1994

choice for transporting raw materials and finished products that the expanding world market greedily requires¹⁷.

Many of the commodities, such as coal or iron ore, which are essential to manufacturing processes are heavy and have low unit value. The only really cost-effective method to transport these commodities in big quantities and great distances is ships, because they offer the transportation service at a lower cost compared to the other modes¹⁸.

3.1. Challenges faced by the shipping industry in the twenty-first century

Below we shall briefly present the major challenges faced today by the shipping sector, which, if looked at from the right perspective can lead owners to certain conclusions, both positive and negative:

3.1.1. Cold layups and a new “pivot” age for demolition

It is well known that owners constantly seek to find efficient strategies in order to operate their vessels in the least costly way. Naturally this concern becomes a strategic aim when they are facing an oversupplied market where freight rates are extremely low.

Taking as granted that the age of a vessel is the most crucial factor defining her operation costs, we can easily follow the philosophy of some of the leading companies in the shipping sector aiming at the tactical renewal of their fleet.

The owners, in the process of the said renewal tactics are eager to dispose of their existing old vessels and buy new ones.

For the purpose of disposal, owners are now split between laying up their vessels and scrapping.

As regards laying-up and supposing that the standard daily operating costs for a 15-years old Panamax is 5000\$ and that an expected daily return is currently 2000\$, the cost per day amounts

¹⁷ Stopford

¹⁸ Kendall and Buckley, 1994

to 3000\$. If the current lay-up cost today is around 1500\$ per day, it becomes obvious that, at least for younger vessels, layup will be the lesser of two evils, the greater will be demolition.

As far as demolition is concerned, the first 3 months of 2016 constitute the biggest quarter on record for bulk carrier demolition. In the first 9 weeks of the year, 120 bulk carriers of 10.1 m dwt have been reported sold, a pace that, if continued, will see the current record of 10.9 m dwt set in Q2 2015 surpassed. Such high levels of demolition clearly reflect the depressed state of the bulk carriers market in 2016 so far. The average age of vessels being scrapped has fallen by around 25% in 2015 at 20 years compared to 2010 where the average vessel was 27.7 years.

3.1.2. Shipbuilding sector

The news coming from the shipyards across the globe and mainly from China, South Korea, and Japan, can be interpreted both positively and negatively, depending on the point of view. As stated above, the decreasing age of the dry bulk ships being scrapped illustrate the great challenges faced by the dry bulk sector. In addition, a lot of orders for new buildings have been cancelled until today, straining the pressure in the considered constructing countries (China, South Korea, and Japan).

Especially in China the reality is harsher due to overcapacity of the shipbuilding industry. Many yards are forced to offer cheap alternatives to the superior quality of vessels built in the neighbouring Japan and South Korea, or else they would face a fate similar to more than 2000 enterprises which became insolvent due to huge debts.

Moreover, the outlook for China's shipbuilders is further shadowed by the Baltic Dry Index (BDI) consistently setting new lows since the start of this year. According to the latest Clarkson's data, the Chinese shipyards have an exposure in bulk carriers which exceeds 46% of their capacity.

In Korea the situation is not much better. South Korea's top three shipyard groups and three of the by far biggest players in the global shipbuilding industry, i.e. the Hyundai Heavy Industries Co., Samsung Heavy Industries Co. and Daewoo Shipbuilding & Marine Engineering Co., are all headed toward a combined loss of more than 8 trillion.

In addition, “as the South Korean builders struggle with financial troubles and declining orders, China has kept up its hot pursuit and broken into the world’s top five for the first time. While the South Korean companies had previously traded the top five spots among themselves, this marks the first time (in more than 10 years) that they have lost one of them to a foreign competitor.”¹⁹



Global Shipbuilding Industry Orders

Ranking	Shipyard	Country	Total Orders (CGT)*	Ships Ordered
1	Daewoo Shipbuilding & Marine Engineering	South Korea	8,244 mil	126
2	Samsung Heavy Industries	South Korea	5,032 mil	90
3	Hyundai Heavy Industries	South Korea	5,002 mil	104
4	Hyundai Samho Heavy Industries	South Korea	3,924 mil	92
5	Shanghai Waigaoqiao Shipbuilding	China	3,030 mil	78
6	Hyundai Mipo Dockyard	South Korea	2,846 mil	127
7	Jiangsu New Yangzi	China	2,416 mil	99
8	Hudong-Zhonghua	China	2,197 mil	49
9	Imabari SB Marugame	Japan	1,890 mil	47
10	Imabari SB	Japan	1,631 mil	93

As of November, 2015 *CGT: compensated gross tons Data: Clarkson Research

Figure 2: Global Shipbuilding

3.1.3. Panama Canal Expansion

The Panama Canal expansion is intended to double, by this year, its capacity by increasing the number of ships and simultaneously adding a new traffic line. Thus the maximum allowed dimensions of vessels will be increased, leading eventually to a new type of ships called Post-Panamax.

A wider and deeper passage, thus, may encourage shippers to consider alternate sourcing and trading routes. A billion-dollar question is addressed to the U.S shippers and consignees; will the Panama Canal expansion significantly alter the today’s image of supply chain flows and distribution patterns?

¹⁹ Article : South Korea’s stranglehold on the shipbuilding industry loosens, but only just

The answer seems to be positive as in comparatively short time since its construction to accommodate a new generation of larger cargo ships, America's ports are pouring billions into upgrades in anticipation of their arrival.

On the other hand, there are those who consider that the forthcoming expansion will not create additional demand, but will eventually alter trade lanes. This theory is mainly based on the existing intermodal transportation system which at this moment is unable to serve that additional demand.

Of course all the above perspectives remain controversial as the truth is expected to be revealed in the future. Undeniably though, this near expansion will benefit the East Coast and the regions located near the center of United States like Ohio Valley.

3.1.4. Oil prices

A major problem faced by the industry of shipping is the impressive volatility of the oil prices. Depending on the ship's age, the fuel cost can account for more than 60% of operating costs and this is the main reason why shippers or ship-owners, depending the fixture, are trying to find ways to keep this cost down. Consequently, new perspectives are appearing rapidly such as slow steaming, scheduling optimization, investment on eco ships etc., and are expected to be adopted by ship-owners.

Accordingly, lower oil prices have, at first glance, a rather positive impact, since they lead to lower operating costs and higher profit margins. We can also assume that this downturn in oil prices positively affects both consumers and households giving a boost in the overall international economy.

But this simplistic view may not be completely accurate, not only for developed countries but for emerging market economies and for the global economy in general as well.

The combined negative effects of a deep and prolonged drop in oil prices may well outweigh any positive results mentioned above, leading to instability to principal commodity prices pressing downwards the freight rates.

It has been evidenced that the commodities associated with industrial metals have fallen to their lowest level since 2009. Since freight rates are also moving downwards, more and more ship-owners are unable to meet their loan obligations. And in turn banks are likely to need liquidity injections by their central banks in the form of more quantitative easing (QE), further feeding stock market and bond asset bubbles. (see 4.4.3) As Jack Rasmus said *“Decline in financial assets tied to oil could increase the tendency toward global financial instability. Oil deflation may lead to widespread bankruptcies and defaults for various non-financial companies, which will in turn precipitate financial instability events in banks tied to those companies. The collapse of financial assets associated with oil could also have a further ‘chain effect’ on other forms of financial assets, thus spreading the financial instability to other credit markets.”*²⁰

In addition to the above, the long-lasting historical and well-documented relation between the falling oil prices and the rising US dollar exchange rate is another negative eventuality. The drop of oil prices results in appreciation of the US dollar, which in turn leads to a relative fall of the currencies of a number of emerging market economies.

3.2. Seaborne trade

In view of the fact that sea transport still remains the most inexpensive form of goods transportation and thus preferable despite its lack of speed, the latest news regarding it, as showed by the review of Maritime Transport conducted by UNCTAD sum up perfectly the current situation.

²⁰ Article :The Economic consequences of global oil deflation by Jack Rasmus

“On balance, growth in world GDP, merchandise trade and seaborne shipments is expected to continue at a moderate pace in 2015. The outlook remains uncertain and subject to many downside risks, including continued moderate growth in global demand and merchandise trade, the fragile recovery in Europe, diverging outlooks for net oil consumers and producers, geopolitical tensions, and a potential faster slowdown in developing economies, in particular the large emerging

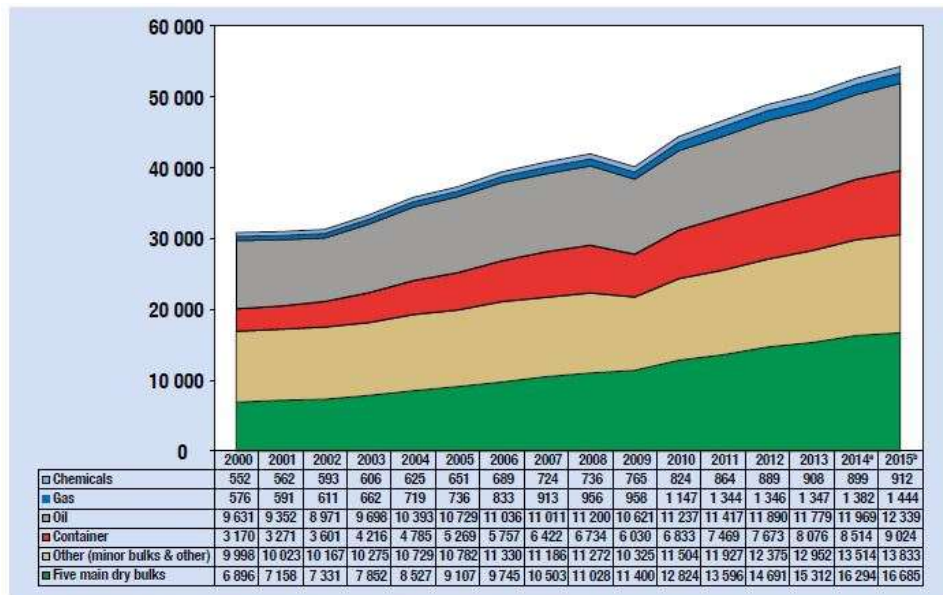


Figure 3: World seaborne trade in ton-miles by cargo type, 2000-2015(bil. of ton-miles)

economies, as well as uncertainty about the pace and the implications of the slowdown in China.²¹

We point out that the above figure represents in the most accurate way the demand for shipping services over the years, as it uses the ton-mile unit, the only measure tool that takes into account the distance, which determines ships’ transportation capacity over time.

As evidenced by the above chart: “In 2014, growth in ton-miles performed by maritime transportation was estimated to have increased by 4.4 per cent, up from 3.1 per cent in 2013 (see figure 2.1) (Clarkson’s Research, 2015b). Dry bulk commodities, namely iron ore, coal, grain, bauxite and alumina, phosphate rock and minor bulks accounted for nearly half of the total 52,572 estimated billion ton-miles performed in 2014. The ton-miles of the dry bulks expanded at a firm rate (6.4 per cent for major dry bulk commodities and 5.2 per cent for minor bulks).”

²¹ Review of Maritime Transport 2015 UNCTAD

And also “Coal and iron ore import demand from Asia has contributed significantly to the growth in dry bulk trade volumes over recent years. Apart from China, iron ore and coal demand from other fast growing economies such as India and the Republic of Korea has also been on the rise.”

3.3. Commodities

Demand for transportation is highly associated with the world commodity trade and the main tasks of shipping analysts is to examine and forecast the future developments of these commodity trades.

In our study it is appropriate to focus on commodities that belong to the dry bulk shipping market and to consider them as a group. These are principally the five main bulk cargoes: iron ore, coal, bauxite/alumina, grain and phosphate, processed as inputs for products which in turn form the backbone of merchandise trade.

These are transported by Panamax vessels, designed to serve long haul iron ore and coal trades and in reality they substitute Capesize vessels which have the ability to serve markets that capes

are unable to.

Table 1: Importers & Exporters of main bulk cargos

Australia	54	China	68
Brazil	25	Japan	10
South Africa	5	Europe	9
Canada	3	Republic of Korea	6
Sweden	2	Other	7
Other	12		
Coal exporters		Coal importers	
Indonesia	34	China	20
Australia	31	Europe	19
Russian Federation	9	India	18
Colombia	6	Japan	15
South Africa	6	Republic of Korea	11
Canada	3	Taiwan Province of China	5
Other	12	Malaysia	2
		Thailand	2
		Other	9
Grain exporters		Grain importers	
United States	26	Asia	33
European Union	14	Africa	21
Ukraine	10	Developing America	20
Canada	9	Western Asia	19
Argentina	8	Europe	5
Russian Federation	8	Transition economies	2
Others	25		

Sources: UNCTAD secretariat, based on data from World Steel Association, 2015; *Dry Bulk Trade Outlook* (May 2015a); Clarkson Research (2015b); and International Grains Council, *Grains Market Report*, June 2015.

To sum up Dry bulk cargo, is shipped in large quantities and can be easily stowed in a single hold with little risk of cargo damage. Dry bulk cargo is generally categorized as either major bulk or minor bulk. Major bulk cargo constitutes the vast majority of dry bulk cargo by weight, and includes, among other things, iron ore, coal and grain.

3.3.1. Iron ore

Iron ore is the largest of the major bulk commodity trades and the principal raw material used for the production of steel. It is used primarily in structural engineering applications and in shipbuilding purposes, automobiles, and general industrial applications (machinery). By far the major iron ore exporters are Australia and Brazil, together amounting to 79% of iron ore exports. Also, “China’s role is particularly interesting because it is both a major producer and a major importer of iron ore; a fact that depicts the country’s voracious appetite for minerals during the economic growth years²².”

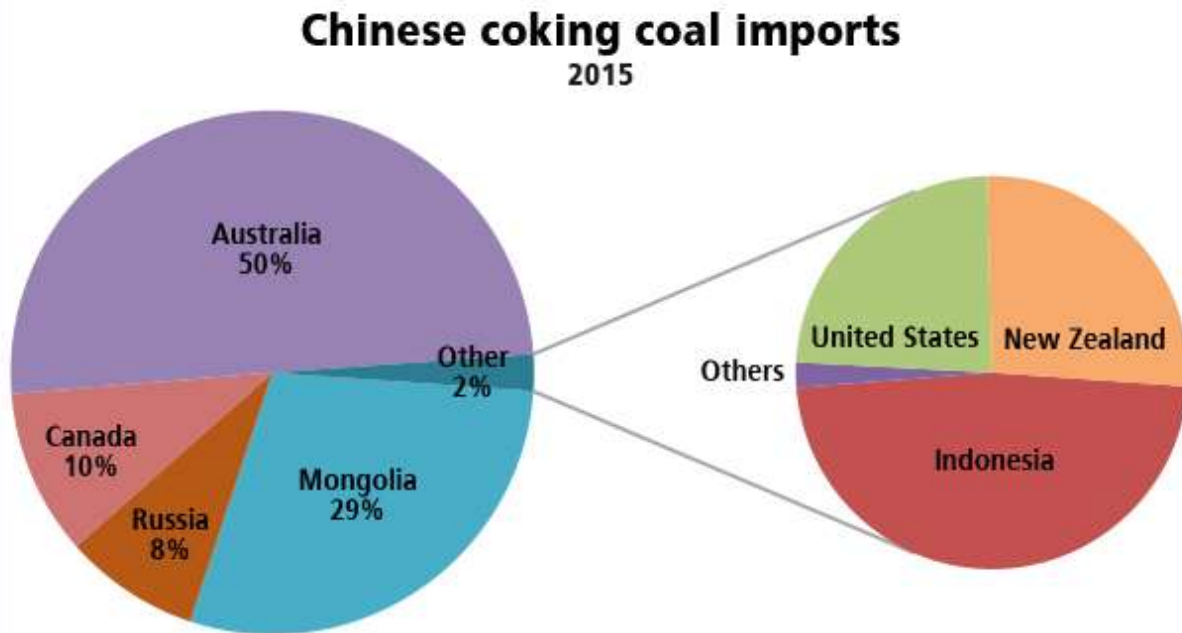
²² Tcha, M. and Wright, D. (1999) Determinants of China's import demand for Australia's iron ore

The largest trading routes for iron ore are from Australia to Asia, intra-Asia, from South America to Asia, from South America to Western Europe and from Africa to Asia.

3.3.2. Coal

Coal is the second largest dry bulk trade, with imports of 665 mt during 2015 principally into Western Europe and Japan. It is a complex trade with two very different markets, ‘coking coal’ used in steel-making and ‘thermal coal’ used to fuel power stations. China was the main engine, fuelling the rapid expansion of the world seaborne coal trade over the past decade, with its share of global coal shipments reaching 20% in 2015.

Currently, overall dry bulk demand is the weakest since 2009 and freight rates give ship-owners few options but to endure. Diminishing volumes as well as dwindling sailing distances for total Chinese coal imports is a strain on the market.



Source: BIMCO, China Customs

Figure 4: Chinese coking coal imports

“Factors contributing to the drop in China’s imports include, among others, the falling import demand, which reflects China’s regulations on saleable coal use, a slowdown in steel production, coal import taxes and quality limits, efforts to protect the domestic coal mining industry, hydroelectric power production and government initiatives to reduce air pollution.”²³

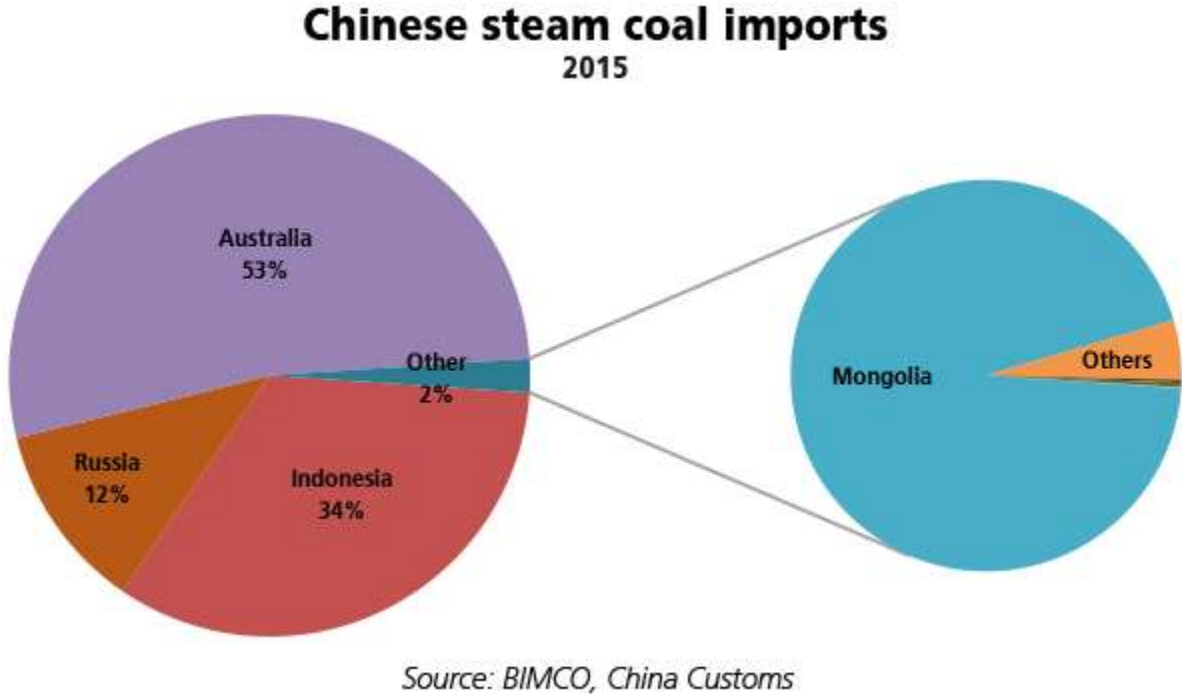


Figure 5 Chinese Steam Coal

The problem with the short distances is intensified year by year and the most prominent example is the extinction of longer-haul trade from South Africa to China for the first time in 2016. South Africa used to supply more than 8% of the China’s steam coal in 2013 and by the end of 2014 that share was more than halved. The final strike came at the end of 2015 when the trade between those two stopped. As we can see from the above figure China’s declining coal trade proves beneficial to Australian and Indonesian exporters.

²³ Review of Maritime Transport 2015 UNCTAD

3.3.3. Grains

Grains include wheat, coarse grains (corn, barley, oats, rye and sorghum) and oil seeds extracted from different crops such as soybeans and cottonseeds. In general, wheat is used for human consumption, while coarse grains are used as feed for livestock. Oil seeds are used to manufacture vegetable oil for human consumption or for industrial use, while their protein-rich residue is used as a raw material in animal feed.

Total grain production is dominated by the United States as we can see from **table 1** Argentina is the second largest producer followed by Canada and Australia. In terms of imports, the Asia/Pacific region (excluding Japan) ranks first, followed by Latin America, Africa and the Middle East. The principal vessel types used in the grain trade are Panamax and Handymax.

3.3.4. Conclusions

A prudent investor and/or owner would need to take into consideration both the appearing tendencies of the market conditions prevailing to shipping industry (such as age of laying up vessels and the cost of shipbuilding) together with the dominant world trade events, which could be proved useful in, again, showing up the logically expected market trends.

By indication and taking into account the data presented in this chapter the owners/investors may consider:

- a) the rising number of ships demolished, in conjunction with the falling shipbuilding prices. Both would indicate a lower price for new ships which would comply with the objective of 'least operational cost' and a "new-ships fleet strategy" mentioned above;
- b) on the other hand, the oversupplied market (as evidenced by the yearly order books) points to the market remaining constrained, directing to the opposite conclusion;
- c) the Panama Canal expansion is expected (under certain circumstances) to create a rise in transporting commodities associated with the new route (such as grain used/produced by the USA, Argentina etc);
- d) also, the new Panama Canal may encourage shippers to consider alternate sourcing and trading routes and alter the today's supply chain flows and distribution patterns for U.S

shippers and consignees, given that its construction may also accommodate a new generation of larger cargo ships, already anticipated by America's ports which are pouring billions into upgrades in anticipation of their arrival²⁴;

- e) the prevailing low oil prices would, on one hand, not be considered as a drawback for bunkering but may have overall impacts on the world trade, or lead to the extinction of certain routes and/or trades (as for example the China's steam coal trade);

²⁴ Scheduled to open in April 2016 the larger canal will be able to accommodate a new line of Post-Panamax vessels too large to pass through the canal pre expansion.

4. Chapter Four: Indices

‘Risk comes from not knowing what you are doing’ Warren Buffett

Chapter 4 of the study introduces the concept of indicators. It is divided into two major parts; the first one is dedicated to indicators that are associated with the economy in general, while the second part refers to indicators in the shipping industry. In addition, special mention will be given to leading indicators.

4.1. History behind indicators

An economic indicator refers always into an economic activity which is usually pictured in a chart form after the appropriate statistical analysis of the data. Economic indicators allow analysis of economic performance and predictions of future performance. Data should be obtained from accredited organizations such as the National Bureau of Economic Research in United States of America or the economic country groupings, such as the G20 and the BRICS.

The reading of the economic indicators can have a huge impact on the market; therefore, knowing how to interpret and analyse them is important for all investors. Beyond the right interpretation though, a good selection of the most suitable indicators is needed in order to avoid irrelevant correlations with the pointed subject.

4.2. Categories of Economic Indexes

Economic indicators must meet certain sets of criteria; so they are divided in three categories, classified according to the economic area they refer to. So we have the Leading, the Lagging and the Coincident ones. A brief analysis of the listed is following below.

4.2.1. Leading indicators

Leading indicators are indicators that usually, but not always, change before the economy as a whole change. You can parallel them with the amber traffic light in the streets, which indicate that the red light is coming. Unfortunately, their results in the real economy are not as close-coming as

the red lights! Still, there are indicators that can provide valuable signs for the future of the economy, as suggested by common sense. Stock markets indices of the most powerful nations (G10) consist one of the most used short-term indicators, as they tend to decline when the whole economy declines and they begin to improve when the general economy recovers from a slump.

4.2.2. Lagging indicators

These indicators mainly confirm that an action today will lead to a specific trend in the future. The most known lagging indicator is unemployment's. Indeed, history has shown that when the unemployment rate is high an economic downturn is probably waiting in the corner.

4.2.3. Coincident indicators

Coincident indicators change at approximately the same time as the whole economy, thereby providing information about the current state of the economy. As an example we can use the industrial production, an indicator we will examine later.

4.3. Leading indicators

As we stated above special attention will be paid to leading indicators due to their significance in the world economy. As it has already been briefly mentioned, the rationale behind the leading indicators is that they lead because most of them tend to “predict” future economic activity. An example is the ‘new orders for machinery’, which is a leading indicator that precedes the decisions of the companies to buy new equipment²⁵. Moreover, the idea stems from the observation that when certain economic variables change today, other economic variables will change as well after a period of time. Something that has to be stressed is the fact that some leading series of indicators generate false signals, so the effort is concentrated on creating composite indices that include an array of leading series in order to have a better indication of the future activity.

There are two main schools of thought in the leading indicator scientific field. The first one has been developed in the U.S while the second one has its roots mainly in Europe with OECD being

²⁵ Moore, G. (1983) *Business Cycles, Inflation and Forecasting*.

the representative organization. The section below discusses these two eminent approaches whose different methods in developing indices is the result of their different perception regarding the actual definition of a 'business cycle'.

4.3.1. U.S.A

In the U.S, the most prevalent tool for the economists and analysts in order to forecast the future of the economy is the Index of Leading Indicators. It is computed by the Department of Commerce and it is published every month while it is important to point out that every state has its own Leading Index, monthly published, since 1981-2²⁶. Particularly interesting, in the field of leading economic indicators, it is the 'Composite Index of Leading Indicators' which is published by the U.S Conference Board every month. Its main use again is to forecast the economic activity of the forthcoming months. The index consists of ten components of the economy that are generally considered important and whose changes are believed to precede alterations in the economy. The ten components are the following:

- a) The S&P 500 stock index
- b) Consumer expectations
- c) Interest rate spread
- d) The money supply (inflation adjusted)
- e) The average weekly hours worked by manufacturing workers
- f) The average number of initial applications for unemployment insurance
- g) Manufacturers' new orders for materials and consumer goods
- h) The speed of delivery of new materials from suppliers to vendors
- i) Manufacturers' new orders for capital goods excluding these for defence
- j) The amount of new building permits for private housing units

²⁶ Lahiri, K. and Moore, G. (1991) *Leading economic indicators*

The ‘Composite Index of Leading Indicators’ was initially published only for the U.S but now has expanded to 12 more countries such as: Australia, Brazil, China, Euro Area, France, Germany, India, Japan, Korea, Mexico, Spain, U.K²⁷ (Conference-board.org, 2014).

4.3.2. OECD

The reputation of the U.S leading indicators published by the NBER has triggered the creation of similar indexes in other developed countries. Since 1970, OECD publishes Composite Leading Indicators (CLI) in order to anticipate turning points in economic activity. Once again we should state that both CLI and “Composite Index of Leading Indicators” cannot put into their account significant unforeseen or unexpected events such as natural disasters, embargo, political turmoil etc.

4.4. Presenting the most appropriate indexes

From the multitude of the existing leading indicators, a selection need to be made of the most helpful to our aim, i.e. a choice of the most indicative indices that could potentially help investors to decide whether an investment is worth making or not. A brief presentation of what the author considers as quite indicative ones for general purposes follows:

4.4.1. Stock markets

“The stock market has forecasted nine of the five recession”. Paul Antony Samuelson 1st American who won the Nobel Prize in Economics.

Although Paul Samuelson’s famous witticism about the reliability of the stock market as economic indicator is not the best advertisement for our analysis we cannot neglect its relation to the economy. Indeed, stocks markets around the world are extremely volatile and the interpretation of their daily results can lead to wrong and unsustainable signs for the future economy.

On the contrary, not a few times a significant drop in the stock markets confirms the fear that a general economic downturn is coming. **The real question that should be asked is why the stock**

²⁷ www.conference-board.org

prices and economic activity have parallel variations? The answer is given if we combine Tobin's q ratio theory²⁸ with our basic knowledge of macroeconomics.

Assume that a company faces a declining shares' value. Subsequently its q ratio is also declining, which reflects investor's pessimism about the future yield of their investment. Other things being equal, (as e.g. and in relation to short period, where the interest rates remain stable) the parallel of the shares value (i.e. stock index) and the q index shows that the investments are decreasing, the demand for goods and services are declining and the economy seems to enter in a recession.

Regarding now bulk ship management companies, they are seeing their share to the bottom of the barrel in comparison with the value they had when they entered in the stock market. The losses recorded in the third quarter of 2015 are great. Indeed, some of these companies, including two under Greek interest, Dryships and Paragon Shipping, was evicted from its main markets to NASDAQ. This could easily indicate that the shipping sector faces difficulties. Accordingly, the economy may well be soon find itself in recession. Which in itself is an indication of the current stage of the economic cycle in shipping²⁹.

4.4.2. Interest rates

These strong connections between the stock market and the economy are not slipping away from the attention of those who carve economic policy, who in turn affect the interest rates. Federal Reserve and other central banks, 'following' the stock markets, control the interbank³⁰ lending rates and thus further affect the economy.

Historically central banks aiming to give a stimulus to the market in periods of economic downturn, such as the current, have either lowered rates or increased the supply of money which in reality represents the other side of the coin. This practice seemed to work in the beginning but over the years its implementation has been less and less effective. Lower interest, in contrast with the

²⁸ **Q=total market value of firm/total asset value** source: Investopedia

²⁹ This result is also easily ascertained by the great share prices drop of all major shipping companies as evidenced by their share prices during 2016.

³⁰ The interbank rate is the rate of interest charged on short-term loans made between banks. Banks borrow and lend money in the interbank market in order to manage liquidity and meet the requirements placed on them. The interest rate charged depends on the availability of money in the market, on prevailing rates and on the specific terms of the contract, such as term length. Source: Investopedia

expectations, lead consumers to ‘stuff their cash under the mattress’ sending simultaneously a clear message to investors that something is going wrong with the economy.

The most important thing though, is that for the first time in the contemporary economic history the consumers are being penalized for keeping their money in banks. According to the writer’s opinion this situation is going to reduce bank profits in a time when the majority of big banks have exposure to the flailing energy sector (historic low oil prices)

On the other hand, *“an interest rate hike by the Fed is likely to have a crippling effect on global markets as it ripples through commodity prices, and weakens currencies in comparison to US Dollar due to significant capital outflows. For the U.S., it would make exports less competitive in global markets and is likely to reduce inflation just as the Fed is pushing to achieve their target inflation rate of 2%.”*³¹ Accordingly such a measure, can act in favour of some developing countries as their product/commodities become more competitive by taking advantage of the lower exchange rates compared with the strong currencies.

4.4.3. Banking system

Throughout economic history, the problems of the banking system often coincide with downturns in the economic cycle. Back to 1930 when a major economic crisis broke out, many banks found that they could not pay their obligation, as the value of their assets fell below the value of their liabilities. Those banks were forced to stop their business, leading many economists to conclude that the numerous bankruptcies of banks, that given period, helps to explain the severity and persistence of the great crisis.

Also, banking crises have as some of their causes in unsustainable macroeconomic policies from governments, market failures and most frequently they are characterized by boom-bust cycles in credit and asset prices.

In addition, major economic events in certain industries also affect the banking sector per se. For example, in shipping “The biggest economic challenge facing the industry causing financial

³¹ Article: Timing of the Fed Interest Rates Hike by Shiv Mehta November 2015

distress is the present financial crisis in Europe and its effect on the availability of credit for this capital intensive sector. A huge percentage of the new building book, which was deferred over the past two years, is yet to be delivered. Owners are struggling to find the funds required to pay the shipyard upon delivery. The banks know that the vessel's value upon delivery will be impaired against their loan and are reluctant to make the final payments. Most of the traditional shipping banks are based in the Eurozone and several are experiencing balance sheet issues of their own, which has increased their cost of funding. Recently, some of these banks have been unwilling to finance the purchase of second-hand vessels, which is creating a stalled sale and purchase market. Additionally, these same banks are witnessing significant erosion in the collateral value of their security and are pushing owners to sell vessels that they believe will be further impaired. This has and will continue to put tremendous pressure on second hand values.”³²

Under this pressure exerted from banks a large number of ship-owners have already approached them seeking loan-relief. Unfortunately, though the ‘amend and extend’ business strategy of the banks has accomplished nothing more than forcing owners to drain their cash reserves. With spot rates in several sectors barely covering operating costs, some of the larger shipping companies are facing bankruptcy issues unless they find a new way to finance their operations or their investments.

4.4.4. Housing and building permits

Housing starts and building permits are economic indicators used to determine the health of the housing sector. In the United States, housing start and building permit data is released by the Census Bureau, and is estimated from the Survey of Construction (SOC) and the Building Permits Survey (BPS). Data is released each month in the New Residential Construction report.

The building permit statistic is an estimate of the number of new housing units that have been issued a permit during a given month. The Census Bureau collects permit data by sending a survey to permitting offices.

³² Article: Financial distress in the shipping sector

The housing starts statistic indicates the number of housing units that began construction during a given time period. Field representatives of the Census Bureau sample individual permits from permit offices, and check with permit holders to determine if construction has begun.



Figure 6: Housing market index combined with consumer spending

Economists look at building permits and housing starts to determine how well the economy is performing. If more building permits are being issued economists may assume that more investment is being allocated to the housing market, which traditionally makes up 5% of the U.S. economy. A decline in the number of housing starts relative to building permits may indicate that planned construction is being put off, possibly because of unfavourable economic conditions.

Of course, an unusual augment of this index should be treated with cautious rather with the excitement that accompanies a future economic growth. An increased number of house permits may be a first warning sign that many home loans are issued with terms unfavourable to the lenders (banking system). We should not forget the year 2008 when the world economy faced its most dangerous crisis since the Great Depression of the 1930s. The contagion, which began in 2007 when sky-high home prices in the United States finally turned decisively downward, spread quickly, first to the entire U.S. financial sector and then to financial markets overseas. The casualties in the United States included a) the entire investment banking industry, b) the biggest insurance company, c) the two enterprises chartered by the government to facilitate mortgage

lending (**Fannie Mae and Freddie Mac**), d) the largest mortgage lender, e) the largest savings and loan, and f) two of the largest commercial banks.

4.4.5. Consumer spending

Consumer's spending index is highly associated with the house and building permits index as we can see from the above figure and this is something logical if we think that when consumers are eligible to spend more money to satisfy their needs house prices tend to increase as they constitute one of their most primary needs.

Many economists believe that consumer spending is the most important short run determinant of economic performance. In our analysis, consumer spending is not going to concern us a lot due to its very nature, which only reveals the use of finished goods and services. **This is distinguished from the economy of raw materials, referring to the supply chain and intermediate stages of production necessary to make finished goods and services which mainly concern dry bulk vessels.**

5. Chapter Five: Shipping indicators

5.1. Pure shipping indicators – the 4 shipping markets

Today sea transport services are being affected by four closely related markets. These markets are:

- **The new building market**
- **The freight market**
- **The S&P market**
- **The demolition market**

5.1.1. New-building market

New-building market plays the most crucial role in the seaborne trade as it's the only creative industry among the 4 mentioned. This fact has several consequences. First and foremost, due to its nature, is the only responsible for the fleet growth. To make it clear it is the first brick in a domino chain, previously named, supply and demand mechanism.

5.1.2. Freight market

The freight market is generally consisted by two major types of trade: the voyage-charter in which the shipper “buys” transport from the ship-owner at a fixed price per ton of cargo and the time-charter under which the ship is “rented for an amount usually expressed in a daily hire”. The voyage charter suits shippers who prefer to pay an agreed sum and leave the management of the transport to the ship-owner, while the time charter is for experienced ship operators who can handle the transport themselves. The transaction of the goods is being fixed when a specific price is agreed among the counterparts. An indication for that specific freight or hire rate comes from the only physical freight market, the Baltic Shipping Exchange. The price offered depends on the commodity and its destination.

The Baltic Dry Index is a common indicator that analysts, investors, and financial managers follow to get a sense of where shipping rates are heading. Published by Baltic Exchange daily, the index

tracks spot rates for key dry bulk shipping routes around the world, does its magic, and combines them all. Although the index tracks the spot market, spot markets and time charter rates tend to watch each other.

The composite BDI is the product of an unweighted average of TCAs for all vessel classes and a “continuity multiplier” which changes when routes or vessels classes are added or removed from the index. The BDI calculation is:

$$BDI = (Capesize\ TCA + Panamax\ TCA + Supramax\ TCA + Handysize\ TCA) / 4 * 0.113473601$$

Also, dry bulk goods are used principally to produce other goods, and demand is dependent on when finished goods come to market. Rice and grain can arrive in consumer markets quickly, while iron ore manufactured into steel requires more time. Thus, even if raw goods shipments are expanding, when the supply chain will move these items into their finished stage isn't clear. Economic surprises, unanticipated pricing changes, tariffs and quotas can disrupt the supply chain and delay manufacturing, complicating the BDI's ability to predict the direction and pace of global economic activity³³.

5.1.3. Second hand asset market

The participants in the S&P market are the same mix of shipping companies, ship-owners, shippers, hedge funds, speculators who trade in the freight market. Here the owner of a vessel comes to the market to raise money by selling its asset. There are numerous reasons behind this purpose. He may want to differentiate his trade by entering in a new market and his vessel is not more suitable, he may have a policy of replacing vessels at a certain age or he predicts that he is going to sell it higher than he bought it exploiting a likely downturn in the dry bulk market. Vessels are also being sold as there are no alternatives for their owners; quite often owners sell their assets as they are unable to meet their liabilities to banks or they cannot afford to maintain it.

³³ Cnf: Shipping indexes signal global economic trends /federal reserve bank of Dallas

5.1.4. Scrapping

This is the last market but not the least; in fact, the recycling of the vessels is one of the primary concerns for both shipping market and the owner. An owner who probably owns an over-aged vessel unable to compete the new ones in trading and unable to be sold for continuing trading, offers it on the demolition market. With this action two things are accomplished simultaneously. First and foremost, the number of existing total fleet is decreased favouring the freight markets. Finally, the owner takes back a proportion of his money invested in the acquisition of the vessel, based on its lightweight, by selling it for steel.

The ultimate buyers are the demolition yards, most of which are located in the Far East. India, Pakistan, Bangladesh and China seem to control this recycling industry but recently European countries such as Turkey and Poland are experiencing an unprecedented growth earning the preferences of the ship-owners. Iron prices are determined by negotiation and depend once again on the supply and demand mechanism. *“Steel prices can be very volatile, fluctuating from a though of 100\$/lwt in the 1980s to more than 400\$/lwt in 2007. The price also varies from ship to ship, depending on its suitability for scrapping.”*³⁴

Accordingly, the demolition market should be looked as a whole, both in the traditional and the emerging areas.

5.2. Different categories and widely used indicators in shipping

The division of indices in leading, coincident and lagging, is also applied to the maritime sector. Respectively, a leading indicator of the shipping industry is considered the European Freight Forwarding Index while the Harpex Index is considered a lagging indicator and the BDI a coincident indicator of maritime business³⁵. As the major concern though, is the extraction of the appropriate information in this thesis, we are not going to analyse further those indexes as they are providing essential information about the container market rather than the dry bulk sector. Only for reasons of complete reference, below we are referring synoptically to them.

³⁴ Martin Stopford, p213

³⁵ Karamperidis, S. (2014) *Developing Maritime Indices*

- Logistics Performance Index (LPI)
- Liner Shipping Connectivity Index (LSCI)
- European and Chinese Freight Forwarding Index
- Port Congestion Index
- ConTex Index
- Harpex Index
- Producer Price Index

5.3. What a vessel's price means?

In the circumstances presented above it is clearly depicted that second-hand prices affecting ship-owner's policy. The question raised here is; what determines the value of a vessel at a particular point of time?

Firstly, the freight rates. Earlier we have discussed that the freight rates are mainly responsible for the time length of peak and troughs. The dry market history clearly shows the existing correlation between those two. "This correlation provides some guidance on valuing ships using the gross earnings method which suggests that when freight rates are high the S&P market values a 5-year-old vessel at about four to six times its current annual earnings, based one-year time charter."

Secondly, a determinant for the evaluation of a vessel is its age. It is commonly accepted by brokers who value ships a "rule of thumb" that a vessel loses 5-6% of its value each year. "The depreciation reflects the loss of performance due to age; higher maintenance costs, a degree of technical obsolescence and expectations about the economic life of the vessel".

Finally, the most important factor that affects a vessel's price is what we call "market sentiment". The market can swing from deep depression to intensive activity in a matter of time; when they feel that it is "one the move". The initial reluctances are stepped aside and suddenly begin a battle with the time.

6. Chapter Six: Data Analysis

In this Chapter we shall endeavour to analyse the various data already presented and mentioned in chapter 5. The author will use the indicators (and other relevant data mentioned therein) to create fractions. The resulting ratios are going to be examined and the author will discuss the main findings arising. For this venture the author has crafted several graphs and tables.

In addition, the analysis will take into account the other two constituents of the author's main line of thought and methodology, which are the common sense and the inferential statistics

6.1. A brief Description of the ratios that will be examined

The origin of those ratios comes from the careful analysis of the 4 major markets described in chapter 5. As it has become evident from our previous analysis, those markets are highly correlated. Following the presentation of the appropriate charts, it will be ascertained that warning signs do exist and their occurrence happens in different sectors concurrently.

A brief presentation of the relevant ratios follows, and same will be examined in greater detail later in this chapter.

6.1.1. Order book/Existing fleet

The order book as a percentage of the existing fleet is a ratio that analysts widely use as it is quite illustrative. When this percentage is growing people involved in the maritime industry reasonably expect that an expansion of the fleet will take place in the near future. The repercussions of this expansion will affect the supply side of the supply-demand mechanism and as a consequence it will exert pressure on the future freight rates. A precaution here is required in order to avoid oversimplicity. Even though the rationale behind this ratio is totally justified, it necessitates close attention. As mentioned in previous parts of this thesis, there are numerous factors that affect the supply side of this particular mechanism. It should not be disregarded that there will always be the alternative of owners scrapping their home tonnages or even cancelling the deliveries of their orders.

6.1.2. Contracting /Order book

Contracting is a straight-forward figure which includes the number of new orders places for new vessels in a particular year. Its importance as indicator arises from the fact that it provides an insight into the future shape of the supply of the demand-supply mechanism that regulates the shipping industry. Comparing it with the existing order book it gives a powerful ratio that offers a clear picture of the magnitude of new orders in a specific year with the order book in that year.

An interesting detail, revealed by our analysis which needs to be stressed is that the contracting number of a particular year (2010) is nearly half the order book of this year. Considering now, that the order book of any year includes the aggregate number of new orders placed during all the previous years minus the deliveries we can undoubtedly conclude that this finding could work as a potential warning sign of a future overheated market.

6.1.3. Second hand/New building Price Ratio

It is commonly accepted that the typical life of a bulk carrier is approximately 25 years. In addition, in this thesis we have ascertained that this view is going to change quite soon as both new regulations from major policy makers (IMO) and the huge technological leaps that accompany technology impose a new reality for shipping with new more ecological friendly and technologically advanced ships. Nonetheless, neither of these factors can stop a vessel's depreciation over time. In reality we may consider that the previous accepted range of 5-6% of depreciation per year that incurs is a little bit outdated taking into consideration the forthcoming alternatives.

For the purpose of this paper we assume that a vessel loses 6-7% of its initial value, so a basic thought that a 5-years-old vessel must worth 70% of its initial value is absolutely reasonable.

6.1.4. Freight rates

As we noticed the freight rate is the average of the prices agreed for the transportation of specific goods in specific routes. Generally, this transportation is generally classed into two major types: the voyage charter and the time charter. As is general knowledge, spot freights are higher than

time charter hires. An examination of the fluctuations of the freights is going to help us reach some inferences about the rational price of a vessel, the logical expectances about the future freights rates growth and many other things such as the identification of the most profitable route.

6.2. Fleet Analysis

By the analysis of the most recent data³⁶ we extract substantial information about the existing numbers of the global Panamax fleet. The aforementioned fleet stands at 2,043 vessels of equivalent 157,38 m dwt). Of this 180 vessels or 12,59 m dwt are over 20 years of age accounting for 8,81% of the total fleet in absolute number of vessels or 8% in terms of total m dwt.

Table 2: In service Panamax Fleet

	Total	In Service Fleet							Total	Orderbook		
		<5yrs	5-9yrs	10-14yrs	15-19yrs	20-24yrs	25+yrs	2016		2017	2018+	
60,000-67,999 dwt	63	13	14	5	3	4	24	0	0	0	0	
in mil DWT	4	0,82	0,88	0,32	0,2	0,26	1,53	0	0	0	0	
68,000-71,999 dwt	167	21	7	0	32	80	27	2	0	2	0	
in mil DWT	11,7	1,48	0,5	0	2,25	5,59	1,88	0,14	0	0,14	0	
72,000-74,999 dwt	353	18	17	71	217	27	3	2	2	0	0	
in mil DWT	26,04	1,34	1,27	5,25	15,98	1,98	0,22	0,15	0,15	0	0	
75,000-79,999 dwt	659	180	180	208	76	9	6	12	9	3	0	
in mil DWT	50,25	13,74	13,71	15,89	5,77	0,68	0,46	0,92	0,69	0,23	0	
80,000-80,999 dwt	138	55	83	0	0	0	0	10	9	1	0	
in mil DWT	11,03	4,4	6,63	0	0	0	0	0,8	0,72	0,08	0	
81,000-82,999 dwt	619	443	144	32	0	0	0	213	122	78	13	
in mil DWT	50,68	36,23	11,81	2,64	0	0	0	17,41	9,97	6,37	1,06	
83,000-87,999 dwt	44	11	29	4	0	0	0	2	0	2	0	
in mil DWT	3,68	0,92	2,42	0,33	0	0	0	0,17	0	0,17	0	
Panamax	2043	741	474	320	328	120	60	241	142	86	13	
in mil DWT	157,38	58,93	37,22	24,43	24,2	8,51	4,09	19,59	11,53	6,99	1,06	

6.3. Order book/Existing fleet

After the above brief presentation of the Panamax fleet we shall now examine our first ratio, which, we expect to help us extract valuable findings. Below we appose our Panamax database which

³⁶ Extracted from Allied shipbrokers report

contains information about the order-book, the contracting and fleet for the years of our research 2001-2016.

Table 3: Panamax database regarding order book, contracting and actual fleet

Panamax orderbook ,contracting and fleet database						
year	orderbook	contracting	existing fleet	contracting as % of orderbook	orderbook as % of existing fleet	contracting /existing fleet
2001	200	30	1185	0,15	16,88	0,03
2002	240	80	1200	0,33	20	0,07
2003	300	145	1240	0,48	24,19	0,12
2004	340	155	1300	0,46	26,15	0,12
2005	350	60	1400	0,17	25	0,04
2006	320	170	1450	0,53	22,07	0,12
2007	414	220	1480	0,53	28	0,15
2008	555	150	1500	0,27	37	10
2009	546	80	1560	0,15	35	5,12
2010	504	413	1627	0,82	31	25
2011	829	190	1727	0,23	48	11,00
2012	742	80	1856	0,11	40	4,31
2013	451	150	1961	0,33	23	7,65
2014	376	140	1980	0,37	19	6,69
2015	320	60	2000	0,19	16	2,97
2016	241	0	2043	0,00	11,8	0,00

From the above table we produced the following chart, wherein we can easily focus on a point which exhibits an unusual behaviour. Thus, let us discuss it thoroughly.

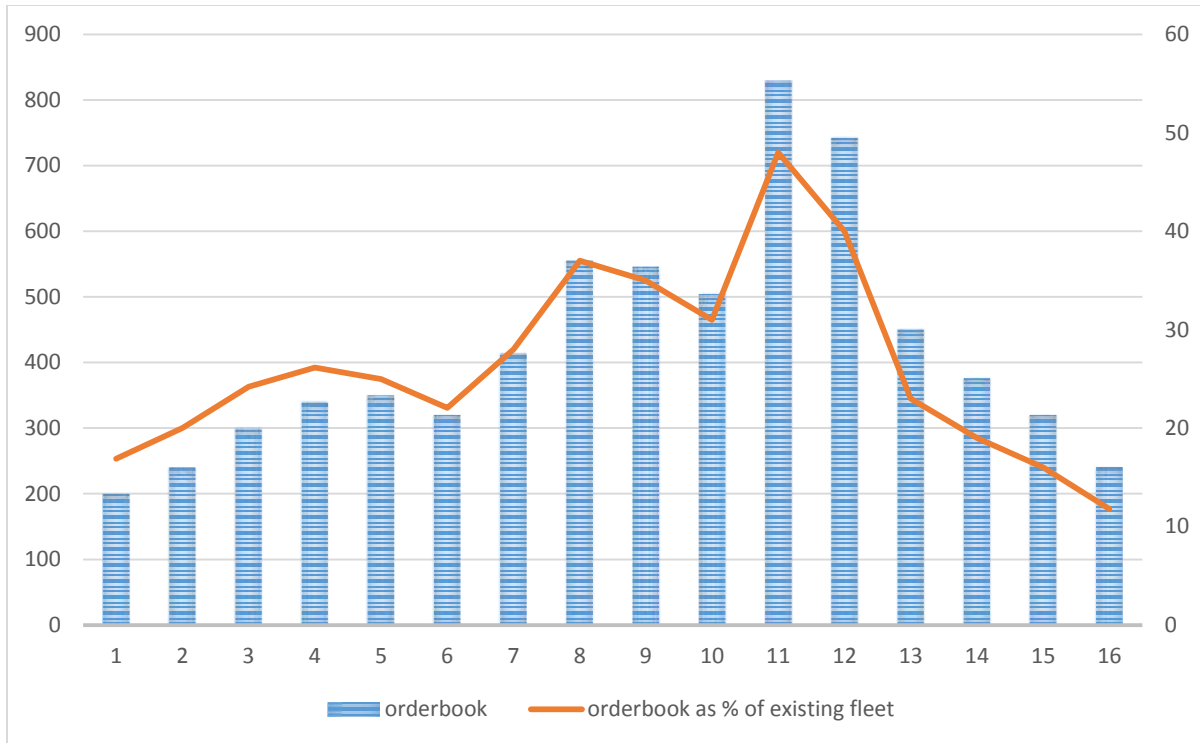


Figure 7: New contracting paced each year by time till delivery, no of vessels

In 2001 and 2002 order books are fluctuating at levels of nearly 17% and 20% respectively, which, in terms of time scale of our research represents the lowest value. Continuing in the years 2003 until 2006 we observe an increase of this percentage but not something that we have to worry about. The percentage of this rise is approximately 5% in 2003. As from 2004 and until 2006 we observe small fluctuations. The first warning signs can be recognized in years 2007-2008 and 2010 as the above percentages reach the values of 37% and 48% respectively. The reasons behind this overloaded order book are, at a first glance, easily found and more easily justified. Examining though, in depth the data and without being seduced by the pursuit of easy profit, we can see that placing orders during those specific years could be at least catastrophic. This observation is supported mainly by two factors:

- firstly, by looking at the price volatility of one-year-charter, which was exponentially climaxed in 2008 and thus giving a prudent businessman reasons to doubt its continuous rising and to expect a tumbling and
- secondly by fact of the expected time lag of the deliveries, which was undoubtedly neglected.

The below figures are illustrative of those conclusions.

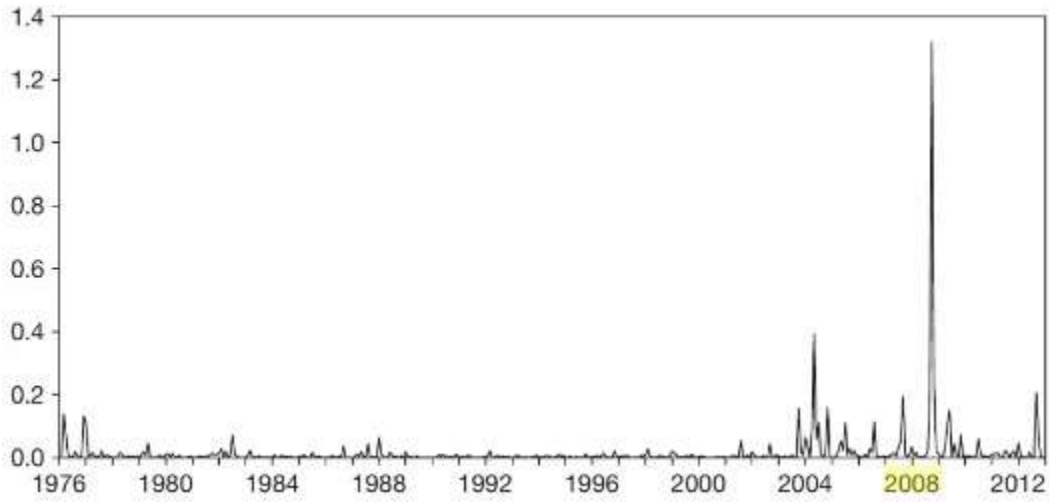


Figure 8: Price volatility of one-year time charter rates for Panamax vessels

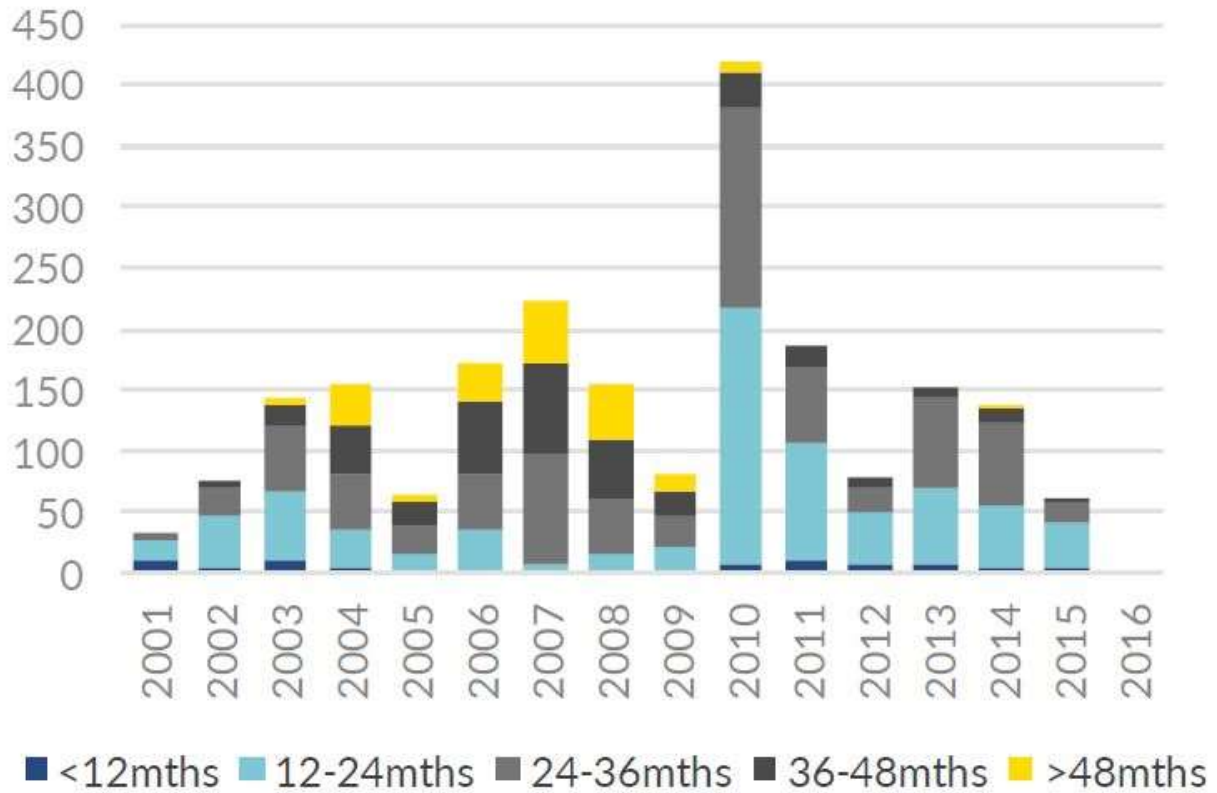


Figure 9: New contracting placed each year by time till delivery, no. of vessels

Ending our analysis with this specific ratio we may observe that during 2015 there were the most-delayed deliveries of vessels since 2010 and the then current order book was again at its lowest level (16%).

Today, at the moment of writing, no Panamax order has been placed despite the super low asset market prices.

6.4. Contracting/Order book

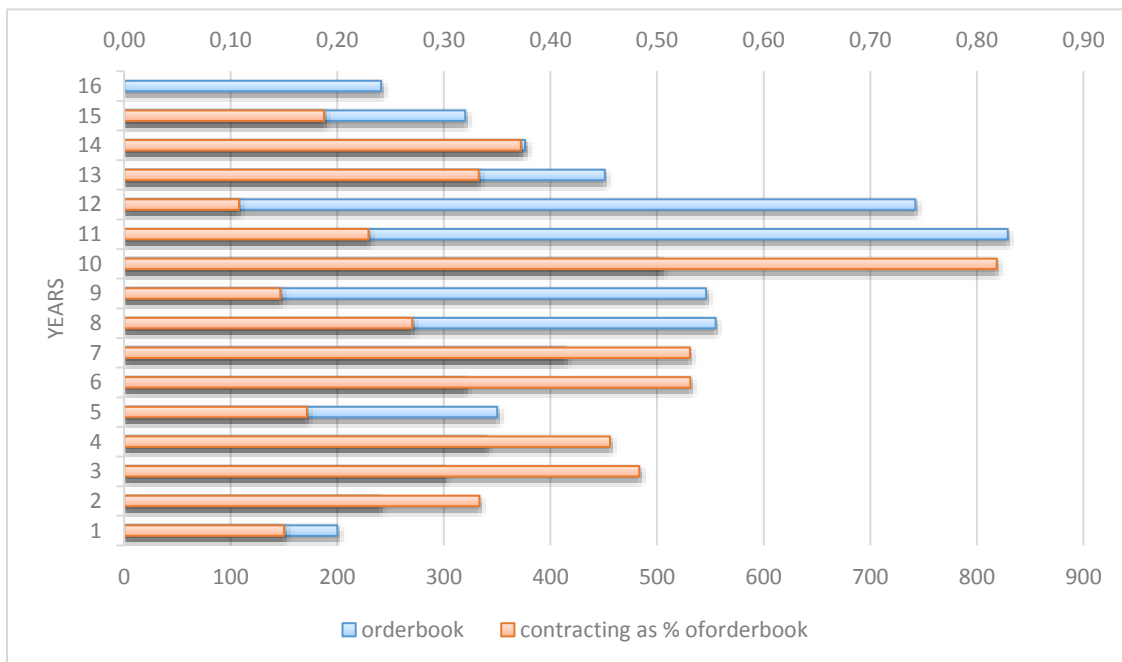


Figure 10: Contracting/Order Book

From the above graph we can see that the fluctuation of the values is within ordinary parameters. Beginning our analysis with the year 2001 we note low activity in contracting which is also accompanied by a historic low order book. In 2003 and 2004 we find, for the first time, a significant growth of this ratio, as the number for the placement of orders was between 400 and 500 vessels. At the same the examined ratio was nearly above 45%. In 2007 and 2008 it exhibited almost the same pattern as the years 2003 and 2004. An important difference between the examined years exists, which had brought during the former economic disaster. In 2003-2004 the world economy was thriving and the delivery of the ordered vessels coincided with the boom of the Chinese economy, which in turn it was transformed to a voracious appetite for commodities. However, during 2007-

2008, the orders were placed in the heat of the moment in times where the freight rates were at their highest levels and the worst financial crisis was about to break out.

The oxymoron in this case is that the Panamax investors should be considered favoured by luck, as the contracting/order book ratio during the same period within the Capesize sector reached 198%!! The investors saw their assets getting depreciated in a matter of time while the most prudent foresaw the opportunity and cancelled their orders, thus mitigating the losses.

This finding depicts, in the most obvious way, the usefulness and importance of this ratio as a warning sign. Further it may act as a proof of our proposition that different sized vessels are governed by different patterns even if they are members of the same larger “family”.

The optimism of investors did not end. In an effort to recover their losses they hoped that the storm passed and they overloaded once again the order book in 2011 with a placement of 829 vessels, thus reaching a contracting percent equal to 80% of the order book. The end of the story, is well known to everyone, as, today the 2011 order-book is completely delivered.

6.5. Second hand /New building Price Ratio

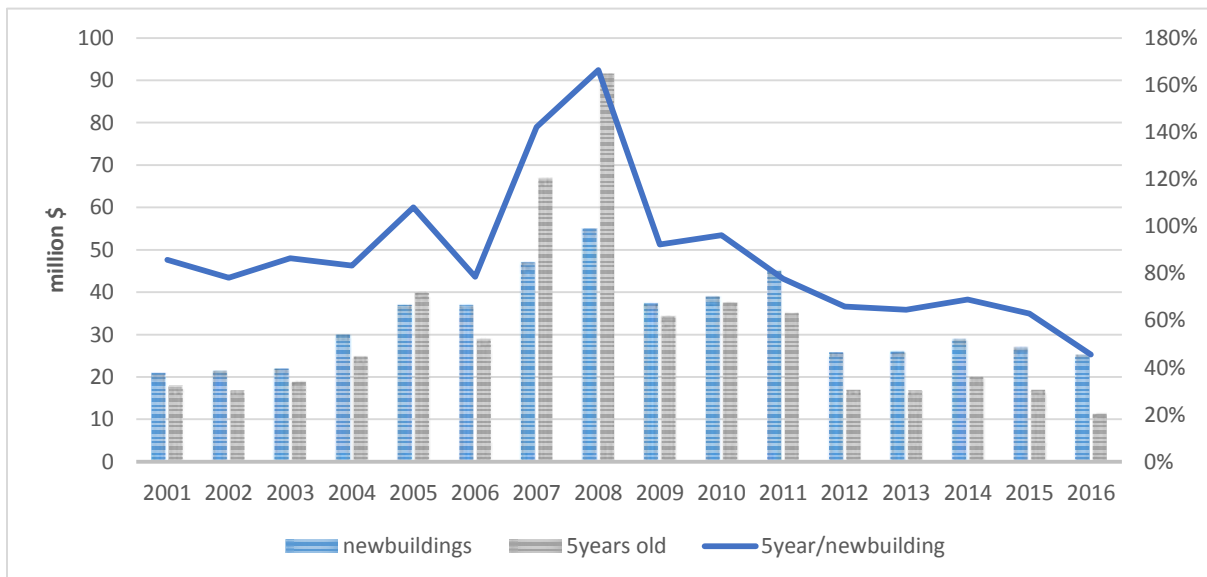


Figure 11: 5 years old Second hand / new building prices ratio

This graph clearly shows that the 5-years-old second hand/new building vessels prices ratio fluctuates beyond the 'reasonable percentage' as same was presented being realistic following the depreciation of the vessels during the years 2001-2003. In 2005 this ratio reached 89%. It is appropriate to clarify at this point what this rise means in money-terms.

In 2004, the value of a new building and the value of a 5-years-old second-hand ship was \$29m and \$25m respectively, which amounts to a ratio of 86%.

In 2005 this ratio only arose by 3%, but this minor change had, at a first glance, a huge impact on the vessels prices. Giving specific numbers, a new building was worth \$37m.

In 2007, it was the first time that the price of a second hand Panamax Bulk carrier exceeded the price of a new building (ratio 144%). The increasing pattern persists for one more year (2008) where it reaches the highest ratio value of 166%. At that time, the value of a second hand was \$91,5m, meaning that a 5-years-old second hand Panamax Bulk vessel was 66% more expensive than a new building.

A better picture of that gigantic increase observed, will be taken if we compare and contrast the alteration of the prices in non-consecutive years. For example, if we consider 2001 as a base year we will observe that a 5-years-old second hand Panamax Bulk vessel had reached a price 4 times above the initial price that the market had set.

Before we continue the historical data analysis, we think it is time to ask oneself if is it worth overpaying 3 or 4 times the objective value of an asset in order to acquire it. Is it reasonable not to comprehend that by overpaying for something you increase the odds of not having a better return on investment? or lastly, is it possible, even for the longest lasting market, to carry on rising? To the author's mind the answer seems to be too obvious to spell it out.

Returning to our data analysis, in 2009, when the global economic crisis broke out, the prices plummeted and that is clearly mirrored on the ratio that also fall to 92%. That was only the beginning, as further drop took place during the following years. Since 2009, the Panamax vessels have been facing drastic falls in their values, which has ended up in the current historical low prices.

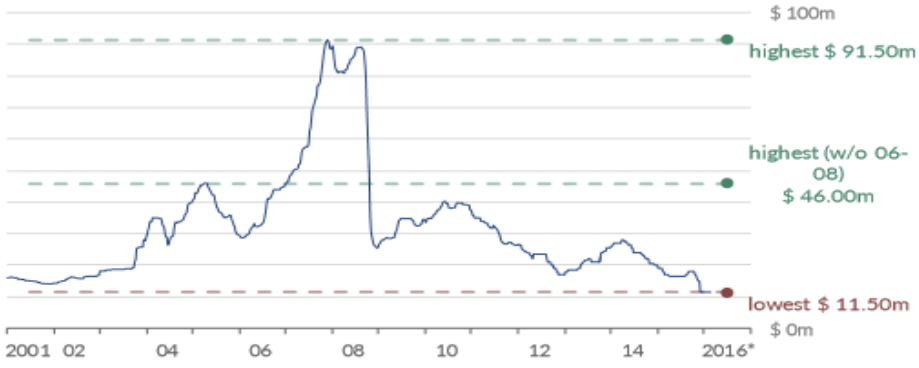


Figure 12: Price trends for 5-year-old Panamax assets

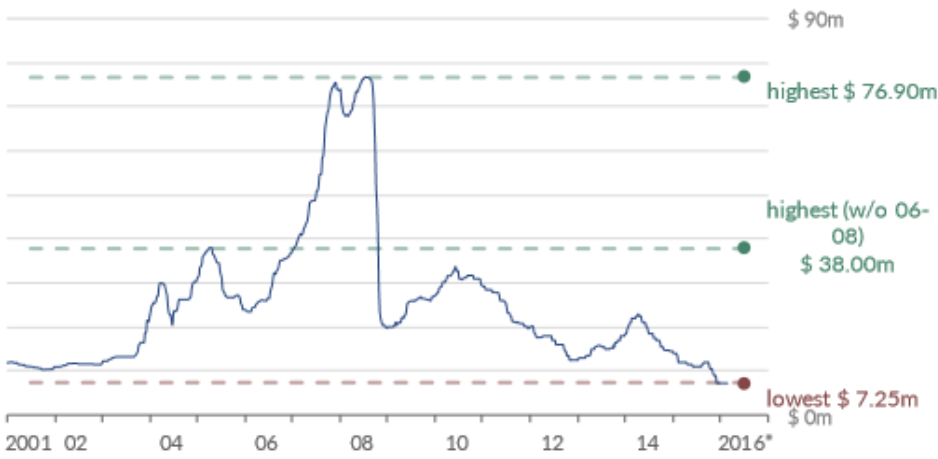


Figure 13: Price trends for 10-year-old Panamax assets

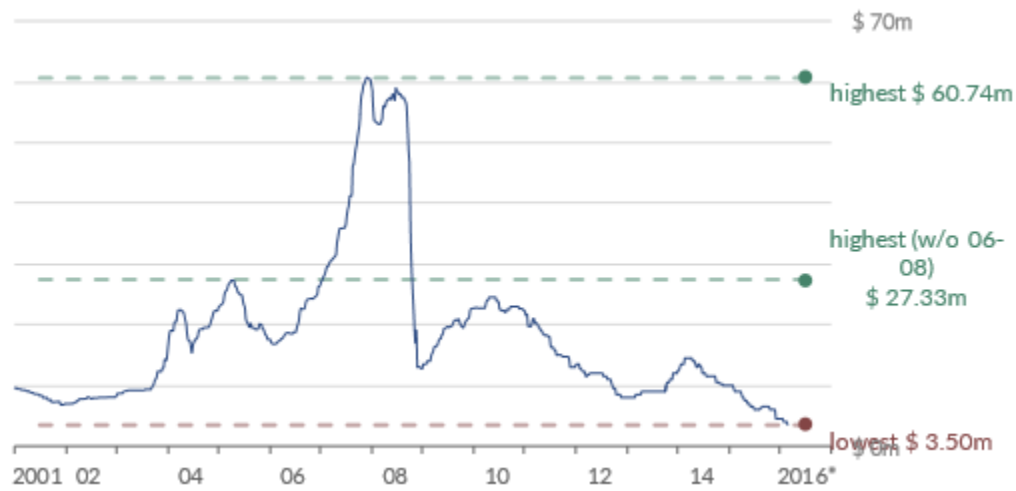


Figure 14: Price trends for 15-year-old assets

Following this first familiarity with the second hand/new building ratio, it is time to survey the current situation by using in our analysis some core statistical data. Our hope is that these mainstream statistics will assist us, even at this initial stage, to look into the heart of the market and be able to evaluate the Panamax ships with the correct criteria.

Price as a percentage of newbuilding and in reference to the typical discount that would accumulate under a normal depreciation (marked in light green) as well as the typical range during medium market conditions (marked in light red) and a target (marked by the grey line), evaluating the current discount on offer.



Figure 15: Second hand prices compared to those of new building (as a% of NB)

Giving now specific numbers to the above figure, the 5-years-old ship is worth \$11,5 million. Paying close attention to the statistical data for this 5-years-old asset we observe that it has a mean value of 30 million dollars and a standard deviation of 21 million dollars. After calculating the confidence intervals using 99% confidence level we are able to see that this asset is valued at historical low prices. From the said confidence intervals $[X - z * * (\frac{\sigma}{\sqrt{n}}), X + z * * (\frac{\sigma}{\sqrt{n}})]$ ³⁷

Where

X represents the mean value, σ standard deviation and n the population. From the said confidence intervals $[(30- 13, 94), (30+ 13,4)$ it is obvious that a 11,5 million asset price even below the lowest

³⁷ For a known standard deviation we use z^* , for an unknown standard deviation we use t-student

predictions. That, surely, encompasses investing opportunities but at the same time creates major concerns about the sustainability of the sector.

Correspondingly, and pursuant to the laws of logic, the other categories referred to in figure 18 are also being negotiated in low prices. As we can see though, investment interest appears only in the 5-years-old assets, as the discount offers opportunities reaching up to a level of 70%. On the other hand, we cannot exclude some speculative moves in the 20-years-old assets where this 20% discount offer can be transmigrated in profit in scrapping.

6.6. Freight Rates

The Baltic Exchange employs a methodology that conserves the continuity of the BDI through vessel and route modifications by calculating a time-charter average TCA, a standard metric used in the shipping industry to assess the daily average revenue performance of a given vessel. Expressed in US dollars per voyage day, the TCA is computed by subtracting expenses such as port costs from the voyage revenue and dividing the adjusted number of voyage days. The TCA for an entire vessel class is found by taking the average of all individual TCAs. The composite BDI is the product of an unweighted average of TCAs for all vessel classes and a “continuity multiplier” which changes when routes or vessels classes are added or removed from the index. The BDI calculation is

$$\text{BDI} = (\text{Capesize TCA} + \text{Panamax TCA} + \text{Supramax TCA} + \text{Handysize TCA}) / 4 * 0.113473601$$

Table 4: Average annual freight rates for both period and spot market

Average annual freight rates for both period and spot market									
Average rate for each year for period freight rates as well as spot market									
Year	Period		Spot market						
	12 months	36 months	BPI : Index	BPI:TCA	ATLANTIC RV	Cont /Feast	Pacific RV	Feast/cont	
2016	5050	6422	354	2865	2242	6140	2600	350	
2015	7500	8406	691	5520	5980	10600	5000	540	
2014	12020	13072	964	7719	6900	15326	7853	820	
2013	10100	10118	1187	9564	10720	17698	8942	670	
2012	9733	10702	963	7700	7554	16289	7200	220	
2011	14660	14500	1749	14000	15298	23450	12000	5000	
2010	24603	19600	3115	25000	26600	35634	23300	14500	
2009	18111	15643	2405	19300	21800	28780	17400	9500	
2008	55640	44428	6090	49235	54123	62500	43600	35870	
2007	52330	39542	7032	56920	58614	61500	55200	52000	
2006	22200	17546	3021	23500	22000	24000	25100	24000	
2005	25850	19604	3128	24600	26500	31006	22000	19415	
2004	34350	22300	4383	35820	35837	40250	34780	32234	
2003	17254	12893	2544	20000	18900	20980	21400	19274	
2002	8900	9205	1130	7750	11000	12700	11850	9678	
2001	9000	9340	1248	8767					

Beginning to explain the above chart, the first point that we note is that the BDI index has reached for the first time a historical low point of 354 points. These harsh moments for the dry bulk sector are justified if we associate them with some facts that had occurred a couple of months earlier. The first one, as we mentioned in chapter 4, has to do with the stock market and especially with the Chinese stock market turbulence, which occurred during the summer of 2015. In June 2015 the popping of the stock market was inevitable as a third of the A-shares value on the Shanghai stock exchange was lost within a month from the event.

The second factor that affected the most the dry bulk shipping had to do again with China. China's economy was decelerating quicker than analysts had anticipated. To be more precise, even though the China's economy grew by 6.9% last year – its slowest pace in 25 years this growth was unable to keep trade at its usual standards. This negative impact is clearly depicted in the freights rates of the Continent/Pacific route where for the first time they dropped to 6140\$ day.

At those levels the majority of Panamax vessels could not operate at profit, which forced owners to cold layups. (see §3.1.1)

Below, we present a graph that shows the trend of Panamax freight rate indices in the 4 different routes that BPI takes into consideration.

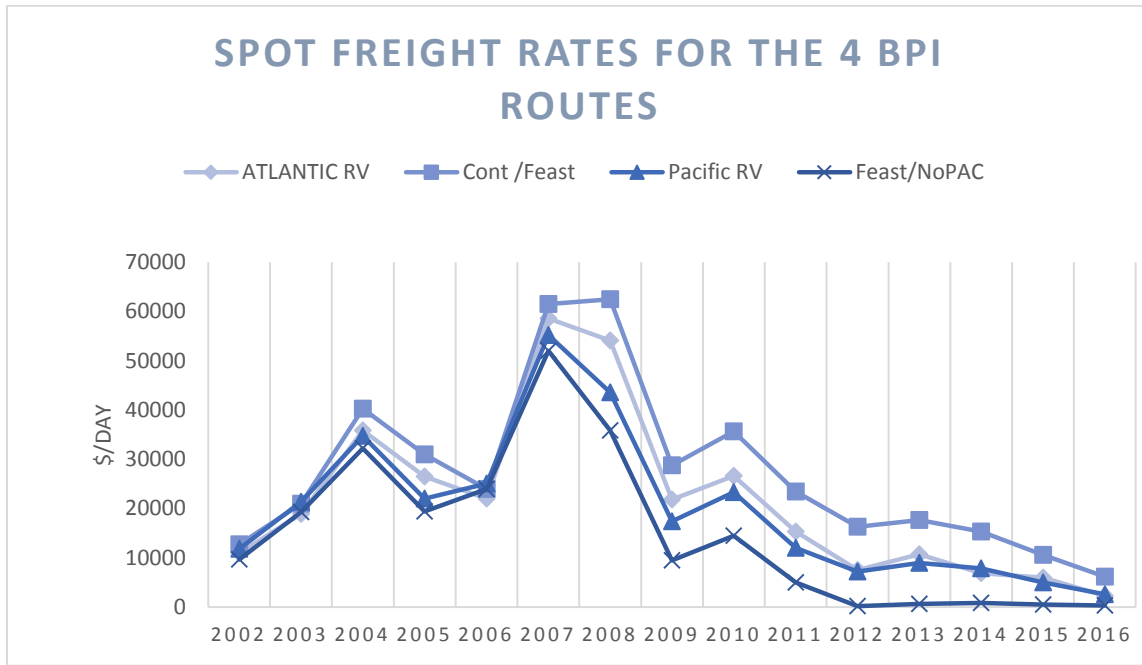


Figure 16: spot freight rates for the 4 BPI routes

Certainly, we see that the low freight rates accompany also the other 3 routes and in more detail we see that the spot freight rates are prohibitive for the 4th route. These low spot freights though are highly explained if we consider that this route operates with time chartered vessels.

This situation brings us to our third point which is the difference observed in freight rates depending on their chartering contracts (time charter or voyage charter). It is commonly accepted that in productive times, shipping owners want to charter their vessels in the spot market and when the sector is facing difficulties they prefer long term contracts in order to mitigate the risks. In this thesis, the author transforms this basic knowledge into a mathematic ratio in order to exploit the advantages of this mathematic visualization. This ratio demonstrates the uncertainty that torments the dry bulk sector and we present it in the hope that it would prove a useful tool for decision making. (strategic decisions, budgeting plan etc.).

Table 5: TC 12 months'/Avg. spot rates ratio

Year	Spot average	12 month TC	TC/ AVG spot
2001	11925	9000	0,75
2002	11307	8900	0,79
2003	20139	17254	0,86
2004	35775	34350	0,96
2005	24730	25850	1,05
2006	23775	22200	0,93
2007	56829	52330	0,92
2008	49023	55640	1,13
2009	19370	18111	0,94
2010	25009	24603	0,98
2011	13937	14660	1,05
2012	7816	9733	1,25
2013	9508	10100	1,06
2014	7725	12020	1,56
2015	5530	7500	1,36
2016	2833	5050	1,78

From the chart it is obvious that during the last 3 years the harsh moments for freight rates intensified, culminating in 2016 where 12-months time charter rates were almost double than the spot average index. For sure, this is not going to change in the near future, unless we see some concerted actions aiming to remove the additional tonnages. At the moment charterers take advantage of the abundance of vessels and the low fuel prices and they hire vessels in very favourable prices.

Finally, thanks to descriptive statistics we constructed the normal distribution bell of the variable x where x represents the freight rates. in order to extract some useful findings for the range of the freights. This finding is quite essential as it reveals with the most tangible way that the expectations of some ship-owners are often absurd.

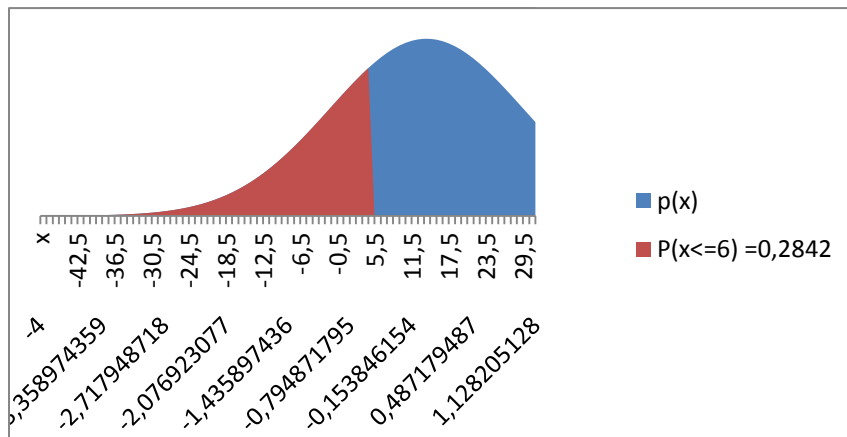
Assuming the onus of proof, we present below the normal distribution bell of the variable x which represents the one of the 4 main routes. Of course the same process may be followed for the other 3 routes or even for the period charter rates as unique variables.

Table 6: Feast/Continent descriptive statistics

Feast/cont	
Mean	14938,07
Standard Error	4040,083
Median	9678
Mode	#N/A
Standard Deviation	15647,17
Sample Variance	2,45E+08
Kurtosis	0,636839
Skewness	1,073189
Range	51780
Minimum	220
Maximum	52000
Sum	224071
Count	15
Confidence Level(99,0%)	12026,69

As we see from the table the mean value is 14.938\$ while the standard deviation is 15.647\$ using confidence level 99%.

Attempting to calculate how big the chance is for a vessel to earn less that 6.000\$ per day in this specific route, we see clearly from the following diagram that this probability in nearly 30%.



The number of 6.000\$ per day was used on purpose, as it is commonly accepted by business analysts that it leads to a breakeven point (revenues-outcome). So, for a prudent investor, who wants to face the harsh reality, it is necessary to be even more reluctant facing this probability as it is smoothed by the gold years of 2007 and 2008 which admittedly are not going to be repeated in the near future.

7. Chapter Seven: conclusions

The basic aim of this study was to investigate the existence of indicators and ratios that hide warning signs before dry cargo market crashes, in order to protect investors and ship-owners from unsound investments, costing hundreds of millions of dollars. The author chose to put under investigation the Panamax vessels as they bring essential characteristics that can reveal crucial points about the whole dry cargo market. The first and the most alluring thing that intrigues the author to deal with them, is their size and their use (substitutes for Capes). The second point stemmed from the great debate that exists at the moment about their value and about a gradual substitution that may suffer from the New Panamax type due to the forthcoming opening of the Panama Canal. Finally, these vessels are considered as the most appropriate for our analysis since they historically exhibit one of the smaller deviations in their prices, and therefore the indicator theory can detect easily changes who exceed or fall a given threshold.

The selection of data from well-respected databases such as Clarkson's SIN and the detailed analysis of carefully selected indicators both from the economic and from the shipping sector were considered as necessary in order to attain this end. All the shipping indicators/ratios studied in this thesis: second-hand/new-building price ratio, contracting/order-book, order-book as percentage of the existing fleet and freight rates were analysed for the years 2001-2016. On the other hand, the approach of the presentation of the economic indicators was done through a different angle, by reason of their different nature. Special attention was given to facts that affect the present economic situation. But this does not mean that the author did not examine eminent examples from the past that could result to useful conclusions.

The outcome of this research will hopefully satisfy an eloquent researcher of the examined field.

The author of this thesis strongly believes that an investment in a sector with a) heavily inflated asset prices and b) new orders that exceed every rational expectation for growth in a market that is totally ruled from the demand-supply mechanism and with the inherent problem of the time-lag between the order and the delivery of that asset, is unsound. In this context, the persistence of the author on mainly pointing out the fluctuations of the assets' prices and 'contracting' is justified.

Furthermore, it must be underlined that the aforementioned approach regarding the suitability of an investment decision refers only to investment and does not encompass speculative activities.

Another worth mentioning observation that stems from the findings of this thesis is the following. When the research began the initial impression was that the important information would be well hidden in data sets and that it would be extremely difficult to extract it. Now it seems reasonable to state that the impression was not accurate. The magnitude of specific numbers is immense and cannot be overlooked by someone who is researching the market with a sound-mind and detached from the ‘market rush’.

Ultimately, the critics of the indicator approach base their opinion on the fact that it is difficult to prove scientifically the causative relationship between the relevant indicators and the economic activity they reflect. Dadkahl and Zahedi³⁸ support that no one should deny the usage of indicators if they actually provide warning signals for forthcoming shifts in the economy or they help to forecast variables of interest with the main argument being the lack of a solid underlying theoretical basis. Real life situations cannot wait for theoretical solutions and as they famously said: *“It has not been discovered a causal relationship between the running of farm animals and an earthquake but it is foolish not to take the sign seriously”*.

³⁸ Dadkahl, K. and Zahedi, F. (1992) Forecasting with leading indicators: Does the new index lead

References

Alessi, L. and Detken, C. (2011) quasi real time early warning indicators for costly asset price boom/bust cycles: A role for global liquidity. *European Journal of Political Economy*, 27(3), pp. 520--533.

Anas, J. and Ferrara, L. (2002) *Detecting cyclical turning points: the ABCD approach and two probabilistic indicators*.

Babecky, J., Havranek, T., Mat\vuj\uu, J., Rusnak, M., Smidkova, K., and Vavsivcek, B. (2013) Leading indicators of crisis incidence: Evidence from developed countries. *Journal of International Money and Finance*, 35, pp. 1--19.

Borio, C. and Drehmann, M. (2009) Assessing the risk of banking crises--revisited. *BIS Quarterly Review*, 29, p. 46.

BP Statistical Review of World Energy (2013) 1st edn. [Online]. Available at: http://www.bp.com/content/dam/bp/pdf/statistical-review/statistical_review_of_world_energy_2013.pdf. (Accessed: 12 June 2014).

Branch, A. (1981) *Elements of shipping*. 1st edn. London: Chapman and Hall.

Bunkerworld.com, (2014) *Bunkerworld Prices - Latest Prices - Bunker Fuel Singapore, Rotterdam, Houston, Fujairah*. [Online]. 2014. Available at: <http://www.bunkerworld.com/prices/>. (Accessed: 3 August 2014).

Chang, Y. and Chang, H. (1996) Predictability of the dry bulk shipping market by BIFFEX. *Maritime Policy and Management*, 23(2), pp. 103--114.

Chen, Y. and Wang, S. (2004) The empirical evidence of the leverage effect on volatility in international bulk shipping market. *Maritime Policy & Management*, 31(2), pp. 109--124.

- Chiste, C. and Van Vuuren, G. (2014) Investigating the cyclical behaviour of the dry bulk shipping market. *Maritime Policy & Management*, 41(1), pp. 1--19.
- Clarksons Research Services Limited, (2014) *Sources & Methods for the Shipping Intelligence Weekly*. Clarksons SIN.
- Dadkhah, K. and Zahedi, F. (1992) Forecasting with leading indicators: Does the new index lead?. *Empirical Economics*, 17(4), pp. 485--505.
- Davidson, L. (1989) Knowing the unknowable. *Business Horizons*, 32(5), pp. 2--8.
- Duru, O., Bulut, E., and Yoshida, S. (2012) A fuzzy extended DELPHI method for adjustment of statistical time series prediction: An empirical study on dry bulk freight market case. *Expert Systems with Applications*, 39(1), pp. 840--848.
- Ecedweb.unomaha.edu, (2014) *Why Nations Trade: Economics Lesson*. [Online]. 2014. Available at: <http://ecedweb.unomaha.edu/lessons/feog1.htm>. (Accessed: 3 August 2014).
- Edison, H. (2003) Do indicators of financial crises work? An evaluation of an early warning system. *International Journal of Finance & Economics*, 8(1), pp. 11--53.
- Fukuda, S. and Onodera, T. (2001) a new composite index of coincident economic indicators in Japan: how can we improve forecast performances? *International journal of forecasting*, 17(3), pp. 483--498.
- Goulielmos, A. and Psifia, M. (2009) Forecasting weekly freight rates for one-year time charter 65 000 dwt bulk carrier, 1989--2008, using nonlinear methods. *Maritime Policy & Management*, 36(5), pp. 411--436.
- Goulielmos, A. and Psifia, M. (2006) Shipping finance: time to follow a new track?. *Maritime Policy & Management*, 33(3), pp. 301--320.
- Goulielmos, A. (1998) *Shipping Finance*. 1st edn. Athens: Stamoulis Editions.

- Graham, B. and Zweig, J. (2003) *the intelligent investor*. 1st edn. New York: Harper Business Essentials.
- Grammenos, C. (2010) *The Handbook Of Maritime Economics and Business*. 2nd edn. London.
- Greenwood, R. and Hanson, S. (2013) *Waves in ship prices and investment*.
- Hofstra University, (2014) *The Baltic Dry Index, 1985-2013*. [Online]. Available at: <https://people.hofstra.edu/geotrans/eng/ch7en/conc7en/bdi.html>.
- Howrey, E. (1968) A spectrum analysis of the long-swing hypothesis. *International Economic Review*, 9(2), pp. 228--252.
- Huang, N., Shen, Z., Long, S., Wu, M., Zheng, Q., Yen, N., Tung, C., and Liu, H. (1998) The empirical mode decomposition and the Hilbert spectrum for nonlinear and non-stationary time series analysis. *The Royal Society*, [Online]. Available at: http://webber.physik.unifreiburg.de/~jeti/studenten_seminar/stud_sem_WS_08_09/Huang_etal98.pdf.
- Hymans, S., Greenspan, A., Shiskin, J., and Early, J. (1973) On the use of leading indicators to predict cyclical turning points. *Brookings Papers on Economic Activity*, pp. 339--384. 82
- Jiafu, W., Jianxing, Y., and Gang, L. (2001) Research on the method for predicting shipping market. *Navigaton of China*, pp. 1-4. Available at:.
- Jing, L., Marlow, P., and Hui, W. (2008) An analysis of freight rate volatility in dry bulk shipping markets. *Maritime Policy & Management*, 35(3), pp. 237--251.
- Kahneman, D. (2012) *Thinking, Fast and Slow*. 1st edn.
- Kaminsky, G., Lizondo, S., and Reinhart, C. (1998) Leading indicators of currency crises. *Staff Papers-International Monetary Fund*, pp. 1--48.
- Karamperidis, S., Jackson, E., and Mangan, J. (2013) The use of indices in the maritime transport sector. *Maritime Policy & Management*, 40(4), pp. 339--350.

Karamperidis, S. (2014) *Developing Maritime Indices*.

Kavussanos, M. and Alizadeh-M, A. (2001) Seasonality patterns in dry bulk shipping spot and time charter freight rates. *Transportation Research Part E: Logistics and Transportation Review*, 37(6), pp. 443--467.

Kendall, L. and Buckley, J. (1994) *The business of shipping*. 1st edn. Centreville, Md.: Cornell Maritime Press.

Knatz, G. (2011) The route-to-carbon footprint connection: examining greenhouse gas emissions and alternative routings. *Marine Technology*,

Ko, B. (2011) Dynamics of dry bulk freight market: Through the lens of a common stochastic trend model. *The Asian Journal of Shipping and Logistics*, 27(3), pp. 387--404.

Koenig, E. and Emery, K. (1994) Why the composite index of leading indicators does not lead. *Contemporary Economic Policy*, 12(1), pp. 52--66.

Koopmans, T. (1947) Measurement without theory. *The Review of Economic Statistics*, pp. 161--172.

Lahiri, K. and Moore, G. (1991) *Leading economic indicators*. 1st edn. Cambridge [England]: Cambridge University Press. 83

Leonov, Y. and Nikolov, V. (2012) A wavelet and neural network model for the prediction of dry bulk shipping indices. *Maritime Economics & Logistics*, 14(3), pp. 319--333.

Limin, T., Jiaqing, S., Shilong, Q., Qingye, W., and Yongxin, L. (2009) *Econometrics Model Analysis of the Shipping Market Considering the Financial Crisis Influences*. pp. 1--4.

Lin, F. and Sim, N. (2014) Baltic Dry Index and the democratic window of opportunity. *Journal of Comparative Economics*, 42(1), pp. 143--159.

Lin, F. and Sim, N. (2013) Trade, income and the baltic dry index. *European Economic Review*, 59, pp. 1--18.

Lin, Y. and Wang, C. (2014) *The Dynamic Analysis of Baltic Exchange Dry Index*. 9(17), pp. 803--823.

Maritime Trade Intelligence, (2014) *Seaborne Trade Routes*. [Online]. Available at: <http://i0.wp.com/maritimeintel.com/wp-content/uploads/2013/10/International-maritime-routes.png>. (Accessed: 13 June 2014).

Miller, R. (2002) Can markets learn to avoid bubbles?. *The Journal of Psychology and Financial Markets*, 3(1), pp. 44--52.

Mongardini, J. and Saadi-Sedik, T. (2003) Estimating Indexes of Coincident and Leading Indicators: An Application to Jordan. *IMF working Paper*, [Online]. WP/03/170. Available at: <http://www.imf.org/external/pubs/ft/wp/2003/wp03170.pdf>. (Accessed: 8 July 2014). 84

Moore, G. (1983) *Business Cycles, Inflation and Forecasting*. 2nd edn. [Online]. UMI. Available at: <http://www.nber.org/books/moor83-1>. (Accessed: 8 July 2014).

Moore, G. (1980) The case for international business cycle research. *Atlantic Economic Journal*, 8(3), pp. 5--16.

OECD, (2012) *System Of Composite Leading Indicators*. OECD.

Pantuso, G., Fagerholt, K., and Hvattum, L. (2014) A survey on maritime fleet size and mix problems. *European Journal of Operational Research*, 235(2), pp. 341--349.

Peris-Mora, E., Orejas, J., Subirats, A., Ibanez, S., and Alvarez, P. (2005) Development of a system of indicators for sustainable port management. *Marine Pollution Bulletin*, 50(12), pp. 1649--1660.

Pigou, A. (1927) Industrial Fluctuations. *The Economic Journal*, 37(147), pp. 418-424.

Platou, (2006-2015) The Platou Report 2006. R.S Platou *Economic Research A.S.*

Robinson, J. (1934) What is perfect competition?. *The Quarterly Journal of Economics*, pp. 104-120.

Rodrigue, J., Comtois, C., and Slack, B. (2006) *The geography of transport systems*. 1st edn. London: Routledge.

Samuelson, P. (1976) Optimality of sluggish predictors under ergodic probabilities. *International Economic Review*, pp. 1--7.

Schiller, R. (2000) Irrational exuberance. *Princeton UP*,

Smirnov, S. (2013) Those unpredictable recessions.... *Foresight*,

Spoores, J. (2011) *Leading Steel Indicators*. 1st edn. [Online]. Available at: http://www.steelreality.com/uploads/5/8/4/0/5840536/leading_steel_indicators_apr_21.pdf. (Accessed: 7 July 2014).

Stock, J. and Watson, M. (1989) New indexes of coincident and leading economic indicators. *Mit Press*, pp. 351--409.

Stopford, M. (2007) "Will the next 50 years be as Chaotic in Shipping as the Last?".

Stopford, M. (2009) *Challenges For Global Shipping*.

Stopford, M. (2013) *Five Issues For Shipping Today*.

Stopford, M. (2009) *Globalization and the Long Shipping Cycle*.

Stopford, M. (2009) *Maritime economics*. 1st edn. London: Routledge.

Stopford, M. (2014) *Shipping Markets: In the Middle of a Revolution?*.

Stott, P. (2014) *Shipping market analysis and risk management, Cycles and volatility*.

Swift, L., Piff, S., and Swift, L. (2010) *Quantitative methods for business, management & finance*. 1st edn. Basingstoke: Palgrave Macmillan.

Talley, W. (2012) *The Blackwell companion to maritime economics*. 1st edn. Malden, Mass: Wiley-Blackwell.

Tcha, M. and Wright, D. (1999) Determinants of China's import demand for Australia's iron ore. *Resources policy*, 25(3), pp. 143--149.

The Economist, (2006) *Guide to Economic Indicators*. 1st edn. [Online]. London: Profile Books Ltd. Available at:

[http://www.adrri.org/assets/documents/Guide%20to%20Economic%20Indicators%20-%20Making%20Sense%20of%20Economics\(1\).pdf](http://www.adrri.org/assets/documents/Guide%20to%20Economic%20Indicators%20-%20Making%20Sense%20of%20Economics(1).pdf). (Accessed: 4 July 2014).

The Economist, (2004) *The Essentials Of Business Numeracy*. 5th edn. [Online]. London: Profile Books. Available at: <http://bordeure.files.wordpress.com/2008/11/the-economist-numbers-guide-the-essentials-of-business-numeracy.pdf>. (Accessed: 7 July 2014). 86

The Market Oracle, (2012) *What is the Dry Bulk Shipping Industry BDI Index saying?*. [Online]. Available at: <http://www.marketoracle.co.uk/Article36761.html>. (Accessed: 15 June 2014).

Tianfang, X., Zuobin, S., and Dong, X. (2002) Analysis on the factors affecting the shipping market. *World Shipping*, pp. 19-22. Available at: (Accessed: 3 August 2014).

Tsolakis, S., Cridland, C., and Haralambides, H. (2003) Econometric modelling of second-hand ship prices. *Maritime Economics & Logistics*, 5(4), pp. 347--377.

Tyrrell, S. (1997) *Index Numbers*. 19(2), pp. 54-56. Available at: (Accessed: 7 August 2014).

UNCTAD, (2009) *Global economic crisis: implications for trade and development*. First Series. Geneva: UNCTAD.

UNCTAD, (2010) *Oil Prices and Maritime Freight Rates: An Empirical Investigation*. Technical Report by the UNCTAD Secretariat. United Nations.

UNCTAD, (2009) *Review of Maritime Transport*. New York and Geneva: United Nations Publications.

UNCTAD, (2013) *Review of Maritime Transport*. New York and Geneva: United Nations Publications.

Veenstra, A. and Franses, P. (1997) A co-integration approach to forecasting freight rates in the dry bulk shipping sector. *Transportation Research Part A: policy and practice*, 31(6), pp. 447--458.

Wecker, W. (1979) Predicting the turning points of a time series. *Journal of business*, pp. 35--50.

Yamarone, R. (2004) *The trader's guide to key economic indicators*. 1st edn. Princeton: Bloomberg Press.

Zarnowitz, V. (1992) *Business cycles*. 1st edn. Chicago: University of Chicago Press. 87

Zeng, Q. and Qu, C. (2014) An approach for Baltic Dry Index analysis based on empirical mode decomposition. *Maritime Policy & Management*, 41(3), pp. 224--240.

