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## Research on China newbuilding price index and its derivatives

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**WORLD MARITIME UNIVERSITY**

Shanghai, China

**RESEARCH ON CHINA NEWBUILDING PRICE INDEX AND ITS  
DERIVATIVES**

By

**ZHANG YANGYANG**

China

**Supervisor: Qu Linchi**

A research paper submitted to the World Maritime University in partial fulfillment of

the requirements for the award of the degree of

**MASTER OF SCIENCE**

in

**INTERNATIONAL TRANSPORT AND LOGISTICS**

2014

## **DRECLARATION**

I certify that all the material in this research paper that is not my own work has been identified, and that no material is included for which a degree has previously been conferred on me.

The contents of this research paper reflect my own personal views, and are not necessarily endorsed by the University.

.....

.....

**Supervised by**

Professor \_\_\_\_\_

Shanghai Maritime University

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Finally, I would like to say thank you to my master mates, for accompanying me in the past two years. .

## **ABSTRACT**

Title of Integrative paper: **Research on China Newbuilding Price Index and Its Derivatives**

Degree: **MSc in International Transport and Logistics**

China is one of the most powerful shipbuilding countries in this century, mainly thanks to government's supports in the past five years, and it is heading for the best from every perspective by extending product range to tankers. Against the backgrounds of all these, China Newbuilding Price Index (CNPI) was issued for its first time on 15<sup>th</sup> July 2011. Detailed introduction is provided within the paper. Together with exploration in developing CNPI into a financial derivative, some problems have been uncovered, which are analysed and illustrated in this paper, with a brief discussion on BDI and SCFI, and their derivatives for comparisons.

Method of comparative analysis and back-testing are used in this dissertation. A wide range of CNPI's written teamworks have been taken for reference, for the regret that fewer literatures and researched on this new born index can be found. Clarksons and CNPI databases are two main sources of all statistics that are used.

**Keyword:** CNPI, Shipbuilding, Newbuilding, BDI, FFA, Shanghai Shipping Freight Exchange

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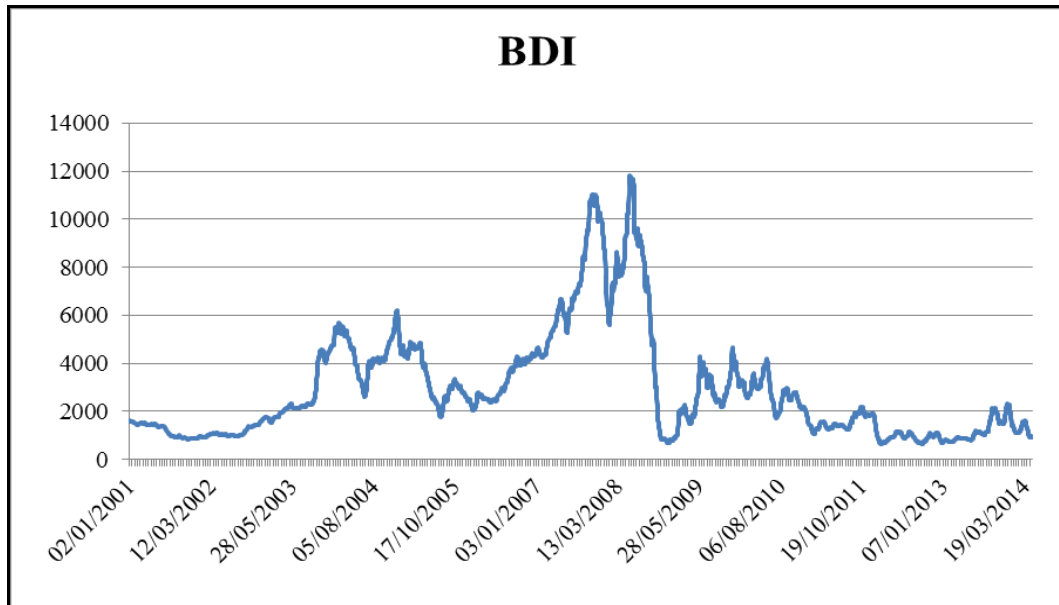
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# **1. Introduction**

## **1.1 Background**

### 1.1.1 Shipping market and newbuilding market

Shipping people have been through a lot since late 2008 while The Baltic Exchange Dry Bulk Index (hereinafter called “BDI”) plummeted from a historical height to a historical low. It has been the longest cold winter ever in the shipping history and many big names fell down because of failure fighting deficits, and some survivals are still against the balances. One of the acknowledged existing problems is the unbalance of demand and supply, also saying the overcapacity. With redundant tonnages of dry bulkers and containerships, the freights are not going stably. From outside of this, the pressure of revolution for China makes Chinese economic growth in the following a few years more vague while Greece, one of the main vessel-owning country, and German, in which many containership owners are living, are on the way of recovery from financial crisis.



**Figure 1.1: BDI**

**Source: Clarksons**

On the other hand, the newbuilding market underperformed for 4-5 years and has been continuously coming to itself slowly and steadily. However, the newbuilding price is less than half of the price in 2008 for a same-designed ship. Far beyond this, the rising variable costs caused by expensive fuel oil compel shipowners to put forward more requirements, especially for environmental friendly concerns, for ship builders since they are at stronger bargain positions and newest international regulations made it a necessity to reduce oil consumption. Against this background, newbuilding price is increasing at a pace ahead of freight rates, which does not match scholars' old views.

### 1.1.2 Shipping derivatives

When it comes to shipping derivatives, the most well-known shipping derivative is Forward Freight Agreement (hereinafter called “FFA”), which is based on BDI, and FFA is designed for hedging at the very first beginning. In 1985, The Baltic Exchange started its path on shipping derivatives by launching a future product called BIFFEX, short for Baltic International Freight Future Exchange, and finally ended up with underperformance. Not very long later, at the beginning of 1990s, FFA came into public as an improved financial instrument, and then became widely acknowledged little by little.

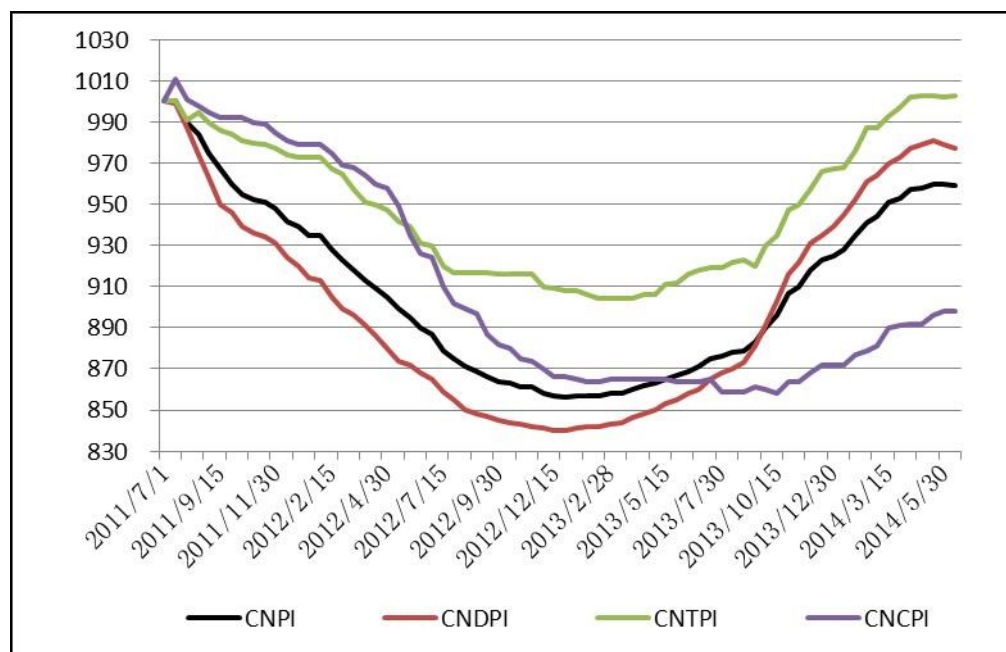
FFA is traded with over-the-counter contracts and professional brokers are responsible for facilitating fixtures. The main players involved are shipowners and charterers since all the format contracts have defined specifications regarding ship types, charterparties, shipping routes, etc. On the one hand, shipowners have tonnages while charterers need the tonnages, and either of them has concerns on volatility of freight rates. On the other hand, the dry bulk market is a perfect competitive market and nobody is able to seduce the change of freights. However, the birth of FFA provides not only shipowners and charterers with great risk managements, but speculators with every possibility to chase profits in shipping financial market, even though they know nothing about shipping. Anyway, FFA is an innovation for risk management in shipping.

### 1.1.3 China Newbuilding Price Index

From 2003, shipbuilding industry in China has been in prime time and on the speedway to develop. In 2009, the central government released stimulus plan for shipbuilding industry, which actually helped China become the top one shipbuilding country in these years, although it is questionable because in terms of total value of new orders, China is still second to South Korea. However, it excludes military-purpose orders. With the following longest ever “cold winter” of shipping, shipbuilders in China suffered low newbuilding prices, and therefore deficits, and many of them went to bankrupt. There is an overcapacity problem in shipping market whereas there is a same problem in shipbuilding market, hence the situation is worsened.

The main embarrassment of Chinese shipyards is they are not synced at quotation since they scattered over the whole country, which is different from that in South Korea where the majority of shipyards are controlled by few Chaebols. In other words, they lack a benchmark for reference when offering a price to buyers. Especially when the fact is Chinese shipbuilders’ strongest point is in constructions of dry bulkers rather than tankers and mega-containerships, but still shipyards in China want a way out of the dilemma that they barely have experience in building state-of-the-art ships while they are able to.

China Newbuilding Price Index is made up of CNDPI for dry bulkers, CNTPI for tanker market and CNCPI for containerships. Furthermore, each of the composite indices also comprises particular base ship types with defined ship particulars. CNPI is not only working as the quotation benchmark but also a role of regulating market. It is said that there are more than 1,600 shipyards in China, not just locating along the coastal line, and at least 300-400 of them have the capability to build merchant marine carriers. CNPI is providing a single industry player with a possibility to avoid deviation from other compatriot competitors. To some extent, in an invisible way, CNPI is telling international shipowners what the average market situation is on the basis of one specific ship type.



**Figure 1.2: China Newbuilding Price Index**

**Source: CNPI**

## **1.2 Literature review**

### 1.2.1 Recent research achievements

Shipping is widely acknowledged as capital-centrlised. It is closely related with finance and they are dependent on each other. It seems like shipping is born to be with finance since shipping derives from international trade and international trade is not only about movements of various cargos but also currencies. Dai Yong (2001) defines shipping finance as a field that involves leasing, funding, foreign exchange, insurance, derivatives, etc. around shipping. Looking at all the developed shipping centres, it is clear almost all of them are also marked with financial centres. Building Shanghai into a shipping and finance cluster is not simply required by the development of this city or region, according to Yuan Xiang (2009), as well as commanded by the central government.

Even though Asia has become the centre of physical maritime transportation, Europe still is the origin of maritime intelligence and services and America is undoubtedly the top one financial power. In Lian Ping and Xiao Jianjun's (2010) article, on the one hand, Chinese banks are amateurs in shipping finance, only a few of them like China Import & Export Bank and China Development Bank have accumulated certain experience in this field. On the other hand, from Ji Xiaoqing and Cao Xiao's



(2011) points of view, shipping is a systematic industry, which, in a broader definition, is way more complex than just maritime transportation. A variety of companies in this circle is naturally connected with other companies, no matter how and no matter by what. In such a complicated as well as long industrial chain, it won't be easy to build up a magnificent architecture only by a few stanchions.

Without doubts, shipping financial derivatives in China are still in the infant phase. In December 2012, Shanghai Clearing House and other initiators launched RMB FFA in Shanghai but so quietly that even local shipping community had not noticed such a historical event. Liu Xunliang (2013) comments that shipping people do not see RMB FFA's bright future because there is a lack of supervision. He says we do have failure experience in FFA market but we have not taken the lessons, and when it is introduced into our homeland, we are still unprofessional and less-formalised.

Speaking of shipping financial derivatives, Ding Xiuying (2008) indicates that the function and role of shipping derivatives shall be figured out clearly on the top of everything. Generally, Manolis G. Kavussanos and Ilias D. Visvikis (2006) insist that risk management is of very importance to shipping industry and it is still developing, while shipping financial derivative is mainly designed to against risks. Wang Jun (2001) thinks it is necessary to facilitate the development of shipping financial derivative in Shanghai as Chinese shipping players do not have their familiar tool to hedge the risks.

Liu Xunling (2011) writes that the rising of Chinese shipping industry, in particular the rapidly thriving of shipbuilding industry, highlights the reality that shipyards and shipowners lack a benchmark when it comes to newbuilding price. He said the shipbuilding industry in China is so scattered that they shipbuilders in China do not have a proper quoting system. Bao Zhangjing and He Fang (2013) reckon the newbuilding market suffered a worst situation in the recent decades whereas the unbalance between demand and supply sides have caused a great opportunity for shipbuilders to upgrade their own strengths for better positions in the following revoke. CNPI is the product of era. As the model and forefather of CNPI, BDI is the most famous index not just in the shipping but also for economists. Li Yaoding and Zong Peihua (2006) say the BDI has been regarded as the signal reflecting where the spot market is heading for and how volatile the freight rates are from a general view. However, BDI is not as simple as layman think it is. BDI contains four composite indices those are BCI, BPI, BHSI, and BSI, and all of them contain several detailed shipping routess with explicit elements.

### 1.2.2 Existing problems

Despite CNPI has been successfully published for almost three years, compared with other indices, its status being the benchmark for newbuilding market has not been widely acknowledged by the shipping people in other countries, especially for

Greece and Germany where most of the financially strong shipowners are living. Due to the abnormal performance of either newbuilding industry or shipping market in the past 4-5 years since financial crisis, we shipping people shall be wisely more cautious about investments into ships. Speaking of CNPI, constitutes and tracks of this index are supposed to be verified, to see if it matches the reality.

One of the main solid problems remaining on CNPI is the adjustment of assessed prices. For all the panelists, they will have three options when they submit the price assessments half a month. As to the price, the main terms are three: “fixed price”, “adjusted price”, and “evaluation”. “Fixed price” means a panelist has concluded a or several concrete fixtures for this ship type at this price. Another scenario for using this term is when the panelist knows a real fixture has been concluded at this “fixed price”. All the above data shall be 15 days latest. Meanwhile, the “adjusted price” is a price that is adjusted by the shipbroker because the involved newbuilding ship is not entirely same with the base ship type so the shipbroker is accountable to give an adjustment by his experience. Last of all, the “evaluation” is a price given by a shipbroker based on his instincts as there is no fixture. Nevertheless, a problem would be inaccuracy of the price given by shipbrokers since most of the ships sailing around the world are unlike. For instance, even the prices are all the same, the shipbuilders are probably different so the delivery is possible to be various.

Verifying CNPI and its family is the priority in order to award more credits to its function. Additionally, derivatives that derive from CNPI have been primarily designed but have not been promoted because some of the format contracts are still fallacious. I intend to explore the possibility and feasibility to make both CNPI and its derivatives more perfect. Considering the fence on capital and inconformity in terms of legislation, the path to promote shipping financial derivative will not be worked out easily. Nevertheless, it is on the way moving forward. As far as I am concerned, the priority shall be open to innovative thoughts. More alternatives will be researched and discussed.

### **1.3 Research purpose and methodology**

#### 1.3.1 Research purpose

The main purpose of this research is to study the China Newbuilding Price Index, in particular its restrictions if there is any, and explore the possibility of developing China Newbuilding Price Index into shipping financial derivatives. In the first place, China Newbuilding Price Index is analysed in details in case of its unfamiliarity. Considering that there are some existing shipping indices, some of them will be exemplified for illustration. Next is analysis of newbuilding market, which is used as parallel to test CNPI. Due to the specialty of newbuilding market, I try from the sides of shipping sector as well as builder countries. Lastly I would like to move back to

China Newbuilding Price Index but with derivatives. The emphasis is discussing the potential derivative products. Conclusions and suggestions are available in the end.

### 1.3.2 Research methodology

In order to be more creative, a lot of assumptions and predictions are set up. The dissertation applies method of comparative analysis on various kinds of shipping indices with CNPI. Comparisons are also constructed between existing shipping derivatives for subsequent efforts to give suggestions on CNPI derivatives. In newbuilding market analysis, I carry out a back-test to verify the match of CNPI and real situation of newbuilding market by linear regression. In terms of index's sensitivity, an economic model is already available for the illustration.

## **2 China Newbuilding Price Index**

### **2.1 Introduction and development of CNPI**

This segment will explicitly introduce China Newbuilding Price Index (CNPI).

Actually CNPI is more than a simple indices family, but a comprehensive intelligent system reflecting promptly Chinese newbuilding market. It is an indices family since CNPI, an overall composite index, contains three composite indices: CNDPI for dry bulker market, CNTPI for tankers, and CNCPI for containerships. The units of

overall composite index and three composite indices are on a point measurement. In dry bulker section, CNDPI is regarded with six specific base ship types, which are Handysize, Ultramax, Panamax, Kamsarmax, Capesize, and Newcastlemax. CNTPI is comprised of Medium Range tanker (product tanker), Large Range 1 tanker (product tanker), Large Range 2 tanker (product tanker), Suezmax, and VLCC, and last two are for crude oil. In CNCPI, the vessel types are 1,700 TEU, 4,800 TEU, and 9,000 TEU containerships. Millions of US dollars are used as unit for base ship indices.

<b>China Newbuilding Price Index</b>					
<b>Dry Bulker (CNDPI)</b>					
Handysize	Ultramax	Kamsarmax	Panamax	Capesize	Newcastlemax
<b>Tanker (CNTPI)</b>					
MR	LR1	LR2	Suezmax	VLCC	
<b>Containership (CNCPI)</b>					
1,700 TEU		4,800 TEU		9,000 TEU	

**Table 2.1: Constituents of CNPI**

One of all the essences for an index to become a benchmark is the certainty and standardisation of subject matter. So is CNPI. Although in CNPI family, tonnage range is due allowed, and in real world all the ships are unlikely to be 100% same even when they are designed to be sister ships, every base ship type has its own particulars, also a specific base tonnage is fixed. There are two rules that are strictly obeyed when considering which type of carrier is reasonable to be base ship type. One of the two is “mainstream”, which means this type must be regular and familiar. For instance, in tanker panel, VLGC and LNG carrier are not included despite they

are so added-value products for yards, only because chemical product carriers are in niche market. Another is “forward-looking”, which emphasises prospects of the vessel. The best example is cancellation of Supramax. The living space for Supramax in newbuilding market was squeezed by Handy-series ships and Ultramax dry bulkers, and brokers said they were barely inquired by shipowners for Supramax, all of which led to the dead end of Supramax.

Besides, other parameters of CNPI are defined as well. The base payment term is 10%×4 and 60% and the term parallels with 24-month timetable. The timing for the first 10% is “Contract Signing”, and the second 10% matches “Steel Cutting”, and 10% of payment for “Keel Laying” and “Launching” respectively. “Delivery” takes the left 60% of payment. The base payment term is definitely one of its highlights, but somehow brings a few questions. On the top of all, the reality is when newbuilding market is depressing, shipyards in China possibly compromised the payment terms on a less favourable basis in order to earn new orders for survival, especially for those private-owned shipbuilders who do not have strong financial backups. Some of them are struggling for new orders by accepting 2%+98% payment term. If this kind of fixture was brokered by a brokerage house that happens to be CNPI panelist, in such scenario, the panelist would be asked to ignore the concluded fixture that could not mirror the average level. However, when there is a little deviation from base payment term, rather than thorough difference, the panelists are required to give their adjusted price with reference to real payment term. All in all, the premise is the panelist is involved in the deal, otherwise he will only be allowed to give “evaluation” instead.

What is worth mentioning is all the panelists are brokerage houses, excluding neither shipowners nor shipbuilders, and also funds and other financial institutions are not included. The main and only purpose of newbuilding shipbrokers are to conclude fixtures, which determines that the prices given by them are closest to real market level, instead of being higher or lower. In CNPI panelists, you can find many big names in this community, such as Braemar Seascope, BRS, Optima, RS Platou, Lorentzen Stemoco, Howe Robinson from non-China countries and local houses such as Innomarine, INTLCO, Pentalink, Platinum Ocean and Rich Shiptrading. Totally all 19 panelists are brokering 70% of the total value of Chinese exported new ships.

<b>Dry Bulker</b>	<b>Tanker</b>	<b>Containership</b>
1. Arrow	1. Arrow	1. Arrow
2. Bancosta	2. Braemar Beijing	2. BRS
3. Braemar Beijing	3. Haidely	3. Howe Robinson
4. BRS	4. Innomarine	4. Intermoda;
5. E&S	5. Intermodal	5. Optima
6. Haidely	6. INTLCO	6. Pentalink
7. Hartland	7. Lorantzen Stemoco	7. Platinum Ocean
8. HIT Marine	8. Optima	8. Rich Shiptrading
9. Innomarine	9. RS Platou	9. RS Platou
10. Intermodal		
11. INTLCO		
12. Howe Robinson		
13. Lorentzen Stemoco		
14. Maxkind		



15. Optima		
16. Pentalink		
17. Platinum Ocean		
18. RS Platou		
19. Rich Shiptrading		

**Table 2.2: CNPI Panelists**

**Source: CNPI**

Weight is another backbone for the composition of CNPI. Every base ship type has its weight in relevant composite index. More importantly, the weight is according to the total CGT (compensated gross tonnage) of newly ordered ships subordinated to certain base ship type at Chinese shipyards during a given period of time. For instance, Ultramax dry bulkers has been shipowners' favourite since its appearance whilst Supramax lost its popularity. So Ultramax's price amounts for 41% of CNPI and Supramax was cancelled in dry bulker panel. The weight is certain for a while, but will be voted for re-correction every year in the annual meeting of panelists. The adjustment will be realised by multiplying a coefficient.

<b>Ship Type</b>		<b>Weight</b>
<b>Dry Bulker</b>	Handysize	15%
	Ultramax	41%
	Panamax	1%
	Kamsarmax	9%
	Capesize	28%
	Newcastlemax	6%

**Table 2.3: Weights of dry bulkers of CNPI**

**Source: CNPI**

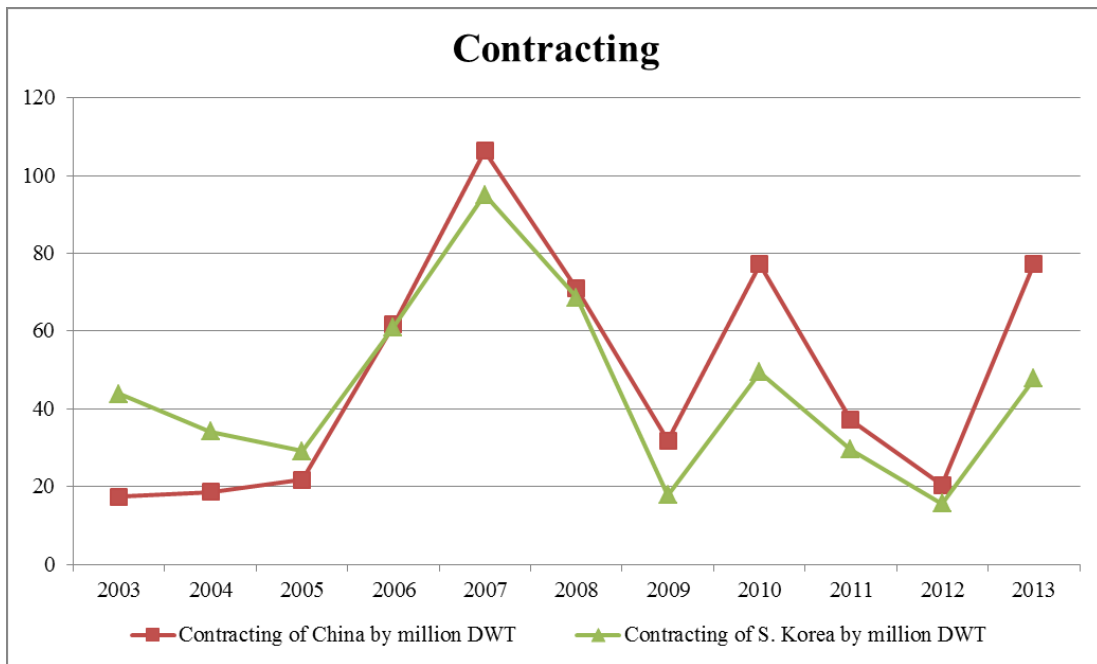
## **2.2 Influences of CNPI**

Aiming to protect CNPI's impartiality, some rules are strictly obeyed by CNPI team and its panel. Five days early before the index day, all the panelists would have received reminder to submit price assessment declaring clearly the deadline is 1200 of index day even when it is on weekend. Any panelist is obliged to follow the instruction in the Manual for CNPI Panelist 2013. If a panelist encounters questions or problems that will incur unknown consequences to index, i.e. cannot submit price assessment in time, the panelist must report immediately by written proof (email or telegraph, etc.) with explanations and CNPI team will confirm acceptance or not by reply. Practically, it has been usual for CNPI panelist cannot offer their assessment smoothly mainly because shipbrokers are quite often in their business trips and most of them are long-haul, particularly when a transaction is getting close to a firm fixture and they are willing to provide the latest fixed price for our reference. Under such scene, CNPI will shut down the window for submission precisely by 1200, and if the panelist ask for another chance to submit, a written application and explanation are necessary for CNPI team;s consideration. If YES, another chance will be granted but with time limit, no longer than one hour; if NO, it is a no. However, sometimes the reason is accident, like computer broken down, and the panelist will be required to submit their evaluation by email or text along with authorization, therefore CNPI team is able to do it on their behalf, but later the panelist must provide a confirmation letter.

When there are changes about panelists, in or out, or base ship type, more or less, conversion factors may be generated in order to prevent abnormal fluctuation of the

related indices. Given the time when a broker firm is applying to become new panelist and it is approved, in the next issue of CNPI, a price assessment will be added up to the system. No matter the new panelist is good or bad at valuation, effects on index are definitely exist. If every assessment show an upward pattern, but finally the index is going down, no doubt a conversion factor is ought to be multiplied, and reason for the abnormal outcome possibly result from new panelist's unfamiliarity, which means his given price may be too much lower than others, which its still show a rising tendency. Another example is that, on 15<sup>th</sup> August 2013, Supramax was got rid of dry bulker panel and Ultramax was added in at the same time, the weight of each composite index was affected because each composite index's weight depends on how much it accounts for total dead weight tonnages of new placed orders during a certain period of time.

As we all know, shipyards from S. Korea, China, and Japan are building more than 90% of total DWT in the world, whereas each of them is inclined to different products. In recent decade, because of efforts paid by Chinese yards and governments, the gap of shipbuilding industry between China and S. Korea has been narrowed, and by 2013 China became the largest shipbuilder country by excess of S. Korea in terms of completions, orderbooks, and new orders.



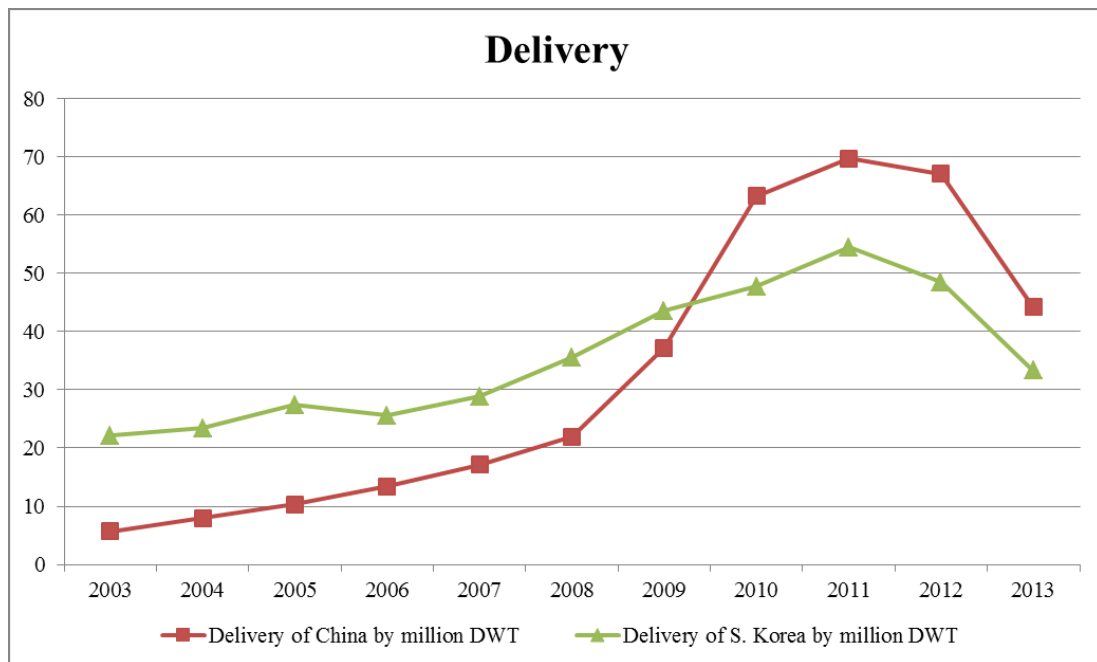
**Figure 2.1: Contracting of China and S. Korea by million DWT**

Source: Clarksons



**Figure 2.2: Orderbook of China and S. Korea by million DWT**

Source: Clarksons

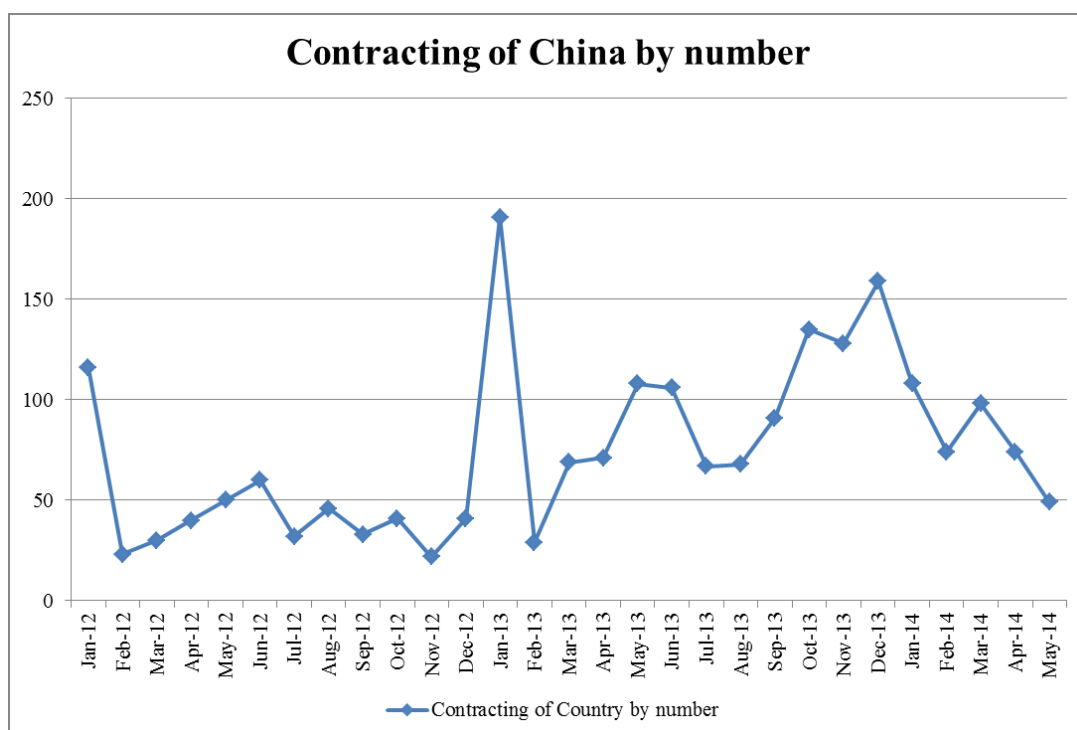


**Figure 2.3: Delivery of China and S. Korea by million DWT**

**Source: Clarksons**

Nevertheless, as to total value of new orders, China still far fall behind S. Korea due to the reality that the Chinese shipyards' hit-products, dry bulkers and smaller containerships, are less valuable than their compatriots' in S. Korea, which are tankers, gas carriers, and mega-containerships. Facing the changing global shipping world, direction of newbuilding price is going somewhere unpredictable, and Chinese shipbuilders are obliged to struggle with the situation. What is worse is a new ship will be delivered two years after signing contract, and during this period shipbuilders stand a great chance to suffer a loss without any compensation or insurance if buyer decides to abandon the orderbook. Actually, with more unified international conventions are becoming, ships are constructed in a more standardised way, especially for dry bulkers. Being intellectually equipped with CNPI, shipyards will be able to expect where the newbuilding price is heading for, north or south, in order to have themselves prepared in advance. For instance, CNPI was going down

until January of 2013 when it turned to be upward and it still is, but at that moment positive mood was popular among all shipbuilders, therefore they were not ready to receive a large scale of new placed orders from European buyers. The reality was the new order flood began afterwards since then. More often Chinese shipbuilders are taking CNPI as a benchmark to give their quotations. For a few types of ships that they are not experienced at, like tankers and mega-containerships, CNPI is able to give them the picture of current market when facing inquiries.



**Figure 2.4: Contracting of China by number**

**Source: Clarksons**

From buyers' perspective, CNPI is credited to have more realistic value. Nowadays, on the one hand, there are more and more financial institutions, such as private funds or leasing companies, behind traditional shipowners, some of them place orders straightway at shipbuilders in the name of themselves and resell vessels for margin profits when the price is going up, instead of operating the fleet. On the other hand,

going public or IPO has become a few shipowners' new favourite approach to achieve financial supports. In either condition of above two, CNPI is a powerful evidence to enhance investors' confidence and motivations because numbers do not lie. More and more billionaires uncover that investing in ships is more exciting and earn more quick money, but the real problem is they barely know the operation of shipping industry, not to mention shipbuilding. CNPI is an indicator that awards them a reference focusing on newbuilding prices for them to decide if the timing is right. Furthermore, in shipping companies' IPOs, CNPI is a persuasive index to convince the stock investors that lower newbuilding prices will reduce prospective capital costs and bring more competences in charter-out business (because of more bargain room), therefore acquire higher ROI (rate of return on investment). Usually when buyers are considering placing new orders, they are more likely to analyse previous data about freight rates and newbuilding prices. In fact the previous data explains everything but today's situation and the future, whereas CNPI duly explains the real status of newbuilding market quite well.

### **2.3 Comparisons with other shipping indices**

In the shipping world, there is no doubt that the most famous as well as the dominant index is BDI, although The Baltic Exchange also issues other indices like The Baltic Exchange Dirty Tanker Index (BDTI), The Baltic Exchange Clean Tanker Index (BCTI), The Baltic Exchange Liquefied Petroleum Gas Route (BLPG), The Baltic Exchange Sale and Purchase Assessments (BSPA), and The Baltic Exchange Demolition Assessments (BDA). Unlike CNPI, BDI is about freight rates of tramp market. However, actually, the methodology of compilation of CNPI comes from BDI. For another thing, Shanghai-based Shanghai Containerised Freight Index (SCFI)

is another frequently-mentioned shipping index. SCFI is also about freight but focuses on line market. Either of BDI or SCFI have their financial derivatives. Hereinafter BDI and SCFI will be taken as examples to be compared with CNPI since BDI is most dynamic of all Baltic family indices and SCFI is locally born with great representation.

### 2.3.1 The Baltic Exchange Dry Bulk Index

BDI is made up of BCI, BPI, BSI, and BHSI averagely, which means individual weight of the four are the same, and BCI stands for Capesize sector while BPI for Panamax, BSI for Supramax, and BHSI for Handysize. BCI includes nine shipping routes with strict and clear definitions on commission rate, cargo, charter party, age range, together with other specific charter party terms that will exert effects on the execution of charter party. The weight of each shipping route in BCI is dependent on transported cargo volume. Similarly while a little differently, BPI is about voyage charter rate of four shipping routes but distributes 25% weight for each, and BSI is comprised by freight rates of six routes and BHSI by six as well, but the weight is variable ranging from 12.5% to 25%.

People that are not familiar with composition of BDI, whether or not he is a shipping people, maybe misunderstand BDI reacts exactly to real weather of shipping market. Actually, besides other particular indices for tanker market and liquefied gas carrier market, BDI is only referred to tramp dry bulker market and one of its weaknesses is BDI shows no sign of tonnage change in spot market. In other words, market players can only presume the present condition of freight rates from BDI, rather than putting eyes ahead of time by knowing the volume of tonnages available. Additionally, four



subsidiary indices are weighted 25% equally of BDI, which is not reasonable since in terms of ship routes and cargo they usually carry, Capesize, Panamax, Supramax, and Handysize are not equally important from certain perspectives. Furthermore, BDI is about “price”, not “volume”, especially volume of fixtures, in which involved parties are underneath the water.

### 2.3.2 Shanghai Containerised Freight Index

As to SCFI, it is an index for line market compiled by Shanghai Shipping Exchange since 2005, and renewed in 2009 with new base index at 1,000 points. SCFI contains freights for 15 shipping routes and release every Friday at the unit of USD / TEU, except USWC and USEC at the unit of USD / FEU, and a composite index measured by points. The transportation and trade term is unified as CY-CY and CIF respectively. In one particular shipping route, the freight not only concludes the arithmetic mean of quotation given by panelists, but also some surcharges, like bunker adjustment surcharges (BAS), emergent bunker surcharges (EBS), currency adjustment factor (CAF), etc. , while composite index is weighted average of all 15 freights. Nonetheless, no more specific about weight is revealed but the formation is presented as below:

(a) Freight of one particular shipping route

$$P_i = \sum_{j=1}^n P_{ij} / n$$

\*Note: “i” stands for route, “j” stands for panelist, and “n” stands for number of panelists

(b) Overall composite index

$$I = \sum_{i=1}^m (P_i * W_i / P_{i0}) * 1000$$

\*Note: “i” stands for route, “m” stands for number of shipping routes, and “Wi” stands for the weight of one particular shipping route.

In spite of certainties on ports of departure, trade terms, weight of each shipping route, and some nominated surcharges, the problem still remains. On top of all is there are some other surcharges originated from port operations or taxations and varying in a wide range according to regulations in variable regions, and they are not included when they still have impacts on the fluctuations of quotations given by line operators. Incidentally in certain area, the total amount of all charges has surpassed the real freight. Also the selection of panelist is questionable. Seeing the list gives rise to the question that why freight forwarders, NVOCC operators, logistic companies, and line shipowners are all counted in as panelists of SCFI. The main profit source of freight forwarders and NOVCC operators is the price difference between buying price (from line shipowners) and selling price (to cargo owners). In such scenario, in order to manipulate the ups and downs of index, a line shipowner with more market shares than others is free to call the price whether or not he is a panelist because fundamentally the line market is an oligopoly market rather a perfect competitive one. Once one of the oligopolies lifts the freights, others will follow and so so freights forwarders and NVOCC operators.

## **2.4 Inadequacies remained**

Notwithstanding, CNPI and its family still have a few defective points to be perfected. First of all is the number of panelist. According to statistic theory, the

number of samples shall be more than 30, to make sure the composition of index is stable. Otherwise the absence of one or several panelists will be of great negative effect as to stability. Practically, if a panelist happens to miss the deadline for submitting price assessment, the system is set to continue to use the last assessment of this panelist. And if the panelist is absent six consecutive times, he will be ruled out of panel. Either absence or withdrawing will have uncertain influences on the fluctuation of index. In reality panelist of CNPI contains 19 members and they are very selective since only reputable and customer-oriented shipbroker houses those have taken strong market position are qualified to become CNPI panelist.

Another problem is about shipyards. Strictly speaking, shipyards in China are not all on the same level, so do their products' qualities. On the one hand, a newbuilding shipbroker is unwilling to recommend a newly-developed shipbuilder instead of first-class shipbuilder, such as Shanghai Waigaoqiao Shipyard, to his principal, particularly when the quotations are close, unless the newbuilding price is attractive. On the other hand, the truth is the majority of yards in China are able to build same type of dry bulk carriers, for example the "Green Dolphin 64" designed by SDARI. CNPI and its subsidiary base ship type indices do not reveal the difference of qualities among uneven shipyards. For practice, if a scale of new Ultramax dry bulker orders is closed at \$27 million each by a first-class shipbuilder and a buyer, another buyer may close a single newbuilding Ultramax dry bulker at a relatively smaller shipyard at the cost of only \$25 million. When the panelist is giving price assessment, the price difference will be evened but the quality is not.

## **3 Newbuilding market and CNPI**

### **3.1 Variables affecting newbuilding prices**

I believe there are many factors that have influences on newbuildings and many of them are interacting. It is difficult to give a fair evaluation on certain one under such overlapping and complex condition, which has become more difficult after worldwide financial crisis since 2008 and from the appearance of overcapacity since 2010. Hereinafter a few variables will be presented together with short statement. In order to better illustrate, line charts are broadly used within which newbuilding price of Ultramax dry bulk carrier from CNDPI is taken as a sample to match variable's track.

#### 3.1.1 Time charter rate

The BDI is more prone to show volatilities of freight rates of dry bulk spot market, which means for larger bulkers such as Capesize and Newcastlemax those are more likely to be bound with COA contracts, time charter rate is better for commercial assessments. Meanwhile, drowning in the low of this cycle for such a long time, shipowners prefer to make moves in newbuilding field only when relying on a 3-5 years time charter.

#### 3.1.2 Second hand purchase cost

Ordering a new ship seems like putting an investment for two years later and expecting returns much far later, while buying a secondhand ship is more “realistic”. When the market is booming, enlarging fleet by obtaining existing tonnages is in favour of securing profitable charter party. Under certain occasions, instant investments in secondhand market grant ship operators greater chances to stand against subsequent lower freights. The most recent case is at the end of 2009, there was a weak rebound in dry bulk market, but shortly after that the overwhelming supply side dragged hire rate back to valley. Some shipping companies took advantage of the flash high to purchase secondhands and charter out at relatively profitable rate whereas others were inspired to raise money for newbuilding projects, and cancel a large bunch of orderbooks in 20010-2011.

### 3.1.3 Exchange rate

The depreciation of local currency of major shipbuilding country earns additional competitiveness for export orders. In 2013-2014, once in a period of time, Japanese shipbuilders witnessed a surge of dry bulker orders owing to devaluation of Yen. Before then, Japanese suffered a shrink of market shares in dry bulker newbuilding market due to higher prices that result from comparatively higher constructing cost.

### 3.1.4 Alternative’s newbuilding price

The rapidity and upsizing are two important characteristics of the development of ships. With dry bulkers are becoming larger and larger, the kinds of cargo they are capable of carrying are also become closer. The 58,000 DWT Supramax dry bulker was barely ordered in the past few years is indeed because the popularity of 64,000

DWT Ultramax dry bulker, and the latter together with smaller Handy-family squeezed living room for the former. Therefore, it can be easily deduced that if the newbuilding price of Ultramax is going down, the Supramax, even other much smaller types, will be possibly ruled out of the regular.

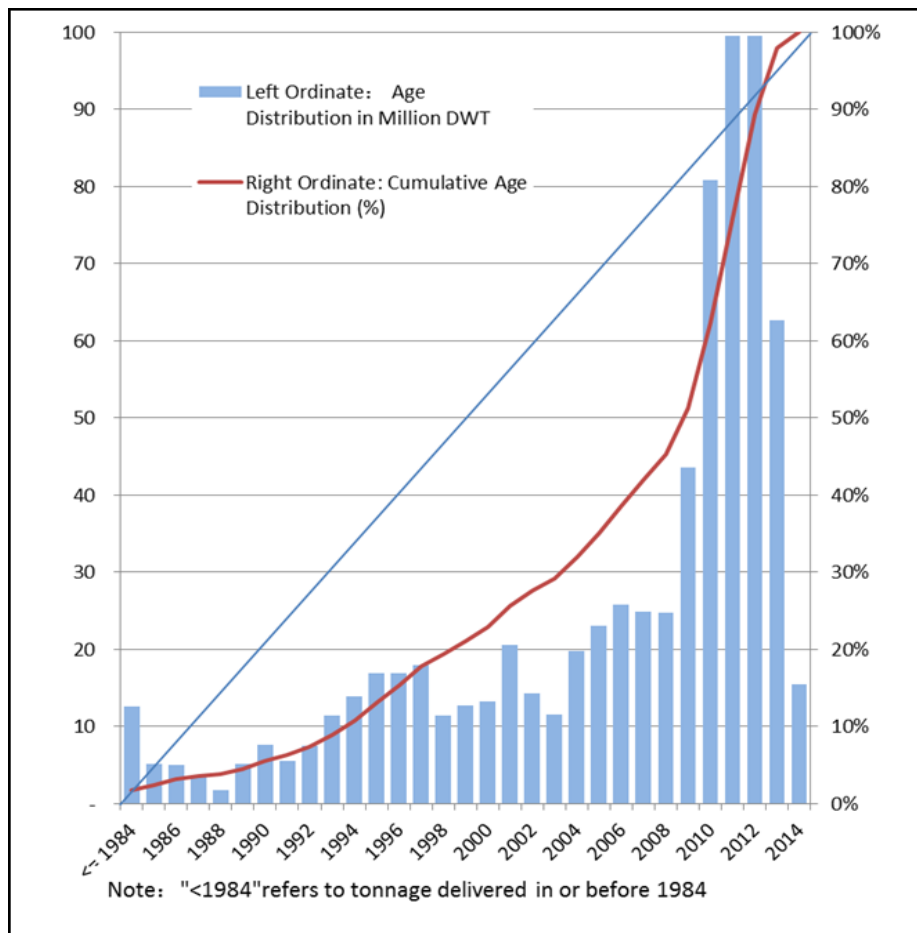
#### 3.1.5 Emerging cargo side

This is about supply side. The balance between demand and supply is maintained jointly. Actually, the transportation centre of the world has transferred from Europe to Asia just because the rise of Asian countries, saying mainly China in 21st century, is calling for importing large scale of raw materials and exporting manufactures. These days, resulting from appeals for more environmental friendly and sustainable development, demand for clean energy (natural gas, shale gas) is leading another round of transformation of tanker market.

#### 3.1.6 Existing tonnages

This is about demand side and I think this is the most highlighted point, considering the very unusual low freights resulting from overcapacity. First of all, the lifetime of ships usually last 25-30 years. Once a ship is delivered by shipbuilder, she will join competition and is unlikely to retire in advance until she is not workable. In the second place, a complete ship cannot be changed or cut into several pieces for particular uses. From above two respects, either the number of existing fleet or dead weight tonnages is of great importance for consideration of new investments in building ships. Lastly, the age distribution of worldwide fleet in each sector could reveal the evolution of whole generation of fleet. From the red curve in the below chart, it is alerting that the generally the world dry bulker fleet is so young that not

many tonnages would be abandoned in the next a few years. The overcapacity will remain a negative influence on freights.



**Figure 3.1: Age distribution of world dry bulker fleet**

**Source: Raw material from Clarksons and processed by CNPI**

### **3.2 Verification of Ultramax index**

The weather of newbuilding sector is presented by the fluctuations of the fixtures' prices. In order to see and verify if the track of real fixed price matches the corresponding index of CNPI family, the methodology used is back-testing. The

index and fixed prices will be pictured in the same line chart for better comparison. In each half month (because CNPI is issued every fortnight) of time series, the undisclosed highest and lowest closed and revealed price in real world will be marked and connected by lines. If in one certain fortnight there is no new revealed fixed price, the former highest and lowest price will be followed in use. The date is set from the first day of 2013 until 31<sup>st</sup> May 2014.

For choice of base ship type for verification, I would rather choose the most popular bulk carrier type --- Ultramax --- to be verified since more fixture records are available for reference. The tonnage range is 60,000 – 65,000 DWT, and parameters of Ultramax bulker are as below:

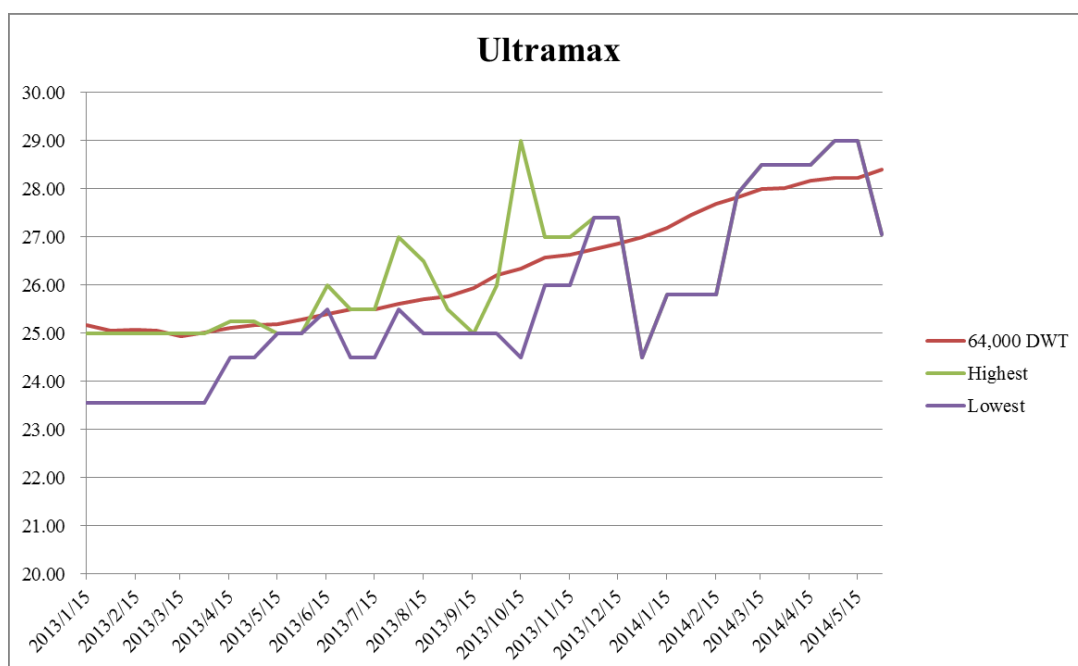
<b>Ship Type</b>	<b>Tonnage Range</b>	<b>Typical Design</b>	<b>LOA</b>	<b>Breadth</b>	<b>Depth</b>	<b>Scantling Draft</b>
Ultramax	60,000 - 65,000 DWT	64,000 DWT	199.90m	32.26m	18.50m	13.30m
<b>Main Engine Type</b>	<b>CSR (KW)</b>	<b>Type of Fuel Oil</b>	<b>Fuel Oil Consumption at Sea (metric ton per day)</b>	<b>Service Speed in Knots at Fully Laden Status</b>	<b>Holds / Hatches</b>	<b>Cranes</b>
B&W 5S60 ME – C8.2	6,843	CST 380	26.30	14.4 with 15% Sea Margin	5 / 5	4×30 MT swl

**Table 3.1: Particulars of Ultramax base ship type**

**Source: CNPI**



First of all, all the new orders of Ultramax placed during the said period of time are picked up, and orders obtained by Chinese builders will be further filtered for more accuracy as CNPI is only about ships exported from China. Since newbuilding fixtures are much less frequently seen than chartering fixtures, it is very common that in certain every two weeks, no news is revealed or news is revealed with undisclosed price. The below is back-testing line chart of Ultramax index.



\* “64,000 DWT” stands for Ultramax price index; “Highest” and “Lowest” stand for highest and lowest fixed price respectively in real world during that fortnight.

**Figure 3.2: Back-testing of Ultramax index**

**Source: Clarksons and CNPI**

For tankers, the fact is Chinese shipbuilders are mainly building relatively smaller oil tankers and chemical tankers, unlike S. Korean compatriots, only a handful of strong state-owned shipyards like Hudong-Zhonghua Shipbuilding, Jiangnan Shipyard, Waigaoqiao Shipyard, and Dalian Shipbuilding, are able to construct VLCCs. So it is

difficult to carry out back-testing with local order records. However, MR product tankers' parameters are still attached for reference.

<b>Ship Type</b>	<b>Tonnage Range</b>	<b>Typical Design</b>	<b>LOA</b>	<b>Breadth</b>	<b>Depth</b>	<b>Scantling Draft</b>
MR	40,000 - 59,999 DWT	52,000 DWT	183.30m	32.20m	18.20m	13.00m
<b>Main Engine Type</b>	<b>CSR (KW)</b>	<b>Type of Fuel Oil</b>	<b>Fuel Oil Consumption at Sea</b>	<b>Service Speed in Knots at Fully Laden Status</b>	<b>Caro Tanks</b>	<b>Slop Tanks</b>
B&W 6S50 MC – C	8532	CST 380	34	15.0 with 15% Sea Margin	12 (No.1-6 P&S)	2 (P&S)
<b>Cargo Tank Coating</b>	<b>Tank Capacity in CBM</b>	<b>Cargo Pumps</b>				
Pure epoxy coated	58,000.00	Deep well type				

**Table 3.2: Particulars of MR product tanker base ship type**

**Source: CNPI**

For containerships, the lack of revealed closed fixtures makes the market look vaguer. Being similar tanker section, the focus of Chinese builders is small-sized containership with capacity of around 2,000 teus, but lack of order records make

back-testing unavailable. Parameters of 1,700 teu class base containership are illustrated as follow:

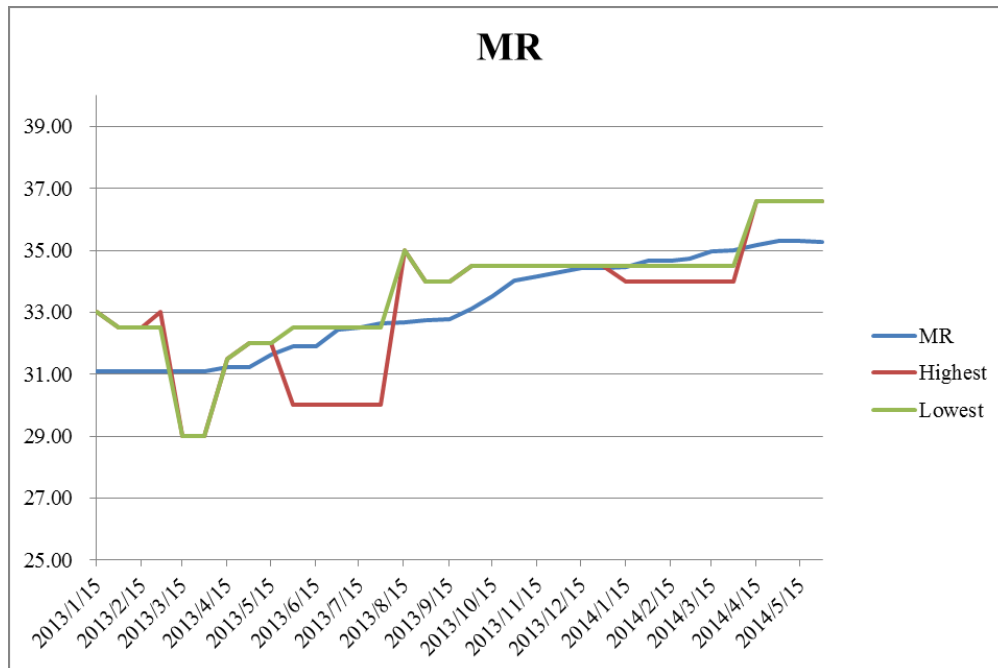
<b>Ship Type</b>	<b>Capacity Range</b>	<b>Typical Design</b>	<b>DWT</b>	<b>LOA</b>	<b>Breadth</b>	<b>GRT</b>
1,700 TEU Type	1,000 - 3,000 TEU	1,718 TEU	22,000	172.00 m	27.40 m	18,327
<b>NRT</b>	<b>Main Engine Type</b>	<b>CSR</b>	<b>Type of Fuel Oil</b>	<b>Fuel Oil Consumption at Sea (metric ton per day)</b>	<b>Service Speed in Knots at Design Draft</b>	<b>Container Capacity</b>
10,908	ME Wartsila6RT58T-D	CSR (90% MCR) 12204 kwx101.4 r/min	CST 380	49.0	19.7 with 15% sea margin	14T Homogeneous cargo intake 1,100 TEU
<b>Reefer Sockets</b>						
363 units						

**Table 3.3: Particulars of 1,700 TEU base ship type**

**Source: CNPI**

### **3.3 Verification of MR product tanker index**

Excluding Chinese shipyards, S. Korean shipyards are the main force in tanker newbuilding field, together with a few Japanese compatriots and others from Europe and North America. With such an extensive geographic scope, the need for newbuilding order records for back-testing is reasonably and fully satisfied. However, in order to have more related contrast, only S. Korean and Japanese records will be considered in this section, and highest and lowest newbuilding contract price will be market in the MR index line chart. To be clearer, for example, a S. Korean shipbuilder obtains an order at price of \$33 million in August of 2013, while a Japanese shipbuilder secured another order at 34 million during the same time, only the comparatively higher price will be considered as the highest in this half-month. All the parameters of base MR product tanker are introduced in the above. On the basis of MR index of CNPI family, the processed chart is the below:



**Figure 3.3: Back-testing of MR product tanker index**

**Source: Clarksons and CNPI**

### 3.4 Analysis on conclusions

#### 3.4.1 Analysis

Seen from above two sections, it can be easily found that CNPI indices are generally going to the same direction with the reality. Beyond this match, there are some fallacious or shortcomings that cannot be avoided, which are:

1. The disclosed prices are about past, which means they are negotiated into agreement before the contract is signed, but the index is given by shipbrokers with eyes on the right moment and prospects. The index is more real-time than recorded prices.

2. Due the fact not in every two weeks new agreements are reached, whereas indices are consecutive, and this character exaggerates how real prices change.

3. Someone may find that all of a sudden highest prices may drop drastically, even being equal to the lowest. This is because some firmed fixtures are actually executed options affiliated upon contracts before. With reference to fixture records, executed options broker out from January 2014.

4. A most important factor that exerts negative influences on the back-testing is some of the newly ordered ships are similar with base ship type in terms of tonnages, but other particulars do not match parameters of base ship type. Although indices have been manually adjusted by senior shipbrokers, they do not have same opinions on a market level. The role of shipbuilders is also mentioned before, and here its importance cannot be neglected. First class shipbuilders only build first class works at first class cost.

#### 3.4.2 Conclusions

Still a few conclusions are reached as below:

1. The index is indeed able to show the general pattern of average market level. Looking at prominent gap between highest price and lowest price, index is almost just in the middle.

2. Disclosed prices fluctuate more dramatically than base ship type index. Probably the reason is index is more consecutive than prices.

3. Geographical difference between China and S. Korea is more obvious in MR tanker line chart. Most of the time, the lowest prices of S. Korean shipbuilders' new orders are higher than MR indices. This is exactly the truth as a matter of fact.

## **4 CNPI and the derivatives**

### **4.1 Forward Freight Agreement**

As referred before in Chapter One, Forward Freight Agreement derives from the Baltic indices. To give a general idea of FFA, it is a product of shipping transactions mainly focusing on chartering market, including dry and wet, as well as a financial instrument for risk management against volatility of freights. Speaking of literatures that are referred to regulate FFA market, The Baltic Code, The Baltic Rules, Guide to Market Practice, and Manual for Forward Panelist are four must-reads. Due to the fact that FFA nowadays is the most recognizable and successful shipping financial derivative, I will concentrate on its merits for further explanations.

Baltic Forward Assessments (BFA) and FFA Broker's Association (FFABA) are playing significant roles in FFA trades. Somebody may confuse about the relationships of Baltic index, FFA, and BFA. One common misunderstanding is FFA contracts are settled at the average of rates of BFA, while panelists of BFA are submitting assessments on Baltic indices. The truth is FFA is settled at Baltic index of the according constituent shipping route while BFAs are average assessments of

FFA prices. The settlement is based on the difference between the contract price and the final settlement price, which is arithmetic average of all Baltic's daily spot prices in a period for one certain shipping route, and it is in cash. Being an OTC product, it is very flexible but a format contract is provided by FFABA. The contract will be tailored by negotiations on terms and conditions (mainly are route, contract period, contract quantity, and rate to be settled at) according to the the needs of parties involved, and FFA brokers will offer their efforts until the settlements are honoured.

The participants in FFA market include shipowners, charterers, traders, and speculators, and speculators could be banks, hedge funds, and other financial institutions and companies, so the brokers in FFA market differ from the chartering brokers in the physical market because they are more financial. The clients of FFA brokers possibly know nothing about shipping, not to mention the operation of ships, and vice versa that some shipping companies that barely have finance experience are trading FFA with the help of brokers. More importantly the chartering brokers are not governed by a nominated government department or an institution, but FFA brokers in UK are supervised by UK Financial Service Authority (FSA) with strict regulations and laws, and according to Baltic Code, some FFA brokers that are not living in UK are expected to be regulated by the authorities in the resident jurisdiction. As to the supervision on UK-based FFA brokers, all the brokers and brokerage houses are ought to be filed and recorded in FSA by applying for permission, and Handbook of Rules and Guidance and Markets in Financial Instruments Directive (MiFID) have to be complied with. The brokerage houses are obliged to report to FSA on timetable basis about work and practice, personnel turnover, and any other information if it is requested.



Because of the above specialty, it is clear to see that panelists of BFA are totally not the same with panelists for Baltic indices. A BFA panelist shall not only be familiar with The Baltic Code, but also understand Manual for Forward Panelist that specially clarifies the measures have been taken to maintain the credits of BFA, saying quality control. The quality control begins from the appointment of panelist. The appointment of BFA panelist must meet a few criteria, one of which is the panelists must be members of Baltic Exchange and FFABA. This ensures they are competent enough to carry on the name of being BFA panelist. And one of the core competences of a panelist is to assess and judge the most appropriate mid market price on reporting day with their best professions. Besides, the Baltic Exchange will review panelists and their report at least once a year. The last is detention of data that make sure the all rates and records are traceable and available if in need.

FFABA was formed by the member of Baltic Exchange in 1997, and since 2006 it is separated for wet and dry respectively each with its own management. FFABA is an association recognised by all the FFA brokers for self-discipline and only FFABA members are legally allowed to participate in FFA trades.

## **4.2 Shanghai Shipping Freight Exchange**

Shanghai Shipping Freight Exchange (SSEFC) is the first shipping freight exchange platform in China and it is controlled by Shanghai Shipping Exchange. Its main products can be categorized into container products and coal products and both of them began from 2011. It is said since the opening of SSEFC in June 2011, there have been over 1,000 traders enter this market. By 31th December 2011, the trading volume reached 12.11 million lots with total value of 83.8 billion CNY. However,

because of a few interior reserved problems of products and exterior fallacious market mechanism, plus the popularity of speculation in the market, the condition of SSEFC had been deteriorated until the establishment of China Pilot Free Trade Zone. On 10<sup>th</sup> October 2013, SSEFC commenced brand new coal products that are designed to settle at real exchange of tonnages or capacities. In February 2014, an announcement released by SSEFC claimed that container products are also going to be settled at real exchange of tonnages but by TEUs.

Container products (usually referred to as SCFI) of SSEFC consist of two shipping routes underlain by indices of Shanghai Containerised Freight Index, which is similar with FFA. The two shipping routes are Shanghai to US West Coast route and Shanghai to Europe route, but without detailed nominated destination port. Unlike FFA, the approach of SCFI to become an acknowledged success for financial side has been tough for some inherent flaws. First of all is the base standardization of index. BDI has specific definitions on every shipping route, including the tonnage of ship, departure port and destination port, main terms of charter party, vessel's max age, etc. Looking back to SCFI, schedule and frequent are the most two important indicators to measure line service but they are not clarified in statement of base shipping route of SCFI. Additionally, the surcharges and terminal handling cost (THC) have become two profit sources for line companies, in particular for competitors on China-Japan lines, whereas certain introductions of surcharges and THC are not included in the clarification. The other flaw is the standard benchmark to weigh the quality of line service is not reflected by SCFI since liner transportation is complex and connected closely between each node. No doubt that liner transportation is more flexible and comprehensive because it is not just about

maritime transportation but likely to provide overland transportation, some plus other extra service such as yard store.

In the second place, liner market is an oligopoly market within fewer compatriots than that in tramp market. In tramp market, neither the demand side nor supply side have the right to determine hire rates or freights, while in liner market Maersk, MSC, and CMA CGM strengthen the suppliers side, even freight forwarders are relying on their dominance to earn money from shippers through price difference. From the public illustration on the website of SSEFC, the panelists of SCFI contains almost top 10 containership operators in the world, like CMA CGM, COSCO, CSCL, Maersk, OOCL, and so on, and they all have one in common which is the right to call ups and downs in terms of service cost. In other words, they own the capability to lead pricing policy amongst all. Suppose three or four of them are willing to see an increase of SCFI, it will be so easy for them that just level up service cost in a certain period around reporting day. If so, all the shippers or other participants in derivative market will not have the courage to go for short.

Three years after the launch of trading SCFI, the organiser seemed like to realise the problem and decided to renew the product by changing the settlement to tonnages instead of index, but the prospect remains vague and questionable. The product of line companies is their service to move cargo by containers. Although the containers are standardised with same size, but the services provided are various, while they are reflected by freight. For instance, a Door-to-Door service provided by COSCO is unlikely to be highly similar a with a CMA CGM's Door-to-Door service, not to mention a CY-CY. Another varying factor is customer's loyalty to a single liner.

Regular and fruitful client is inclined to stick to a well reputed line company, under which circumstance the client will not have a motivation to exchange capacity.

### **4.3 CNPI derivatives**

The trade of CNPI derivatives has not been launched but is pushed by strong efforts. No matter how the products will be designed, two basic principles will be strictly followed, and they are:

**A. CNPI panelists are definitely not allowed to be involved in derivative trades.**

Panelist are not only related parties but standing for impartiality and objectivity of the indices. CNPI team will be responsible for releasing regulations, rules, and inspector to supervise the running of derivative market. Obviously the counter example is SCFI whose panel is open to the possibility of being controlled by container carriers.

**B. The settlement is cleared at price index for one particular base ship type.**

FFA started from BIFFEX and failed due to its settlement at BFI, a composite index that could only illustrate an overall tendency of the freight. Afterwards specific constituent shipping routes containing stated every details are enabled for settlement, which is proved to be successful. The initial mode and framework of CNPI derivative keep up with FFA but a little distinguished.

Hereinafter I would like to present an infant product to better illustrate how CNPI derivative works.

#### 4.3.1 Shipowner with long paper

Suppose in March 2014 the market newbuilding price for Ultramax dry bulker was \$28 million. A shipowner was on a negotiation of a long term COA that is expected to begin from 2016. If the charter was fixed, the cargo owner would request a new ship to carry out the contract, but the result will only be for sure by the end of 2014, and at that moment a new order will possibly worth more than what is now. So the shipowner risks of suffering a loss. However, he saw \$29 million an acceptable price and decided to buy a long paper of Ultramax which will be settled at the price index of Ultramax in the end of 2014. The balance sheet is shown as following (unit: \$ million):

Date	Long paper	Price index	Balance for paper	<b>Cost with hedging</b>	Cost without hedging
2014.3	29	28	-1	<b>29</b>	28
4		28.5	-0.5	<b>29</b>	28.5
5		30	+1	<b>29</b>	30
...		...	...	<b>...</b>	...
9		31	+2	<b>29</b>	31
10		30	+2	<b>29</b>	30
11		30.5	+1.5	<b>29</b>	30.5
12		32	+3	<b>29</b>	32

**Table 4.1: Shipowner with long paper when price is going up**

Hereby the settlement is assumed to be done monthly. If the price index of Ultramax is going upward in accordance with the reality in the market, the shipowner will earn more and more by long paper but loss more and more at the same time physically. Even so it is clear that cost with hedging remain unchanged all along. But what if the market goes down? Certainly the shipowner will pay for the long paper before the final settlement, but for another thing he is reasonable to benefit from lower newbuilding price in the real world. Still the cost with hedging remains the same. The details are as below (unit: \$ million):

Date	Long paper	Price index	Balance for paper	<b>Cost with hedging</b>	Cost without hedging
2014.3	29	28	-1	<b>29</b>	28
4		28.5	-0.5	<b>29</b>	28.5
5		30	+1	<b>29</b>	30
...		...	...	<b>...</b>	...
9		29	0	<b>29</b>	29
10		28.5	-0.5	<b>29</b>	28.5
11		28	-1	<b>29</b>	28
12		27	-2	<b>29</b>	27

**Table 4.2: Shipowner with long paper when price is going down**

#### 4.3.2 Shipbuilder with short paper

Being the seller in the newbuilding segment, shipbuilders are happy to see increases of prices while hold the wish to sustain a stable cash flow in case of collapse of market or cancellation of orderbooks. Assume in March 2014, a shipbuilder was

afraid of declining market so a short paper was sold. Suppose by the March of 2016, the market price stops at \$23 million, the shipbuilder will save a safe cost with hedging. See the below for details (unit: \$ million):

Date	Short paper	Price index	Balance for paper	<b>Cost with hedging</b>	Cost without hedging
2014.3	29	28	+1	<b>29</b>	28
9	29	27.5	+1.5	<b>29</b>	32.5
12	29	27	+2	<b>29</b>	27
2015.3	29	26	+3	<b>29</b>	26
9	29	25	+4	<b>29</b>	25
12	29	24	+5	<b>29</b>	24
2016.3	29	23	+6	<b>29</b>	23

**Table 4.3: Shipbuilders with short paper when price is going down**

#### 4.3.3 Speculators

For one thing, speculators who want to put money into shipbuilding field, becoming shipowners or shipbuilders, most likely will encounter technical problems. For another thing, speculators are more into quick money rather than long term returns, but both shipbuilding and shipping industries are long-cycled. It is also real for investors to climb over the barrier, in order to get in and out of shipbuilding and shipping industries. With CNPI derivative, buying long paper or selling short paper will only happen when they want to, without any further requirements on shipping related experience or technical skills.

## **4.4 Predicable obstacles and potential defects**

For now then, there are still arguments on if CNPI derivative is literally workable and putting into practice is much far away. Primarily shipping financial derivative is quite new for domestic shipping people, even in the world it has only 20 years history. Hereby a few predicable obstacles and potential defects are presented from my point of view:

### **4.4.1 Lack of trading rules and regulations**

FFA is widely recognised as a mature freight derivative with an extensive range of popularity among all main shipping countries like UK, Singapore, Norway, and America. Fenced with strict rules and regulations, protected by cautious supervision, FFA earns its own credits from traders and brokers. Notwithstanding, Chinese currency FFA (RMB FFA) has faced with its Waterloo since the launch on 10<sup>th</sup> December 2012. According to released data by The Baltic Exchange, there are just 7,416 lots, equal to 499 million CNY, of RMB FFA had been traded by March 2014, which rises a big “why” considering FFA’s achievements overseas. The root reason for this phenomenon is, firstly, there is no need for FFA traders to trade RMB FFA because they have full access to better perform in overseas financial market, and even state-owned capitals of China are inclined to set up entities in Hong Kong or Singapore to enjoy more free financial transactions. Secondly and more important, Shanghai Clearing House just made up of protocols and guidances for domestic players, and overlooked roles of trading rules and regulations, inspections, entry requirements, and self-discipline. But simply copy of foreign rules will not be bound to do its best in the mainland in view of so many differences. The only way to



breakthrough this barrier is to firmly build a series of rules and regulations from the bottom.

#### 4.4.2 Absence of intra-industry self-discipline and supervision

Honestly saying in China, the absence of governing authority over freight derivatives will still be a problem for a long while. In addition, it will not be easy to set up a thorough self-discipline organization to supervise practitioners in this field. Actually the true problem of Chinese financial market is not to stall the innovation of financial products, but to enhance supervision for the sake of lower risks. In China, exchange market is ruled by China Security Regulatory Commission (CSRC), but it is not explicit for over-the-counter trades that are divided into inter-bank market and OTC bank market. The truth is shipping financial derivatives are not inspected by none of them, also this to some degree explains why RMB FFA gradually steps into chaos in China. Otherwise its independence with impartiality and objectivity will be threatened. Learned from exchange market, administrative inspection, intra-industry self-discipline, and internal risk control are integrity.

An organisation that is initiated and built by industry players is both judge and teacher. It functions as a school to breed and train qualified players by releasing guidance and training programme, together with strict and impartial penalty.

#### 4.4.3 Liquidity shortage

Suspicious flaws of CNPI have been discussed above in the Chapter 2, but speaking of CNPI derivatives, there are some other potential defects ought to be heavily cared.

As an OTC product, the most worried point is likely to be liquidity shortage that will arise from three prospects.

Imagine all the participants and investors are consistent with each other on the trend of CNPI going up or down, speculators will be less motivated to join them because of too much transparency of direction. A new contracting will only be regarded as fulfilled when it is delivered, usually after two years. For FFA or fuel oil derivatives, a single month is appropriate to be settlement period, but it seems like one year is not so sure to be applicable for CNPI derivative since one year behind contracting, probably the shipbuilder just begin the steel cutting. What is worth mentioning the price of new ships fluctuates much less frequently than the freight rate, so chances stand that in a year the direction of newbuilding price will be expected by all market players to be unchanged. Under such scene, CNPI derivative will be faced with little by little easing out.

The following problem is bilateral market, which is caused by either consistency or imbalance of buying and selling. If during a certain range of time, there are more buying behaviours in market, not only panic will be triggered but also bilateral market. Looking back to the past two years, CNPI has been upward for one and half years and just turned to south recently. Provided that derivative had been launched two years ago, I guess more likely there would be no one betting on downward in the next year, and the only question would be to what extent.

Next is involvement of state-owned capital, including from owner's side and builder's side. In 2009 State-owned Assets Supervision and Administration Commission of the State Council of China issued an alert requesting state-owned

companies are only allowed to hedge with financial derivatives rather than speculation. In consideration of almost in every field the leading sheep is state-owned and shipping is not an exception, their participation means a lot from every side. Nevertheless, it is difficult for a platform to monitor every move of state-owned company, it is unfair as well as against the basic principle to forbid a certain company's certain deal.

## **5 Conclusions and suggestions**

### **5.1 Conclusions**

As fore-mentioned, the status of Chinese shipbuilding on the earth has become more vital than ever before, also thanks to central government's determination to provide favourable policies for faster development with shipbuilders all along the coast line. Because of the same reasons, Chinese shipbuilding with banks suffered a lot facing the flood of cancellation of orderbooks in the downturn of shipping. Two years are must needed before a new ship is delivered, and shipbuilders are too vulnerable to bear so much unhappy abandons. This is why we need China Newbuilding Price Index, to explore a reasonable track of newbuilding price, and its derivatives, to better take risks under control and make them tolerable. The grounds on which authority of CNPI is built are its impartiality and leadership, and this is exactly CNPI team and all the panelists will pay everything to defend. The fact is there are still unresolved problems remained on the table, and they cannot be worked out overnight. Extension of panelist shall be carried out with maximum caution by steady pace, while category of shipyards will be so instructive.

In dry bulker and tanker freight market, FFA is available for shippers and carriers to earn a balance by combination of physical market and paper market. Fuel oil derivative is helping shipowners to deal with severely volatile fuel costs. Shipyards deserve to have a financial derivative which can be used to stabilise cost if it is used properly. Also more and more exposure of leasing companies and funds has become another variable in newbuilding sector, even some of them began to own ships without running. CNPI derivative is a bold trial under the shadow of both finance and shipping.

## **5.2 Suggestions**

The emphases will lie on the establishment of a series of regulations and mechanism to prevent financial risks. The series include but are not limited to access system of participants (traders and organisers), “ceiling and floor” system, security deposit, position limit, mark-to-market system, and introduction of central counterparty.

Trading platforms are ought to be credible and reputable. Moreover, platform is like fertile soil to cultivate infant financial product and provide education if in need. More importantly, if CNPI derivative is designed to be an OTC product, traders that are also called paper brokers, and organisers must be fully educated from every possibility of occurring risks. Regular examine and evaluation are totally essential.

Ceilings and floors on price change are based on previous day’s settlement price. Neither increases nor decreases from that point shall exceed certain ranges, otherwise the quotations will be discarded. This is to guard against hostile buying or selling behaviours. So does position limit system. Security deposit is for closing out. It will

be activated if the counterparty breaches the contract, and main purpose is to minimize platform's loss under such situation and safeguard the credits of derivative as well as platform's.

The most two eye-catching measures are mark-to-market system and introduction of central counterparty. Mark-to-market system is effective to response to abnormal volatility of fixed price. When the fixed price is seen to be so much higher or lower that will be marked to be a single case, and inspector definitely will keep an eye on the involved party even require more special security deposit, decrease of position, forced closing out, or limit on add of position, etc. All the actions are activated on the occasion that either platform or trader is informed.

Central counterparty (CCP) is significant and indispensable by which credit risk and financial risk are well managed and lowered while liquidity and efficiency are stimulated. Clearing fund is what the clearing members deposit together in the clearing house for participation in paper market, and it is designed to cover the counterparty's loss if someone breaks the contract. It is the core of management of risks by central counterparty and owned by clearing members at the basis of contribution. When a clearing member is hurt by force majeure or suffer a much bigger loss, central counter party will pay the bill with earnings from clearing business, which is called risk reserve capital. Thus its importance can be seen.

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## Appendix I:

Date		64,000 DWT	Highest	Lowest		MR	Highest	Lowest
2013/1/15	2517	25.17	25	23.55	3109	31.09	33	33
2013/1/30	2506	25.06	25	23.55	3109	31.09	32.5	32.5
2013/2/15	2507	25.07	25	23.55	3109	31.09	32.5	32.5
2013/2/28	2506	25.06	25	23.55	3109	31.09	33	32.5
2013/3/15	2494	24.94	25	23.55	3109	31.09	29	29
2013/3/30	2502	25.02	25	23.55	3109	31.09	29	29
2013/4/15	2512	25.12	25.25	24.5	3124	31.24	31.5	31.5
2013/4/30	2516	25.16	25.25	24.5	3122	31.22	32	32
2013/5/15	2518	25.18	25	25	3164	31.64	32	32
2013/5/30	2529	25.29	25	25	3190	31.90	30	32.5
2013/6/15	2540	25.40	26	25.5	3190	31.90	30	32.5
2013/6/30	2549	25.49	25.5	24.5	3244	32.44	30	32.5
2013/7/15	2549	25.49	25.5	24.5	3251	32.51	30	32.5
2013/7/30	2562	25.62	27	25.5	3263	32.63	30	32.5
2013/8/15	2571	25.71	26.5	25	3268	32.68	35	35
2013/8/30	2576	25.76	25.5	25	3275	32.75	34	34
2013/9/15	2593	25.93	25	25	3279	32.79	34	34
2013/9/30	2620	26.20	26	25	3310	33.10	34.5	34.5
2013/10/15	2635	26.35	29	24.5	3351	33.51	34.5	34.5
2013/10/30	2657	26.57	27	26	3401	34.01	34.5	34.5
2013/11/15	2663	26.63	27	26	3415	34.15	34.5	34.5
2013/11/30	2675	26.75	27.4	27.4	3430	34.30	34.5	34.5
2013/12/15	2686	26.86	27.4	27.4	3443	34.43	34.5	34.5
2013/12/30	2699	26.99	24.5	24.5	3443	34.43	34.5	34.5
2014/1/15	2718	27.18	25.8	25.8	3445	34.45	34	34.5
2014/1/30	2745	27.45	25.8	25.8	3466	34.66	34	34.5
2014/2/15	2769	27.69	25.8	25.8	3466	34.66	34	34.5
2014/2/28	2783	27.83	27.9	27.9	3475	34.75	34	34.5
2014/3/15	2799	27.99	28.5	28.5	3497	34.97	34	34.5
2014/3/30	2802	28.02	28.5	28.5	3502	35.02	34	34.5
2014/4/15	2816	28.16	28.5	28.5	3516	35.16	36.6	36.6
2014/4/30	2822	28.22	29	29	3529	35.29	36.6	36.6
2014/5/15	2822	28.22	29	29	3529	35.29	36.6	36.6
2014/5/30	2840	28.40	27.05	27.05	3526	35.26	36.6	36.6