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SHANGHAI MARITIME UNIVERSITY

WORLD MARITIME UNIVERSITY

Shanghai, China

**The Impact of China on the International Dry
Bulk Shipping Market**

By

Zhang Hailun

China

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

INTERNATIOANL TRANSPORT AND LOGISTICS

2013

DECLARATION

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.

Zhang Hailun

.....

Supervised by

Professor Qu Linchi(Associate Professor)

Shanghai Maritime University

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ABSTRACT

Title of research paper: **The Impact of China on the International Dry Bulk Shipping Market**

Degree: **Master of Science in International Transport and Logistics**

Through this paper, it will be proved that China is really important to the international dry bulk shipping market and I will also have an analysis on the future of China in international dry bulk shipping market. I hope that I can provide a valuable reference to our country's dry bulk transporters who are related to this major, through this study. So that they can make the best use of today's China factor to further make the analysis of international dry bulk shipping market trend, and establish the shipping development strategy.

The China factor plays an important role in the international dry bulk shipping market undoubtedly. The enterprises and research institutions related to shipping industry should fully understand Chinese industrialization process and the laws of its development, and pay close attention to changes in Chinese economic development. The domestic enterprises and government departments related to the dry bulk trade and transportation need to seriously study the issue that how to make full use of China factor to increase their international competition.

This paper intends to provide a valuable reference to international dry bulk shipping

practitioners, clear Chinese important position and effect on the international dry bulk shipping market in recent years, make better use of current China factor to judge the trend of the international dry bulk shipping market, formulate maritime development strategy and reasonable arrange for the distribution of capacity, through the study of China factor.

KEYWORDS: Dry Bulk Market, China Factor, BDI, Grey Relational Analysis

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List of Abbreviations

BDI	Baltic Dry Index
GDP	Gross Domestic Product

1.Introduction

As Chinese economy develops, the economic connections between China and foreign countries have been tighter and tighter. That is to say that Chinese economy has been more and more important to the world economy. Thus, there are a great number of scholars who pay attention on this topic. The China factor has been first presented in the early years. The shipping industry has been closely connected with the international economy; as a result, the China factor in the international dry bulk shipping market has been regarded as an important subject in recent years.

For a long time, the international dry bulk shipping has played an important role in international shipping as it has possessed a large share in the whole international shipping industry. The dry bulk is mainly the original material for industry production. In other words, the dry bulk may be regarded as the basis of the development of world economy. The transportation of the international dry bulk is mainly taken by shipping.

1.1 Background of this Dissertation

The international dry bulk shipping market is a very huge market which can contribute nearly three billion ton shipping stuff. The international dry bulk shipping market is a distinguished element of the international shipping market. Shipping industry is the bridge and link in the international trade. There is more than 90 percent goods transportation in the international business done by the shipping. The world economy has kept on-going increase trend and the division of labor has been more frequent. Those factors have greatly promoted the increase of the international trade amount. Therefore, the shipping industry is not only an old industry but also a young service industry which has been full of vitality(C. Zhang, 2006).

Compared with the other international transportation ways, shipping has many advantages. For example, shipping can use the natural shipping lane without the limitation of road or rail. Furthermore, shipping can take larger goods than the other transportations. What is more, the energy and fuel of shipping is less, compared with others. That is to say shipping is more suitable for the large amount of goods transportation during the international business. The increase of the international shipping demand has directly caused the quick increase of transportation capacity in the international shipping service market. Totally to say, the capacity of shipping and the amount of shipping increase at the same time. But as the speed of the increase of shipping capacity is faster than it of the increase of shipping amount, the supply of shipping in the international shipping market is more than the demand(Q.Zhang, 2011).

As mentioned, the international dry bulk shipping market is one of the most important members of the international shipping market. So it also faces the challenges as the other shipping industries. The change of the whole structure of the

international shipping market can affect the international dry bulk shipping market as well as the change of the competition terrain of shipping market. It has become a very vital tactic choice to look for another shipping development mode.

1.2 Research Purpose and Meaning

Through this paper, it will be proved that China is really important to the International Dry Bulk Shipping Market, and I will have an analysis on the future of China in international dry Bulk shipping market. I hope that I can provide a valuable reference through this study to our country's dry bulk transporters who are related to this major. So that they can make the best use of today's China factor to further make the analysis of international dry bulk shipping market trend, and establish the shipping development strategy.

Existing problems:

As the world economy develops, the demand for dry bulk has also been increased in a great amount. As a result, the scale of international dry bulk shipping market has been gradually enlarged. We can look into the increase of international dry bulk shipping market in some aspects, such as the shipping amount or the ships. Till 2006, the whole amount of the international dry bulk shipping has reached 2.57 billion ton and there are 6056 ships which have taken part in this industry.

Although the demand for international dry bulk shipping is very huge, the capacity and amount of the dry bulk shipping have been in an imbalance for a long time. The lack of shipping capacity causes the increase of the shipping price. The international dry bulk shipping market has been more and more popular. As a result, more ships

are produced in order to satisfy the demand for more shipping. As new ships put into the shipping market, the shipping capacity increases quickly. Then the shipping capacity is over the shipping amount. In the same way, as the shipping capacity is larger, the shipping price is lower. So the shipping market has some regular characters.

For a long time, the research on international dry bulk shipping market in China has been greatly paid attention on. Not only have the social scholars paid attention to the international dry bulk shipping market in China, but also have the postgraduate students majoring in international shipping and transportation made their efforts in this field. Zhang Qiao, coming from the Transportation College of the Dalian Maritime Affairs University, a social scholar who had paid her attention on the development trend of the international dry bulk shipping market, came up with a thesis named *The Development Trend of the International Dry Bulk Shipping Market* in 2011. In this paper, she looked deeply into the current situation of the international dry bulk shipping market and drew into a conclusion based on the analysis. In her opinion, the increase room of the international dry bulk shipping market was limited in the coming several years because the shipping capacity was far more than the shipping demand.

Yang Yuhong and Li Haitao were two researchers who belonged to the Cosco Bulk Carrier Co, LTD, once made a study about the international dry bulk shipping market in the magazine *World Shipping* in 2004. Their thesis was titled by *The Review and Looking in the Distance of the International Dry Bulk Shipping Market*. In the thesis, the two researchers made a review of the international dry bulk shipping market in the earlier years and made a predict of the coming years of the international dry bulk shipping market situation. The main methods they took to prove their opinion were

figures. Yang Yuhong and Li Haitao came up with many figures of the international dry bulk shipping market and then made the conclusion as mentioned above.

Not only have the social researchers in the international dry bulk shipping market field paid attention and made contributions, but also have the students who were in this major and took this subject as their postgraduate graduation paper. For instance, Liu Shuisheng, a postgraduate student of the Shanghai Maritime University, took a research on the international dry bulk shipping market when he made his graduation paper in 2011. His paper was named *Research on International Dry Bulk Cargo Shipping Market*. His thesis could be taken as one of the best postgraduate students' papers in the major of international transportation and shipping. In his paper, he firstly analyzed the world dry bulk cargo shipping market. He analyzed not only the world dry bulk cargo shipping market but also the ships and the market law. Then he paid his attention to predict the world dry bulk cargo shipping market. At last his thesis made an analysis on the supply and demand of the world dry bulk cargo shipping market.

Besides the above two kinds of researchers in the world dry bulk cargo shipping market field, there is another kind of study on this subject. They focus the world dry bulk cargo shipping market closely and tightly. The research is made based on a single year or even a single month. They give a brief introduction of the world dry bulk cargo shipping market in a short time. The change of the world dry bulk cargo shipping market is clearly put award and their purpose is to present a reference for the decision makers. For example, Hai Lan, a researcher of this subject, once presented a paper named *The World Dry Bulk Cargo Shipping Market* in the magazine of Maritime China. In this paper, the author only focused on the world dry bulk cargo shipping market changes in 2012.

2.The Research of International Dry Bulk Shipping Market

A brief review and analysis of the market situation:

As you may know, we have a index of dry bulk shipping industry, the BDI, which is not only a barometer of international dry bulk shipping market, but also regarded as a weather vane of the strength of the global economy. Because on the one hand, it gives a direct response to the level of the dry bulk market; On the other hand, the types of international dry bulk cargo (refer to iron ore, coal, grain, steel, pulp, phosphate rock, bauxite, etc.) are basically everyday necessities and industrial raw materials, which also leads to that the transport situation of the international dry bulk is closely related to the global economic boom and the level of raw material prices inevitably.

2.1 The Summarization of International Dry Bulk Shipping Market

The rapid development of Chinese economy is an important factor to driving the rapid growth of international dry bulk shipping, including international shipping industry. In the 21st century, Chinese economy has entered a new period of growth.

With the new industrialization and urbanization process accelerated, national consumption structure upgraded and the adjustment of global manufacturing, Chinese huge dry bulk market demand has become the power and source of the development of international shipping market.

Affected by the "China factor" in 2009, the international dry bulk market started to recover gradually and in the following years, the China factor has been played the main role in the international dry bulk market. But in the past few years, there have been a lot of ups and downs of the total demand. In 2009, the aftermath of follow-up impact of long-term collaborative negotiations of continued, and to the 2010, its negotiation was even more severe than before. The changes of current price of iron ore directly affected negotiation process of price of iron ore long-term collaboration. (Y.X. Wang& S.Z. Liu, 2010). A number of international investment banks constantly revised 2010's iron ore long-term collaborative price increase, the maximum reached 60%, and the level of price increase had a great impact on the number of the demand for imports. In 2012, Chinese economy dropped to the deep, which had a certain influence on demand for iron ore. Our country's iron ore inventory destocking remains high, so destocking and price adjustments will continue for some time. According to statistics, the amount of seaborne iron ore in the first half of 2013 decreased by 3.4%, compared with the second half of 2012. Its decrease is the most serious in various kinds of goods. Fluctuation in the Chinese market will drive it in the international dry bulk market (N.F. Wang, 2012).

The overcapacity problem of Chinese steel industry has played a very important role on the international dry bulk market. After the implementation of the top ten industries restructuring and revitalization plan, Chinese steel industry has come out

of the adverse impact caused by the financial crisis, but the excess capacity remains a serious problem, which is still the focus of the international dry bulk market's attention. According to the survey data, in the total of steel consumption in China, building materials industry does the largest contribution to the steel industry. Its demand accounts for about half, the machinery is about 20%, the auto industry accounts for about 4%. Due to the rapid development of our country's infrastructure construction and real estate, the continued growth of investment in fixed assets pulls the iron and steel industry. With the rapid development of machinery Industry in recent years, the export volume has increased year by year, which also plays a large role in pulling the steel industry. With the promotion of the level of the national economy, the demand for cars is also increasing and the flourish of automotive industry is also one of the main factors in pulling the steel industry.

In 2009, China became a net importer of coal for the first time, which was mainly based on the gap between domestic and international coal prices and the significant decrease of coal production caused by the integration of coal industry in Shanxi. In 2010, coal price was obviously higher than before. Chinese, Japan and Australia reached the quarterly agreement on coking coal, and the price in that time rose by 55% compared to the price in 2009. Through the annual long-term collaborative price negotiation of thermal coal between Japan and Australia, the final price was close to \$ 100 /tons. Coal price continued to rise in 2011, the international long-term collaborative price of thermal coal rose nearly by 40% than that in 2010. After coal import up to 290 million tons in 2012, it kept growing substantially in the first quarter of this year. General Administration of Customs statistics showed that import of coal products increases by 30.1% in the first quarter, reaching to 80 million tons. Among the 36 coal mining and processing listed companies disclosed in the annual report, the decline in performance of listed coal is more than 80%(N.F. Wang, 2012).

2.2 The New Features of International Dry Bulk Market in recent years

A .Broken the original shipping cycle variation

It is said that since 2003, the international dry bulk market has continued to rise for five years and this five years have completely broken the original shipping cycle variation (the original shipping market has long trough and short crest and changes by grain trade's seasonality). The market is showing the new features like high frequency and large extent of fluctuation. Iron ore and coal, instead of grain, become the major type of dry bulk cargo and the original shipping market cycle variation gradually disappears.

B. Shipping operation has undergone enormous changes

The changes are mainly reflected in the following aspects: First, the shipping companies began to choose the operating modes flexibly between long-term contracts and spot market and established a strategic partnership with the large shippers; Second, ship owners' strategic thought has shifted, from owning the ship to controlling it, which also brings the identity change from the owner to a comprehensive identity (owner / charterer / ship managers); Third, shipping companies have developed upstream and downstream industries in order to adapt to changing internal and external competitive market environment and achieve sustainable development model.

C. Market main gradually from dispersion to centralization and role diversification

Capacity demand side: Iron ore and grain trade monopolies are gradually intensifying, especially iron ore trade occupying the largest part of dry bulk seaborne trade is controlled by three major mining companies such as Rio Tinto. They basically control the changing pace of shipping market by increasing spot sales, hyping FFA and other business strategy.

Capacity supply side: After shipping crisis, the market has withstood reshuffle. Good-credit, large-scale shipping companies have a significant business advantage in the market, and the living space of small - scale charter operators or owners is narrowing day by day.

Market participation role side: In recent years, with the rapid development of FFA market and chartering business model, the participating subjects of shipping market become more complicated. Identities of ship owners and shippers cross, investment companies and banks have also participated in the shipping market through ship sale and purchase, financing, guarantees etc., especially investment banks for the purpose of speculative profits has also become a new force in the shipping market and played an important role in changes in the market in recent years.

D. Several elements in shipping market capitalized

It refers that ships, freight index even orders can be traded as commodities, such as FFA. Paper market appears around spot market. Interactivity between paper market and spot market increases market volatility, but also risk of the shipping market.

E. Significant changes in traditional international trade structure

Iron ore: iron ore long-term-oriented sales model is seriously challenged, spot sales increases year by year and forms a trend. This year's annual iron ore pricing mechanism is completely broken, and quarterly pricing model is almost settled,

which will further increase iron ore market volatility.

Coal: China is a coal exporting dominant country in tradition, but in recent years, especially from 2009, exports have slowed, imports have increased significantly, which forces Far East Asian countries relying on importing coal from China to turn to Australia, Indonesia, South Africa, Canada and other countries. Growth of trade and increase of transport distance have a positive impact on the international dry bulk market.

China and India factors: The huge demand for raw materials such as iron ore, coal, grains of China's economic development has become the promotion of international dry bulk market in recent years, and this trend will continue. India's strong economic growth, not only brings the significant import demand of coal and other raw materials, but also its iron ore exports are decreasing and there is a trend to increase imports of high-grade iron ore in Australia. This will be a support force of the new international dry bulk market.

F. Shipping pricing mechanism increasingly complex

In addition to supply-demand relationship, FFA market changes, charter rent level, the market game mentality etc., affect current and forward transportation price and ship rent level, making the pace of market changes faster and steeper.

2.3 The Balance of Supply and Demand Analysis on International Dry Bulk Transportation

The rule of shipping industry is a cycle of the rise and fall, which is climax-high

price-capacity increase-oversupply- tariffs fell-trough-capacity reduce- short supply-tariffs rise- climax. The balance between supply and demand is broken, which inevitably changes market conditions.

As the international dry bulk shipping market is derived from international trade market, the long-term trend of dry bulk shipping market is in line with the law of trade market. If global economy is in a boom period, the shipping capacity of the shipping market will increase significantly, and thus ships demand will increase, and the shipping market prices rise: whereas the market fell.

The meaning and characteristics of dry bulk transport market demand:

Dry bulk transport market demand refers to the total demand for maritime transport services the world dry bulk shippers or shippers want in a certain period of time and a certain level of tariffs. (S.S. Liu , 2007)

Different from other goods, dry bulk transport has following characteristics:

a. The derived of dry bulk cargo transport demand

The need of the international shipping market is derived from international trade. Its source lies in the development and changes of the world economy. Therefore, the changes of the dry bulk international trade on the quantity, transport distance, value and commodity structure caused by the development of the world economy have deep impact on dry bulk shipping demand(Evans, 1994).

b. The potential of dry bulk cargo transport demand

On the one hand, the rise and fall of the world economy reflected in international trade has certain latent, and on the other hand, a considerable part of international trade is the trade in future, which brings the lag the shipping demand.

c. The imbalance of dry bulk cargo transport demand

The difference in resources between countries, the level of economic development, economic structure and the different levels of development of international trade cause the imbalance of demand for dry bulk shipping. This imbalance on the one hand promotes the development of the shipping market, on the other hand raises the different ratio requirements on the scale of shipping development, fleet structure, shipping parameters and so on.

d. The identity of dry bulk cargo transport demand

The identity embody that the dry bulk shipping demand does not change the physical form of the dry bulk, but achieve the displacement of this transport object.

The same as oil transport, dry bulk transport belongs to tramp shipping market form. Therefore, any shipping company, no matter how large scale, how much capacity and traffic, can be completely free to enter and exit the market. Because the entry barriers is low, the industry is highly fragmented, and the dry bulk fleet in the world's top 10 occupy only about 20% of the market, only those who have the strong operating capacity and competitiveness can survive. During the time that the relationship between supply and demand is relatively stable, enterprise's management level is the main key to decide the competitiveness of enterprises and economic benefits; But when the relationship between supply and demand and the external environment often and significantly changes, the enterprise ' s business strategy and guiding ideology play a key role in its existence and development. Therefore, the factors that determine the success of enterprise lie not only on the daily internal management level, but also on the rationality and timeliness of business strategy. In recent decades, rise and fall of shipping companies also shows the importance of business strategy. The purpose of formulating business strategy is to broaden business ideas to survive

and develop sustainably, to grasp market opportunities and adjust the direction of development to find the best way to develop, to enable enterprises to stay focused by seeming maximizing the benefits as business strategy, in the constantly changing external and internal environment. Business strategy of a competitive shipping enterprise should have the following basic characteristics:

- (1) Adapted to the domestic and foreign market environment the enterprises are in.
- (2) Seizing the favorable opportunity to maximize the use of favorable conditions to eliminate or digestion adverse factors.
- (3) Internal coordination and cooperation, and giving top priority to the interests of the whole.
- (4) Clearing Target, practicable measures flexibility to adjust.

3. The Influencing Factor on the International Dry Bulk Shipping Market

China is an important factor in the international dry bulk shipping market, the enterprises which are related to shipping market and research institutes should fully understand Chinese industrialization and law of development, and pay more attention to Chinese economic development.

3.1 Analysis of the factors affecting the volatility of International Dry Bulk Shipping Market

The most fundamental reason in the international dry bulk shipping market's cycle fluctuation is that the change of supply and demand. While the supply and demand are affected by some factors, then, I will analyze the influencing factors of supply and demand.

I. Influencing factors of demand

The demand in the international dry bulk shipping market is derivative demand of international trade, which originated in the international trade shipping needs. And the development of the international trade depends on it of the world economy, and the development of the world economy and international trade are also influenced by social, economic, political, technological and natural factors. These complex factors tend to the same effect on the international dry bulk shipping market, and also influence the international dry bulk shipping market's fluctuation.

a. Factors of economic cycle fluctuation

The economic cycle refers to the real GDP to measure the economic activity level of expansion and contraction of the alternative phenomenon. Specific performance is that the economic expansion is affected by resource supply constraints or consumption constraint, and appears the economic contraction. Then due to resource supply abundant or consumption demand, the contraction goes back into the economic expansion, goes around and begins again, continuously into the cycle. Usually, a complete economic cycle can be divided into four stages: Recovery, Prosperity, Recession and Depression(S.S. Liu, 2007).

The international dry bulk shipping market and the macro economy operation should be consistent. Economic cycle determines the international dry bulk shipping market cycle, the changes in the market cycle reflect the economic cycle changes again and it will also have a certain influence on the development of the national economy. The economy from recession, depression, recovery to the periodic variation prosperity is the most basic reason for the formation of bulk shipping market peaks and troughs of the transformation of the cycle of international dry bulk shipping market.

For the shipping market, when the macro economy was out of systole and entered the expansion phase, which namely the economy recovered from recession and tended to

prosper in process. When the market demand increases, leading to price rise, then supply increases. When the macro economy from expansion to contraction, the international dry bulk shipping market's demand has decreased, and capacity is less than the demand reduction, it will appear excess capacity and lower rates.

b. Average transport distance

The international dry bulk cargo demand depends largely on the carriage of goods by sea transport distance, because the same tonnage of dry bulk transport distance is longer, and demand for shipping market is greater. Variation of average distance is changing balance of supply and demand of dry bulk shipping market, so the market will have volatility.

c. Political and legal factors

The supply of goods in the international dry bulk shipping market involves in the whole world and it is affected by the change of political situation, foreign investment, foreign trade policy and other related policy laws which impact on international trade. Generally, it includes the political relations between countries, political and legal constraints within countries, country or region's political stability, national economic legislation and the attitudes of international trade. For example, when the friendly relations between the two countries, the import and export trade between them will increase; on the contrary, when the relations deteriorates, import and export trade will drop sharply, which are likely to make shipping distance change, change the relationship between supply and demand on the market, and then, leads to market volatility.

d. Natural environmental factors

Natural environmental factors refer to the real natural condition and the resources

potential and land area, topography and climate, geographical location, resources distribution, and development and utilization of coastal zone resources and meteorological condition in countries or regions. The natural environmental factors greatly influence the demand of the international dry bulk shipping market. For example, the imbalance of global resources distribution will inevitably lead to the shipping demand and produce the process that the raw materials are transported to the country which is scarcity of raw materials.

II. Supply factors

Discussed supply factors, it will inevitably be linked to demand, because the supply and demand are closely related, shipping supply is always changing with the transformation of the shipping demand. Of course, changes of some factors such as the development of shipping demand, the world economy and international trade of the national policy, law and natural environmental factors will bring to the supply. Usually, the rise and fall of the shipping market's demand and supply will impact the scale and situation of the shipping market. It has been expanded along with the growth in demand and supply, and it has been reduced with the reduction in demand.

a. The scale of transport capacity, new ship orders and old ship demolition

Dry bulk fleet size is the concept of a stock, the new ship and old ship demolition determines its increase or decrease. In general, when the market is in a recovery or prosperity period, the main factors affecting fleet size are the number of new ships, because in these phases, the operators of the ships are through the new ship to improve the economic benefits. They make the market of new ship orders increased, while few old ships demolition, whereas market in the downturn, a large factor affecting the fleet capacity is ship demolition quantity, new ship orders at this time will appear the recession.

b. Seal up for safekeeping of ships

As mentioned above, when the market is in the downturn, ship operators in addition to reduce ship orders, even cancel and delay orders ship delivery, and increase the dismantling of old ships, which is a very important approach to seal vessels, which requires economic benefits of sequestration of ship and ship operators operating income evaluation. For example, when the operation of the ships' income is insufficient to offset the cost of storage vessels, ship operators will generally choose to seal vessels, on the contrary, they will choose to continue to operate.

In short, under the game between the supply and demand factors, the international dry bulk shipping market shows us the cycle of rising and falling.

3.2 The Chinese Elements in the International Dry Bulk Shipping Market

International dry bulk shipping market is not only involved in all aspects of international shipping system, but also international political, economic, financial, legal, natural conditions and etc. Therefore, there are many factors influencing international dry bulk transportation market, including the development of the world economy and trade, the distribution of natural resources, political factors, shipping ports and other infrastructure conditions, dry bulk capacity distribution and climatic factor and so on.

Chinese rapid economic development is an important factor in pulling international shipping industry including international dry bulk transportation. Since the 21st

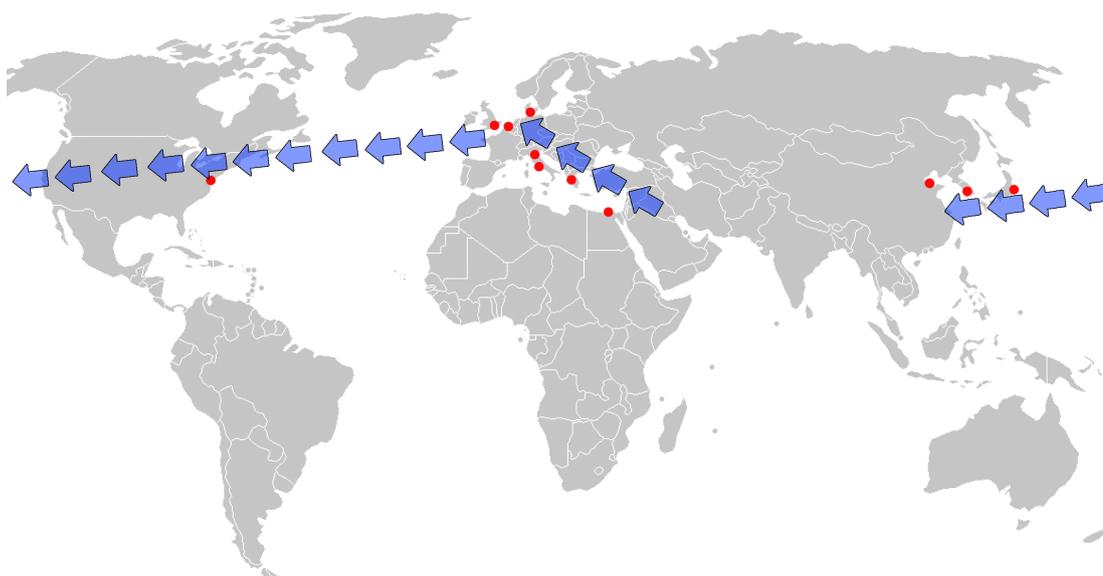
century, Chinese economy has entered a new period of growth. With the new industrialization, urbanization progress accelerated, national consumption structure upgrading and global manufacture adjusting and shifting, Chinese enormous demand for dry bulk market has become the power source of international shipping market's development. With the huge domestic demand and lower production costs, China has become the most active country in the world, which attracting more domestic and foreign investment. China starts to enter an important period of new round of infrastructure. With a wide range of reconstruction and optimization of economic structure and patterns, new constructions of major projects, large-scale transformations and upgrading of a large number of technical equipment bring a huge demand for raw materials logistics of construction and production and lead in an increase of cargo transport volume of finished-products. That will become an important driving force of development of our domestic and foreign bulk-cargo transport market and container market(Ma, 2012).

The formation of China factor in shipping market:

With the industrial division transferring on a global scale, the structure and amount of international trade was changing, causing the shipping market activities accordingly shifting. International shipping market center shifted from United Kingdom in the 19th century to United States and Japan in the 20th century. In the 21st century, China will become the new shipping center, which is the main idea of international maritime trade's "The West Line Theory". The theory refers to that international maritime trade center is continuously moving from east to west. According to the figure, international maritime trade center's path is changing from the Indian Ocean and the Mediterranean Sea to the North Atlantic, the Pacific and China Sea. In the 1950s, Japanese economy experienced a period of rapid growth and Japan became the fastest growing and the most profound country in external trade

and shipping demand in Asia. After Japan, from the early 1970s to the 1980s interim, South Korea rose as an emerging industrial country in Asia, In 21th century, Asia led by China has become the world maritime trade center(Peter, 2002).

"The West Line Theory" sketch map



Why BDI index rose? China factor played a decisive role. It was the growth of demand higher than expected. Iron ore accounted for 30% of the global dry bulk transportation and the incremental of Chinese iron ore import occupied 30-40% of it of annual global dry bulk. From January to May, Chinese iron ore, coal, soybean imports were up 23%, 22% and 36% than last year. The growth of global dry bulk exceeded expectation. Then transport capacity was lower than expected. Because a large number of new ships delayed the delivery and ship breaking speed up, dry bulk transport capacity grew only 6.6% than last year (Capesize and Panama shipping transport capacity grew 11.7% and 5%). The overstock of harbor and the three biggest mines hiring capacity in low price resulted in relatively short supply of negotiable capacity and pushing BDI index(Ma, 2012).

3.3 China's Impact on the International Dry Bulk Shipping Market

According to the International Iron and Steel Association statistics, the global crude steel production reached 15.5 million tons in 2012, up 1.2 percent, the highest record for three consecutive years. China's crude steel output is 716.54 million tons, accounting 46% of global output, at an increase of 3.1% than last year's.

According to customs statistics, in December 2012, Chinese steel imports and exports both fell, iron ore imports in the first broke seventy million tons, marking the highest level in history. China exported steel 4.85 million tons in December, decreasing 28 million tons compared with November, increasing 30.38% compared with the same period last year. From January to December, China totally exported steel 55.73 million tons, at an increase of 14%; In December, steel was imported 1.04 million tons, decreasing 20,000 tons compared with November, dropping 12.61% compared with the same period last year. From January to December steel totally was imported 13.66 million tons, down 12.3%. In December, China imported iron ore 70.94 million tons, increasing 5.16 million tons than it in November, dropping 10.69% compared with the same period last year. From January to December, iron ore totally imported 744 million tons, at an increase of 8.4%. In 2013, China is still the main importing country of iron ore. Iron ore imports are expected to increase about 8% and exceed 800 million tons(C. Zhang, 2006).

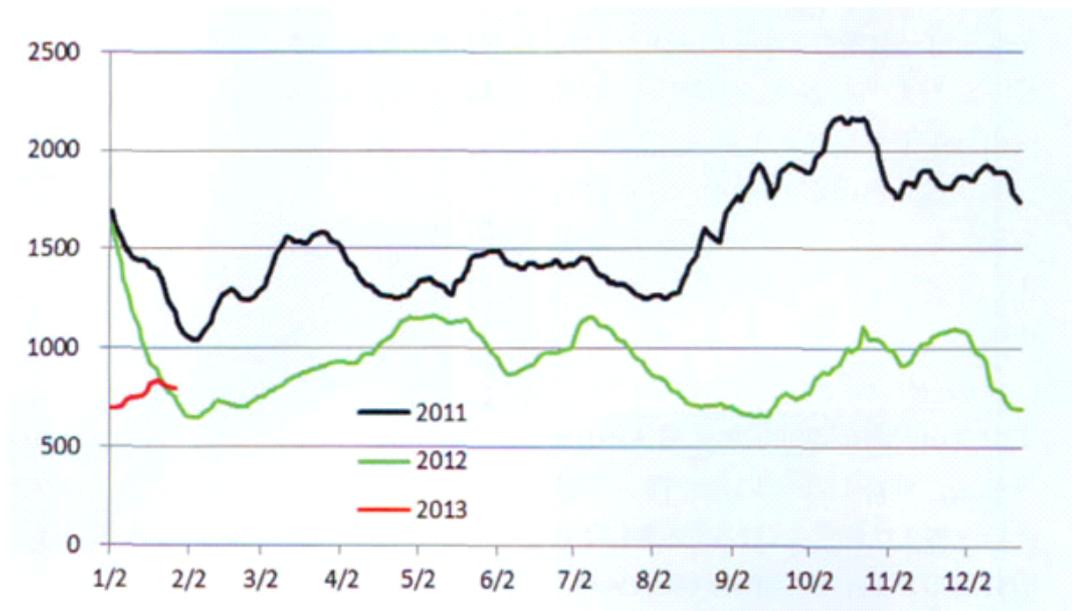
In December 2012, Chinese coal and lignite imports increased significantly, reaching at 35.11 million tons, creating the new single-month highest record, up 21.2% than November, up 31% than the same period last year. In 2012, Chinese grand total of

coal and lignite import reached at 289 million tons, at an increase of 29.8% than the same period last year, of which coal was imported 234 million tons, at an increase of 28.51%. Compared with the large-scale import of coal, coal export continued to decline sharply, dropping to 9.28 million tons and down 36.7%. It was estimated that trade pattern would still be that coal import would increase and export would decrease.

Recognized as the most authoritative barometer of dry bulk shipping market, BDI straightly fell after the outbreak of the financial crisis. In December 2008, BID index fell to 663 points, creating a new low record. The factors influencing BDI includes global GDP growth, global transport demand for iron ore, coal and grain, the supply of global ship tonnages' quantity, the average price of international marine fuel oil, war and natural disasters, and so on. Undoubtedly, the most direct impact is the change of transport demand for iron ore, coal and grain. Chinese dry bulk cargo transport quantity accounts for almost 40% of it in the world, so China enormously affects BDI index. BDI has been treated as thermometer of the Chinese economic conditions.

Since 2009, BDI has wandered at low level. Due to the financial crisis, demand for seaborne cargo transport fell, shipping capacity of bulk cargo overstocked and nearly 500 ships and boats was in the suspended state. Into 2012, since the sustaining growth of transport capacity has still been much higher than the market demand, the situation of excess transport capacity will further aggravate. Because Chinese domestic real estate policy adjustment, the domestic inflation expectations and the Iron ore's high price led the demand from China reducing, as well as the arrival of new annual ships delivery peak, BDI was expected at the state of continuing weak in the near future. That was one of the major reasons why international dry bulk market continued downtown. Picture above is the latest BDI chart(Jiang, 2012).

BDI trend chart (2011-2013)



With the world economy and global trade developing and changing, the global shipping industry is experiencing a new revolution. As the world's economic center is shifting to Asia, the focus of international shipping industry is moving from Western countries, such as Europe and America, to East Asia especially China. "China factor" has gradually become a decisive power in the present international shipping market. From the perspective of the whole economy, China is now the world's third largest trade nation, and foreign trade's continuing growth makes Chinese position solid upgrading in international trade. "China factor" is playing an increasingly decisive role. In a large economic situation, the rapid growth of Chinese foreign trade is also doing promoting action to the development of international shipping industry.

4. The Analysis about the Influence of China in the International Dry Bulk Shipping Market

Grey system analysis methods have several different approaches to the different natures of the problems and Grey Relational Analysis is one of these. Basically, the grey relational analysis of development trend analysis is based on the series of various factors' closeness degree of the curve shape.

4.1 Model Select

This part will use Grey Relational Analysis to research the impact from China on the international dry bulk shipping market. Using the world's major bulk cargo seaborne trade as the research object, through Grey Relational Analysis method, from the number of trade, it will be confirmed that China affect the changes in the

international dry bulk shipping market.

The Grey System refers to the system between white and black systems, meaning that a part of system's internal information and characteristics are known and the other part are unknown. Such as the human body, its height, weight, age, blood pressure, pulse and temperature, etc. are known, and how many the body's acupuncture points, acupuncture points' biological, chemical and physical performances, biological information transfer, consciousness and so on, have not yet ascertained or thoroughly known. Therefore, the human body is gray system(Zhu, 1997).

Initially, this theory was widely used in agriculture, traffic, meteorology, engineering, transportation, economy, health, etc. In recent, it has been applied in a considerable number of research reports in information, electronics, electrical, aviation, commercial and other fields, which makes this theory develop rapidly. Overall, The Gray Theory is to analyze system correlation, build model, and use forecasting and decision-making methods to understand the system under the situation of unclear system and incomplete data. And it is able to take effective action to thing's "uncertainty", "multi-variable input", "discrete data" and "incomplete data". Since The Grey Theory has the advantages of simple mathematical operation and solving incomplete or uncertain information management areas often facing, it is applied to more and more research in the field of management decision.

The Grey System's analysis method is mainly to take advantage of the small number of data and information seeking the related factors and the mathematical relationship between the factors, namely establishing corresponding mathematical model, based on the behavioral characteristics data of the specific Grey System.

The Grey System's analysis method has several different approaches against the different nature of problems. The Grey Relational Analysis is one of them. Basically, The Grey Relational Analysis is to analyze the trend of development based on the proximity degree of curves' shapes of each factor series.(Li, 2004)

The Grey Relational Analysis is an important theory method in the gray theory research projects. It is a calculation method to analyze the relate degree of discrete sequence, in the grey system theory. Traditional statistical regression is a common mathematical method to deal with the relationship between variables and variables. Here are some limitations for statistical regression:

- a. must exist a "interaction" relationship between variables and variables.
- b. require a large number of data:
- c. data distributed must typical, such as normal distribution;
- d. change considerations cannot be too many.

4.2 Model Application

Correlation: r_i

Because correlation coefficient is the number of associated degree to compare series with the reference series at each time (each point of the curve), it is more than one number and the dispersed message does not facilitate to do overall comparison. Therefore, it is necessary to put correlation coefficients at every moment (each point in the curve) together to draw one number, which is to find the average as number representation of associated degree to compare series with the reference series. (Zhu,

1997)

Here is the formula of correlation r_i :

$$r_i = \frac{1}{N} \sum_{k=1}^N \xi_i(k)$$

Selection of data and establishment of index system

Idea is pointed out before that iron ore, coal and grain, these three dry bulk cargoes account for the vast majority of dry bulk transport, the development of their maritime trade can basically represents it of the whole international dry bulk shipping market. Therefore, in this section, according to the shipping trade quantity of these three cargoes over the years, The Grey Relational Analysis is used to analyze gray correlation and the change of development between these three shipping trade quantity and the total shipping trade quantity of dry bulk cargo.

Establish the index system on the basis of this data:

X_0 = shipping trade quantity of world dry bulk cargo

X_1 = shipping trade quantity of world iron ore

X_2 = shipping trade quantity of world coal

X_3 = shipping trade quantity of grains

Here we see shipping trade quantity of world dry bulk cargo and it of iron ore, coal, grains as a gray system, set X_0 as the reference sequence (mother sequence), X_1 , X_2 , and X_3 as comparative sequence (child sequence), do research for the collected data.

Major dry bulk seaborne trade volumes(2011-2013, in million tons)

Year	Gross	Iron ore	Coal	Grains
2011	2339	1109	1017	213
2012	2454	1150	1091	213
2013(Forecast)	2588	1220	1149	219

First of all, the world major dry bulk shipping weight between 2011-2013 data to act as reference sequence, with the same period of time X_i ($i= 1, 2, 3$) as the comparative sequence , then, we will have the numerical calculation of relationship degree for the time period of three kinds of bulk cargo quantity and their total amount.

The first step is to make use of original data regressively, have the $\Delta_i(t+1) = x_i(t+1) - x_i(t)$, $t= 1,2,\dots,n-1, i=0,1,2,3$. Then we have the following table.

Cumulated differences for major bulks annual trade volumes (2011&2012, in million tons)

Year	2012	2013
X0	115	134
X1	41	70
X2	74	58
X3	0	6

The second step: calculate the relative change rate. Establish the sequence: $x_i = \{x_i(1), x_i(2), x_i(3), \dots, x_i(n)\}$, have the average number: \bar{x}_i . Then we have the calculation of the relative change rate: $k_i(t+1) = \Delta_i(t+1) / \bar{x}_i$, and we can get the result on the following table.

Major bulk seaborne trade volumes comparative changing rate (2011&2012, in million tons)

Year	K0	K1	K2	K3
2012	0.046742	0.035355	0.068161	0
2013	0.054464	0.060362	0.053423	0.027907

The third step, calculate the comparative sequence of improved grey correlation

coefficient.
$$\gamma_i(t) = \pm \frac{1}{1 + \left| \frac{k_0(t) - k_i(t)}{k_0(t)} \right|}$$

The fourth step, calculate the grey correlation degree with each terms,

$$\Gamma_i = \frac{1}{n-1} \sum_{t=2}^n \gamma_i(t)$$

Then we have the result: r1=0.652903, r2=0.635741, r3=0.368813

Result Analysis

Three dry bulk and bulk cargo total shipping amount in the gray relevancy from 2011 to 2013: r1>r2>r3. This shows that iron ore and coal, these two kinds of dry bulk

cargo are the most important and their impact on the international dry bulk shipping market is higher than the grain.

The China's and Global iron ore imports volume (2001-2013, in million tons)

Year	China's Imports Volume	Global Imports Volume
2001	92	454
2002	111	491
2003	148	521
2004	208	589
2005	275	642
2006	326	687
2007	383	738
2008	444	799
2009	628	902
2010	619	1051
2011	645	1075
2012	699	1133
2013	724	1204

As can be seen from the table:

First, from 2001 to 2012, the domestic demand for iron ore is improving gradually, which is the main cause of urbanization, railway construction, housing development and other factors in China.

Second, 2003 to 2009, Chinese iron ore import's growth rate is higher than the growth rate of demand, namely the demand of domestic iron ore is increasingly dependent on the imports, so, this import dependency can be seen from rising, especially the iron ore imported amount in 2009 soared to a degree of dependence on 70%.

Third, in 2009, the import volume increased from 4.44 in 2008 to 6.28 tons, increased 41%, this is Chinese steel mills brought by blind expansion of import. Then it can be seen from the slightly reduced from imports in 2010, Chinese steel mills in 2009 was obviously excess import. 2010 is the first reduction in Chinese iron ore import after 12 years.

Focus on the analysis of 2001-2013 these 12 years:

Establish the index system on the basis of this data:

X_0 = Global iron ore imports volume

X_1 = China's iron ore imports volume

X_2 = Rest countries' iron ore imports volume

Considering iron ore import seaborne volume of the world , China and other countries as a gray system, set X_0 as reference sequence (mother sequence) and set X_1 , X_2 , as comparative sequences (child sequences). In order to facilitate to study the changes in the degree of influence that China factor makes on the international dry

bulk shipping market, according to the changing trend of Chinese iron ore import seaborne volume, the result will be calculated by the data from 2001 to 2013.

According to the above four steps, we can get the result:

The first step is to make use of original data regressively, have the $\Delta_i(t+1) = x_i(t+1) - x_i(t)$, $t=1,2,\dots,n-1, i=0,1,2,3$. Then we have the following table.

Cumulated differences (2001-2013, in million tons)

Year	X0	X1	X2
2002	37	19	18
2003	30	37	-7
2004	68	60	8
2005	53	67	-14
2006	45	51	-6
2007	59	57	-6
2008	61	61	0
2009	103	184	-81
2010	149	-9	158

2011	24	26	-2
2012	58	54	4
2013	71	25	46

The second step: calculate the relative change rate. Establish the sequence of:

$x_t = \{x_t(1), x_t(2), x_t(3), \dots, x_t(n)\}$, have the average number: \bar{x}_t . Then we

have the calculation of the relative change rate: $k_t(t+1) = \Delta_t(t+1) / \bar{x}_t$,

and we can get the result on the following table.

Comparative changing rate (2001-2013)

Year	K0	K1	K2
2002	0.046762	0.046586	0.046950
2003	0.037917	0.090720	-0.018258
2004	0.085942	0.147114	0.020867
2005	0.066984	0.164278	-0.036517
2006	0.056873	0.125047	-0.015650
2007	0.074567	0.139759	-0.015650
2008	0.077095	0.149566	0
2009	0.130176	0.451151	-0.211276
2010	0.188314	-0.022067	0.412119

2011	0.030332	0.063750	-0.005217
2012	0.073304	0.132403	0.010433
2013	0.089734	0.061298	0.119984

The third step, calculate the comparative sequence of improved grey correlation

coefficient.
$$\gamma_i(t) = \pm \frac{1}{1 + \|k_0(t) - k_i(t)\|}$$

And we can get the result on the following table:

Grey relational rate (2001-2013)

Year	K1	K2
2002	0.999824	0.999812
2003	0.949845	-0.980720
2004	0.942354	0.938901
2005	0.911332	-0.970434
2006	0.936177	-0.960409
2007	0.938798	-0.960409
2008	0.932426	0
2009	0.757017	-0.924984
2010	-0.857451	0.817123

2011	0.967663	-0.975500
2012	0.944199	0.940848
2013	0.972350	0.970638

The fourth step, calculate the grey correlation degree with each terms,

$$\Gamma_i = \frac{1}{n-1} \sum_{t=2}^n \gamma_i(t)$$

So, we can get the result: $\Gamma_1=0.782878$ $\Gamma_2=-0.092095$

Sorted according to the size of correlation, the size of correlation is bigger means the difference between region's iron ore import seaborne volume and world's iron ore import seaborne volume is smaller and the impact that this region's iron ore import shipping market makes on world's iron ore import shipping market is deeper.

Result Analysis

During the whole calculation, it was found that China factor is changing the international dry bulk cargo market before 2013. Comparing with other countries in the past 12 years, it can be seen that China leads the change to the dry bulk market, on the other hand, the international dry bulk market also affect China. We can get the information that the correlation between them is very close.

It is shown from the analysis, in recent years, China has still maintained the stable development of their own, and continued to lead development of world iron ore market shipping trade.

5. Summary and Conclusion

5.1 Summary

This paper analyzes the various aspects impact on international dry bulk market from China, including price, market cycle, and so on. The paper also gets the quantification of China factor on the international dry bulk shipping market, especially the effect of iron ore market.

Under the background of global economic recession, China still maintains steady progress in the international dry bulk market, it further proves that China has played a decisive role in the international dry bulk market, and this force will produce significant influence on next rising cycle of seaborne trade.

5.2 Conclusion and Revelation

Conclusion:

Variation in Chinese imports of iron and ore clearly illustrated the growing influence of China factor, at the same time, proved the objectivity and importance of the

existence of China factor. In addition, this article made a gray correlation analysis on the iron ore import data of China and other countries in the world from 2002 to 2013, which found that in the impact of Chinese economy and international trade on the international dry bulk shipping market increased steadily during these 12 years, and there was a leap in 2009. The steady progress showed that China could continue to develop steadily in the dry bulk market, and further affect the international dry bulk market.

Aiming at the current situation that the research of China factor' s effect studied by the domestic and the international just stayed in local market research and qualitative discussion, on the basis of analyzing affecting range and time of China factor in the dry bulk market, the paper made a scientific and reasonable analysis on the impact of China factor on the international dry bulk market, through the improved grey correlation analysis model.

Revelation:

China factor plays an important role in the international dry bulk shipping market undoubtedly. The enterprises and research institutions related to shipping industry should fully understand Chinese industrialization process and the laws of its development, and pay close attention to changes in Chinese economic development. The domestic enterprises and government departments related to the dry bulk trade and transportation need to seriously study the issue that how to make full use of China factor to increase their international competition.

The main domestic dry bulk transport operators should pay enough attention to

Chinese influence on the dry bulk market, make full use of their own advantages in location and good relations with Chinese government and domestic enterprises and other conditions to rapidly expand the size of the company, enhance the management level, increase the share of international dry bulk shipping market, and enhance their core competitiveness by the Chinese impact on the international dry bulk shipping market in through.

For domestic cargo enterprises, they should also be fully aware of the enormous influence of China factor. And learn to take advantage of this favorable condition to further consolidate their positions in the international cargo transport market. Learn the advanced experience from domestic and foreign companies, avoid market risks, actively participate in the port and shipping business and cooperation when conditions permit, stable their supply chain and operational costs.

For government departments, fully aware of China factor's function and the regularity of its development, is helpful to work out the scientific development plan of comprehensive transportation system, to find and solve the bottleneck existing in infrastructure in the field of our country's transport and logistics, and to better serve economic construction and social development. Note that, China factor brings to the shipping industry not only enormous development opportunities, but also the implied risk behind. It also should be an important concern for our domestic shipping industry that how to accurately grasp the development and changes in the international shipping market in the Chinese factors, reasonably and effectively control the accompanying risks. In addition, in the period ahead, when we see the growth of amount, we should also pay attention to the improvement of quality.

Follow the principle of scientific development, and formulate the appropriate strategies in economy, industrial development, transport infrastructure planning and other aspects. Understand and handle the emergency work as fully as possible, to ensure the development of our dry bulk shipping industry healthy and stable in the context of the global economic downturn.

5.3The direction of further research

1.Research about Chinese factor in the international dry bulk shipping market's trend which is more specific, such as changes of dry bulk cargo trade volume for Chinese impact on the international dry bulk market index.

2.Research about all kinds of risks, and its control or prevention which will be brought from China factors.

3.Prediction about the variables in the international dry bulk shipping market during the next cycle.

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