8-24-2019

# Correlation analysis between container shipping market and Sino-US trade under the China-US trade conflict

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# Correlation Analysis between Container Shipping Market and Sino-US Trade under the China-US Trade Conflict

By

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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**

(INTERNATIONAL TRANSPORT AND LOGISTICS)

2019

# Declaration

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

The contents of this dissertation reflect my personal views and are not necessarily endorsed by the University.

(Signature): **Lu Chang Qing**

(Date): **2019.6.16**

Supervised by: **Professor Liu, Wei**

Supervisor's affiliation: **Shanghai Maritime University**

# Acknowledgment

First of all, I would like to thank my parents and family for taking great care of my life during my writing.

Secondly, I would like to thank my thesis supervisor, Mr. Liu Wei, who has been teaching me how to write and how to write a thesis seriously and responsibly and how to amend.

Finally, I also wish sincerely to express my thanks to my classmates, and they have given me a lot of help when my papers encounter difficulties, I hope they can get good final results.

# Abstract

**Title of Research Paper: Correlation Analysis between Container Shipping Market and Sino-US Trade under the China-US Trade Conflict**

**Degree:** **MSc**

China and the United States, respectively, as the world's largest developing and developed countries, the two countries' economic and trade relations are one of the most important bilateral relations in the world. The development of economic and trade relations between the two countries not only affects the overall relationship between the two countries but also has a major impact on the business between the two countries. The development of Sino-US trade is also of great significance to the container shipping business of the shipping industry. The current US President Trump has also initiated tariff sanctions against China, which has caused China to impose tariff sanctions on the United States, which has affected both the trade and the global shipping market. The purpose of this paper is to first explore the relationship between world trade and the world shipping market and then use regression to analyze the correlation between trade changes and changes in the container shipping market, compare with the previous Japanese-US trade disputes, and then predict the future direction of the container shipping market.

**Key Words**: Sino-US Trade Conflict, US-Japan Trade Dispute, Comparative Analysis, Correlation Analysis, Regression, Granger Causality Test

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# 1.Introduction

China and the United States, respectively, as the world's largest developing and developed countries, the two countries' economic and trade relations are one of the most important bilateral economic and trade relations in the world. The development of economic and trade relations between the two countries not only affects the overall relationship between the two countries but also has a major impact on the business between the two countries. The development of Sino-US trade is also of great significance to the shipping business of shipping companies.

## 1.1 Research Background

Sino-US trade relations have developed in friction and twists since the establishment of trade relations between the two countries. The annual MFN treatment review, trade-related or unrelated human rights issues, is a true portrayal of the characteristics of China-US trade relations before China's entry into the WTO. China's accession to the WTO has increased with the development of bilateral economic and trade relations, and the frequency of trade friction has increased. The United States has become the country with the most trade friction with China. In 2018, the Trump administration disregarded the Chinese dissuasion and insisted on launching a trade war and set off another round of Sino-US trade disputes. World trade and world shipping market are closely linked. The trade dispute between the two countries will have a great impact on the trade market, which in turn will affect the world shipping market.

## 1.2 Literature Review

Although the Sino-US trade conflict has just taken place, many Chinese and foreign shipping scholars and shipping journals have already published their views on this incident. It can be divided into two main views. The first one is not optimistic about the future shipping market in the Asian region:

'Ross Davies (2018.05) thinks that dry bulkers – used for the transportation of steel and soybeans – are most likely to be hit hardest. The impact on container shipping is set to be on "eastbound transpacific head haul trade from the Far East to North America. Shipping Industry (2018.07) thinks that the increase in tariffs directly hit the export enthusiasm of the goods companies in the list, which will inevitably be accompanied by a decrease in trade orders. The reduction in trade orders means a reduction in demand for shipping, which has brought down expectations for the global shipping market. Aberdeen (2018.07) thinks that the trans-Pacific routes from Asia to the west coast of North America, which have faced problems of excess capacity and declining freight rates, are the first to bear the brunt of the trade war. The conflict will inevitably reduce Asia-US freight traffic. As a middleman between the mainland and US, Hong Kong can do little about the trade war.

Gavin van Marle (2018.09) thinks that in the tramp shipping market, uncertainty about where the next cargo will come from makes it very difficult to reposition your ship after discharge. For the liner shipping market, matching deployed capacity on trade lanes with actual demand becomes even harder. Poorer service offers to customers, and lower profitability seems inevitable.

Basil M. Karatzas (2018.10) thinks that end consumer products are usually shipped as containerized cargo, and accordingly, the container line industry is expected to experience material adverse impact.

Will Martin (2018.11) thinks that trade tariffs may end up stifling global container shipping by as much as 2% in the next two years. The company estimates that those tariffs make up about 2.6% of the global value of traded goods.'

Another view is that the impact of the trade conflict is relatively small:

'Zhang Tao (2018.04) thinks that from the value of goods, the value of the affected exports of high-tech products to the US is in single digits. Percentage points, and because the volume and weight of such products are small, it is expected that the actual proportion of containers will be smaller and the overall impact will be lower.

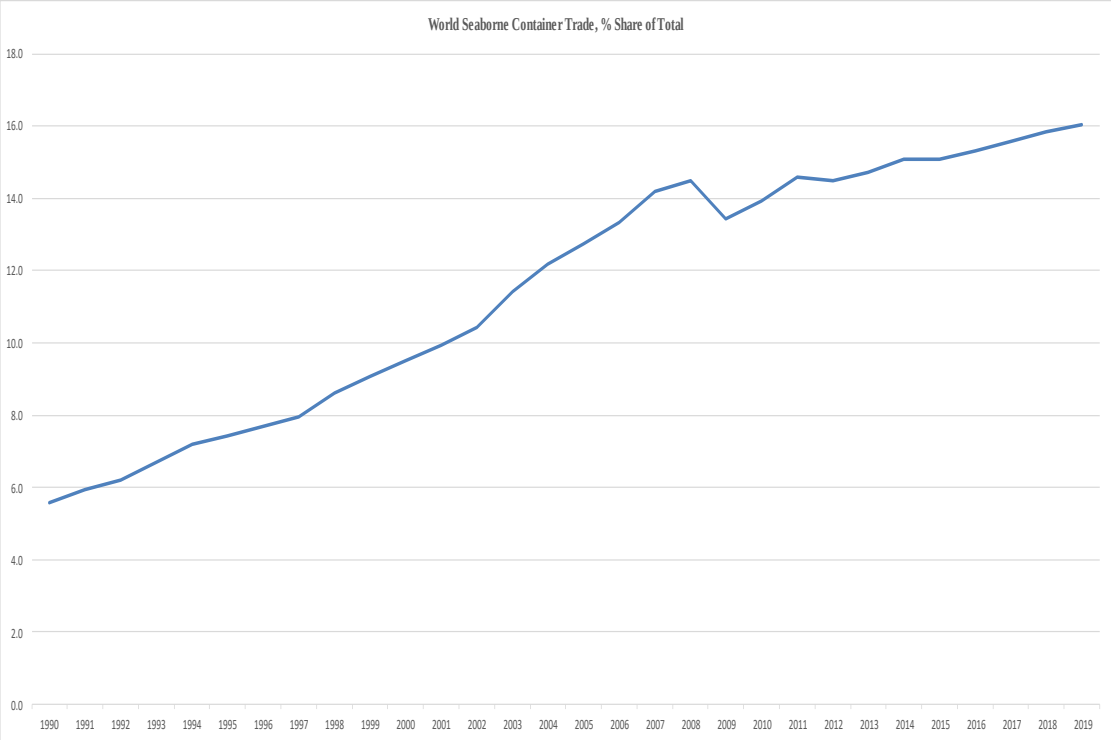
Hu Jing (2018.04) thinks that According to the amount of US exports to China in 2017, the share of 3 billion US dollars is less than 2%, which doesn't deserve to worry. At the same time, among the market share of China's exports to the United States, the proportion of high value-added products is very low, and the overall impact is limited.

Xu Di and Cai Peng (2018.06) think that in this Sino-US trade friction, the largest cargo that affects the dry bulk market is foodstuffs represented by soybeans. In the future, China's demand for food will continue to use the international market actively, and it will also diversify its sources of imports. From this perspective, the future will have a positive impact on the dry bulk market, both in terms of volume and distance.

The author believes that the current Sino-US trade dispute is in a critical period. However, the current research lacks relevant analysis of the impact of trade disputes on the container transportation market. After the China and the United States announced the tax collection list in August 2018, many large ports ushered in a wave of "emptive export effects," to formalize the implementation of penalty tariffs. The delivery of goods to the port of destination has had a significant impact on the operation of the port and the volume of trade on subsequent routes. Therefore, it is important to analyze the impact of the Sino-US trade war on the Pacific route, especially the container shipping market.

## 1.3 Research Objectives

Figure 1 Percentage of Container Seaborne Transportation




Source: Clarkson

The global volume of container shipping trade is highly correlated with the world economy. Container shipping lines connect many countries such as North America, Europe, Asia, Africa, etc., and are the bridge and link of international trade. In the worst financial crisis in 2009, the world economy experienced negative growth, and global container shipping volume shrank by 9.2%. In 2010, the global economic stimulus boosted container shipping volume by 13.7%. Later, affected by factors such as unstable global economic growth, container shipping volume growth was generally between 3% and 5%, of which only 2.2% in 2015. For some time to come, container shipping volume is expected to continue to grow with the relative improvement of the

global economic environment.

Table 1 The world top 20 ports in 2018

| The top 20 container ports in the world | | | | | |
|---|---|---|---|---|---|
| Ranking | Tendency | Port | 0000TEU | Year-on-year growth | Region |
| 1 (1) | → | Shanghai | 4201 | 4.42% | China |
| 2 (2) | → | Singapore | 3660 | 8.70% | Singapore |
| 3 (4) | ↑ | ZhouShan | 2635 | 7.07% | China |
| 4 (3) | ↓ | ShenZhen | 2574 | 2.10% | China |
| 5 (7) | ↑ | GuangZhou | 2192 | 7.61% | China |
| 6 (6) | → | Busan | 2159 | 5.38% | Korea |
| 7 (5) | ↓ | HongKong | 1959 | -5.68% | China Hong Kong |
| 8 (8) | → | QingDao | 1930 | 5.46% | China |
| 9 (10) | ↑ | TianJin | 1600 | 6.17% | China |
| 10 (9) | ↓ | Dubai | 1495 | -2.90% | United Arab Emirates |
| 11 (11) | → | Rotterdam | 1451 | 5.68% | Netherlands |
| 12 (12) | → | Klang | 1203 | 0.42% | Malaysia |
| 13 (13) | → | Antwerp | 1110 | 6.22% | Belgium |
| 14 (14) | → | XiaMen | 1070 | 3.08% | China |
| 15 (15) | → | Kaohsiung | 1045 | 1.71% | Taiwan, China |
| 16 (16) | → | DaLian | 977 | 0.58% | China |
| 17 (17) | → | Los Angeles | 946 | 1.27% | US |
| 18 (19) | ↑ | Tanjung Parapas | 879 | 6.39% | Malaysia |
| 19 (18) | ↓ | Hamburg | 873 | -0.80% | Germany |
| 20 (20) | → | Linchaban | 796 | 2.31% | Thailand |

Source: Shanghai International Shipping Research Center

Among the top 20 container ports in the world, we can find China has 8, and the US only has the Los Angeles port. It shows that China is currently at the forefront of port development in the world, and the impact of Sino-US trade disputes will be very serious. This chapter will analyze the containerization rate of these eight Chinese

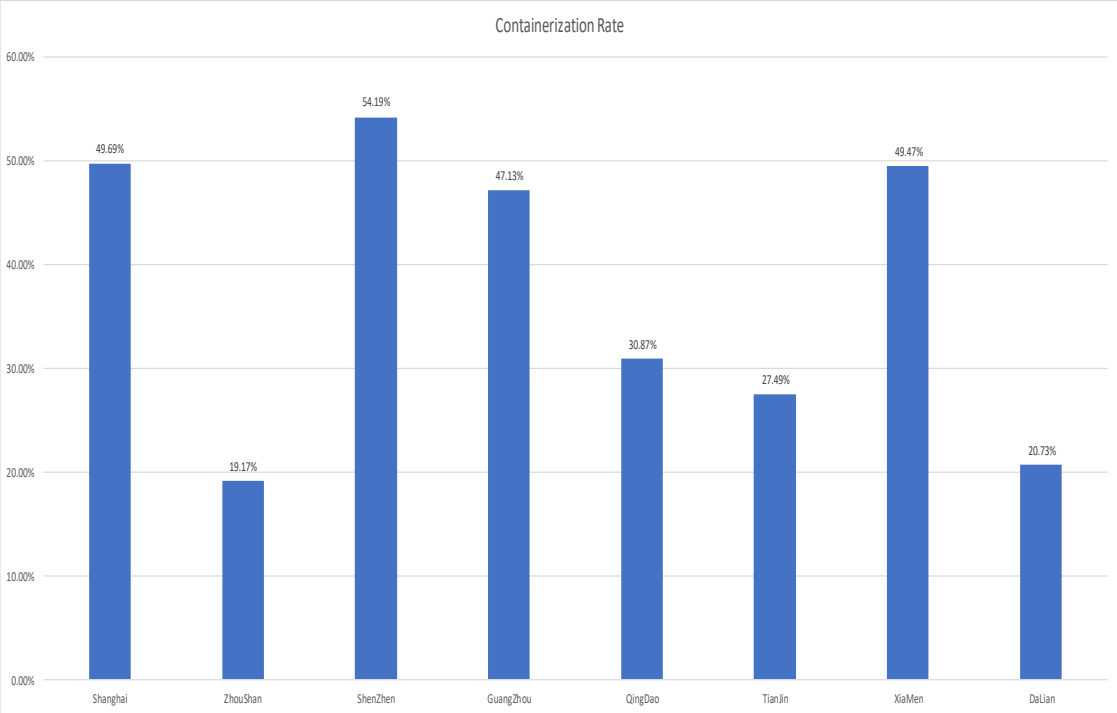
mainland ports.

Table 2 Cargo throughput and container throughput of Chinese ports in 2018

| Port | Cargo Throughput | Container Throughput |
|---|---|---|
| Shanghai | 68392 | 33984.36 |
| NingBo, ZhouShan | 108439 | 20782.4 |
| ShenZhen | 25127 | 13616.57 |
| GuangZhou | 59396 | 27995.7 |
| QingDao | 54250 | 16746.77 |
| TianJin | 50774 | 13955.24 |
| XiaMen | 21720 | 10745.96 |
| DaLian | 46784 | 9697.54 |

Source: Ministry of Transport of China

Figure 2 Containerization rate of Chinese ports




Judging from the containerization rate of ports in various regions, the containerization rate of ports in the Bohai Rim and North Gulf regions is more obvious than that of mature ports such as the Pearl River Delta and the Yangtze River Delta. There is a lot of room for future growth. With the transfer of national industrial policies, the optimization of foreign trade import and export structure, and the improvement of the railway network in the Bohai Sea and North Gulf areas, it is expected that the upward trend of containerized rate of growth ports will be determined, and the container business will expand in the future.

The containerization rate of the port determines the size of the port cargo trade in this port, which determines the trade value of the port, so this concept is very important.

The research goal of this article is to analyze the correlation between the impact of Sino-US trade war on the container ship market.

## 1.4 Research Methodology

This paper will use correlation analysis and regression analysis to analyze the correlation between the shipping index of various container ships under the influence of Sino-US trade disputes and the correlation of several container shipping indices under the Japan-US trade dispute, and use comparative analysis. Contrast the development trend of container shipping index between Japan-US trade dispute and Sino-US trade dispute in two different periods, and conclude consistency and inconsistency.

## 1.5 Outline of the Dissertation

The first chapter is the introduction, mainly introduces the research background and purposes of this thesis gives the research contents and methodology. The second chapter mainly gives the correlation between world trade and world shipping from a macro perspective and introduces the trade situation between Japan and the United States in the context of Japan-US trade disputes in the 1970s and the performance of the shipping market in the same period. The third chapter mainly introduces the research methods used in this thesis, including the use of correlation analysis and regression analysis to study Sino-US trade and container transportation market and then use comparative analysis to study Sino-US trade disputes and Japan-US trade disputes in two different periods on the performance of the container shipping market. The fourth chapter uses the research method to analyze the correlation between the various container transport indicators under the influence of Japan-US trade and the Sino-US trade dispute and concludes the related indicators. The fifth chapter summarizes the research and analyzes the differences between China and the United

States and Japan and the United States in terms of trade disputes, and makes predictions for future development. At the same time, the deficiencies in the paper are explained.

## 2. The Correlation of International Shipping and International Trade

Trade and shipping have always been inseparable. Shipping currently carries more than 90% of trade and transportation tasks. Both of these changes will have a great impact on each other.

### 2.1 Derivation of the International Shipping Market

The so-called derivation refers to the differentiation from the development of a major thing. To understand the derivation of the international shipping market, we must begin to understand the history of the shipping industry. Humans have long known how to use water transport to exchange goods. Most of the rivers and seas pass through densely populated areas. However, due to the low level of science and technology, the ability of ships to resist maritime risks is very weak. Therefore, international trade is limited to countries with proximity, and the scale of shipping is relatively large. With the formation of capitalist production methods, the world market has developed rapidly, international trade has achieved unprecedented development, and the external expansion of capital has caused the demand for shipping to rise suddenly. International shipping has gradually replaced land transportation as the main mode of transportation for international trade.

With the second industrial revolution and the invention of steamboats, the degree of ship automation has increased rapidly, and the tonnage of ships has been increasing. At this time, the business is still combined with the maritime industry. At that time, "commercial transporters" were mainly transported for "self" rather than for "others."

This is because: First, at this time, the ships are mostly small, and it is entirely possible for commercial transporters to fill a ship with their goods. Second, shipping was a dangerous industry at the time, and people were not interested in purely operating shipping. With the development of social productivity, the ship type has gradually become larger, and the trade volume has increased rapidly. It is impossible for businesspeople to ship and manage themselves. It is necessary to have a special person to engage in transportation operations. Also, due to the development of science and technology, the risk of maritime navigation is becoming smaller, and the trade volume is increasing. The world is engaged in specialized production according to their respective natural advantages. The products produced are sold abroad by sea, requiring ships to have rules. Transport goods on site, frequently and continuously. Under this circumstance, it is more difficult for merchants to want to self-operate shipping. Therefore, commercial and shipping began to separate, and the shipping industry became an independent material production department in society. The international shipping industry in the true sense has since emerged.

By the end of the 18th century and the beginning of the 19th century, the shipping industry gradually became a separate industry from the trade activities, resulting in the ship's charterer and the owner of the ship providing the ship's capacity. They have to ship and trade on the ship, so they often gather in a certain place, the sea exchange. These exchanges are the earliest shipping markets, such as the Baltic Shipping Exchange established in the 17th century. The Baltic Exchange has all the basic connotations of the general trade market, such as allowing ship owners and brokers to gather at specified times and signing transport contracts based on market dynamics. The completion of these relationships and processes has enabled the commodity to complete the preparatory phase of consumption. Therefore, the international shipping market is a market derived from the world economy and international trade and is derivative.

## 2.2 The Dependence of International Shipping on International Trade

The so-called "dependency" means "dependence exists, and the so-called "dependency" refers to the degree of "dependence." The international shipping market is derived from the international trade market and has an international trade market. Have a certain degree of dependence. Looking at the evolution of the international shipping market for decades, we will find that its cyclical rise and fall is almost the same as the rise and fall of the international trade market. That is to say, when international trade has grown substantially, the overall demand for shipping will inevitably grow rapidly, and the shipping market will be active and prosperous. Conversely, when international trade stagnates and shrinks, the overall demand for shipping will decrease accordingly, reflecting the lack of supply and excess capacity, and the shipping market is in a slump. Therefore, international shipping is dependent on international trade, and the volume of shipping is closely related to the development of international trade. Starting from this basic understanding, qualitatively analyze and study the relevant dynamics of international trade and shipping market, calculate the dependence of international shipping market on international trade, quantitatively analyze the relationship between them, grasp the development trend of international shipping, and Ability to predict the future. This is undoubtedly very important for shipping companies.

The so-called forecasting is to learn from the past and to learn about the future through the discussion of the past. The purpose is to obtain future information. The role of forecasting in management activities is very important. Forecasting is the basis for decision making and planning and serves both. It is also the key to improving management. The shipping market changes frequently. Shipping companies must have a sense of advancement, plan, and accurately grasp the future development of the

market, so that they can remain invincible in the fierce market competition.

## 2.3 The Role of International Shipping in Promoting International Trade

International shipping is not subject to international trade. International shipping is an important condition for international trade. International shipping is an important part of international trade. Whether transportation can be implemented and the quality of transportation is good or not, these factors directly affect whether international trade can be realized. As an important condition for trade negotiations, transportation arrangements directly affect whether trade can be concluded. For some island countries, almost 100% of their foreign trade goods are transported by sea, and their international shipping has played a huge supporting role in international trade and the national economy. The Japanese economy is a typical example. Japan has a small population of people, lack of resources, raw materials, and food rely on a large number of imports, while its industrial manufactured goods are exported in large quantities, and its national economy relies heavily on shipping. Therefore, Japan attaches great importance to the shipbuilding industry, and its shipbuilding industry has been the world's number one for many years. International shipping is so important in Japan that its economic development relies heavily on shipping. International shipping has a positive effect on international trade, which is reflected in the following aspects:

### 2.3.1 The Development of the International Shipping Market Drives the Prosperity of International Trade

The prosperity of the international shipping market and the international trade market

can be reflected in the world shipping volume and the world's total foreign trade exports. As shown below:

Table 3 World seaborne trades and world merchandises exports

| Date | World Seaborne Trade | World Merchandise Exports |
|---|---|---|
| | Million Tonnes | Million $ |
| 2009 | 8,272.12 | 12560549 |
| 2010 | 9,086.17 | 15300890 |
| 2011 | 9,467.07 | 18338098 |
| 2012 | 9,847.24 | 18511147 |
| 2013 | 10,195.71 | 18950647 |
| 2014 | 10,531.09 | 18984510 |
| 2015 | 10,758.15 | 16530568 |
| 2016 | 11,075.70 | 16030540 |
| 2017 | 11,535.48 | 17731864 |
| 2018 | 11,842.20 | 19475361 |

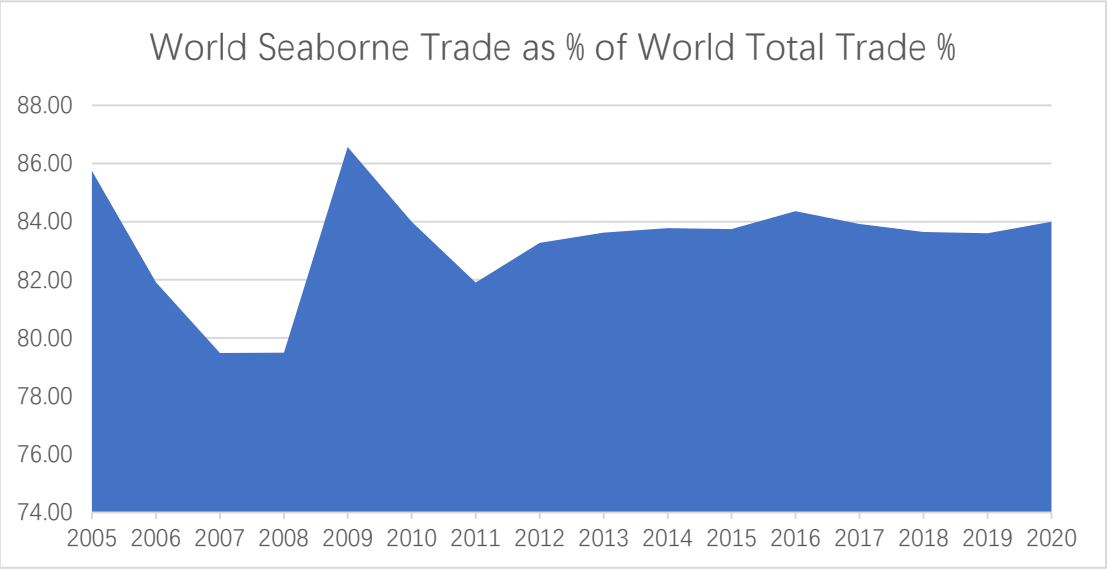
Source: Clarkson, WTO

Statistics show that with the expansion of seaborne trade in the international shipping market, the volume of foreign trade in the international trade market is also growing. This is because the development of the shipping market is good; it will stimulate economic leverage such as commodity consumption and employment, thus promoting trade development. The development of trade will promote the worldwide flow of goods, which in turn will lead to an increase in the volume of shipping. It can be said that international shipping has a non-negligible role in promoting international trade.

### 2.3.2 International Shipping Provides an Unlimited Channel for International Trade

As we all know, the essence of the world economy is manifested in the following three aspects: First, the imbalance of economic resources in various regions of the world; second, the imbalance in the level of productivity development in various regions of the world: Third, the imbalance of consumption levels in various regions of the world. Unbalance will form a "sport." In terms of the "sports" of goods, its role can enable people in all regions of the world to narrow the differences in the level of product development and improve the economic level of each region. In the real world, the flow of goods is often expressed as the import and export of goods. However, import and export trade must be achieved using a certain carrier. The term "carrier" as used herein refers to a means of transport that can provide services for the flow of goods. Vehicles include vehicles, airplanes, ships, etc. Among them, ship transportation has the advantages of large traffic volume, long range, and low cost, so sea transportation is preferred when transporting large quantities of goods. More than 80% of the world's commodity circulation is achieved through shipping, and international shipping has become the main carrier of international trade. Without developed international shipping, there can be no developed international trade, and it plays a decisive role in the national economy and the world economy.

Figure 3 Percentage of world seaborne trade




Source: Clarkson

### 2.3.3 Maritime Transport is the Lifeline of the World Economy

After the Second World War, the third scientific and technological revolution took place. This scientific and technological revolution is mainly carried out in three basic technical fields of electronics, energy, and materials. All countries have realized that only by mastering modern science and technology and vigorously developing industrial production can they have a developed economy. Due to the imbalance of the distribution of natural resources in various countries, many countries do not have the raw materials needed by industry, which requires a large number of imports from abroad. For example, in Japan, if there is no developed maritime transport to transport a large amount of industrial raw materials and fuel, there will be no developed foreign trading.

### 2.3.4 International Shipping is the Link between the World Economy and International Trade Exchanges

International shipping connects all countries (regions) and communicates the exchanges and contacts between technology and economy and trade between countries and regions. It is the main means of transportation for communicating with the international market. International shipping links a wide range of producers and consumers, producers and operators, producers and producers, operators and consumers worldwide, thus making the production and consumption of countries more global and Production and consumption in most countries have turned into worldwide activities. Moreover, the more economically developed countries, the wider the economic ties with other countries. The demand for international shipping is stronger. Also, countries and regions with fast economic development must have high speed in developing international shipping. The international shipping market plays an invaluable role in communicating international exchanges and promoting the rapid development of the market economy in the world. International shipping has effectively promoted the process of world economic integration and made the activities of production, exchange, and consumption worldwide more comprehensive.

In short, in the contemporary world, the scale of exchange of industrial and agricultural products and commodities is expanding. Maritime transportation as the mainstay of commodity exchange cannot be said to be an absolute and necessary condition for international trade. However, it can be said that without developed maritime transportation, it cannot be said. Achieve large-scale international trade.

## 2.4 The Relationship between Japan-US Trade and Shipping

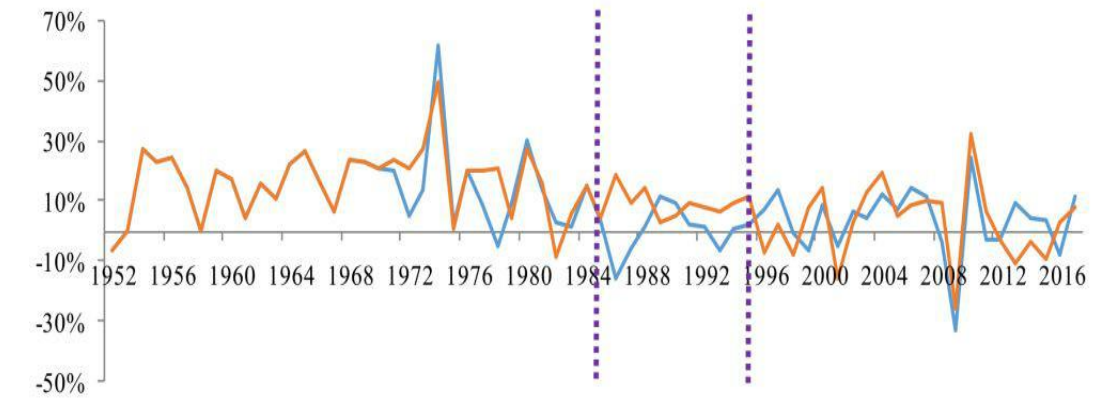
The focus of the Japan-US trade war is divided into "three stages": across the 1950s to the present. 1) The early stage of friction: the first half of the 1950s to the 1980s. In 1955, Japan exported a large number of cheap shirts to the United States, causing the first friction. Under the pressure of the United States, the Japanese textile industry imposed export autonomy restrictions in January 1956; 2) Frequent friction stages: the 1970s and the first half of the 1980s. After the 1970s, Japan became a developed capitalist country and became the world's second largest economic power. Due to the transformation of Japan's industrial structure, the export of its "home appliances, semiconductors, automobiles" and other products triggered a new round of trade friction and was eventually forced to restrict exports again voluntarily. At the same time, the United States dominated the "plaza agreement" in 1985, and the yen was forced to appreciate significantly. In 1988, the United States launched "Super 301 Clauses"; 3) Japan's economic bubble burst and friction mitigation in the context of China's rise: from the 1990s to the present. The Japanese bubble economy collapsed and entered the “lost decade.” At the same time, the regional structure of the US foreign trade deficit changed. The “China’s rapid rise” shifted the attention of the United States, and the trade friction between Japan and the United States eased.

### 2.4.1 The Export of Japan

Judging from the growth rate of Japan's export value, the average annual growth rate of Japanese dollar-denominated Japanese exports during the 1986-1995 period was 9.6%, which still maintained good growth. In the first three years (1986-1988), the

export growth rate has increased by 19%, 9.7%, and 14.6% respectively. Affected by the sharp appreciation of the yen, Japan's export value, denominated in Japanese yen, fell by 15.9% in 1986 and by 5.6% in 1987. It began to recover positively in 1988, and the average annual growth rate was zero between 1986 and 1995.

Figure 4 Export growth rate of Japan



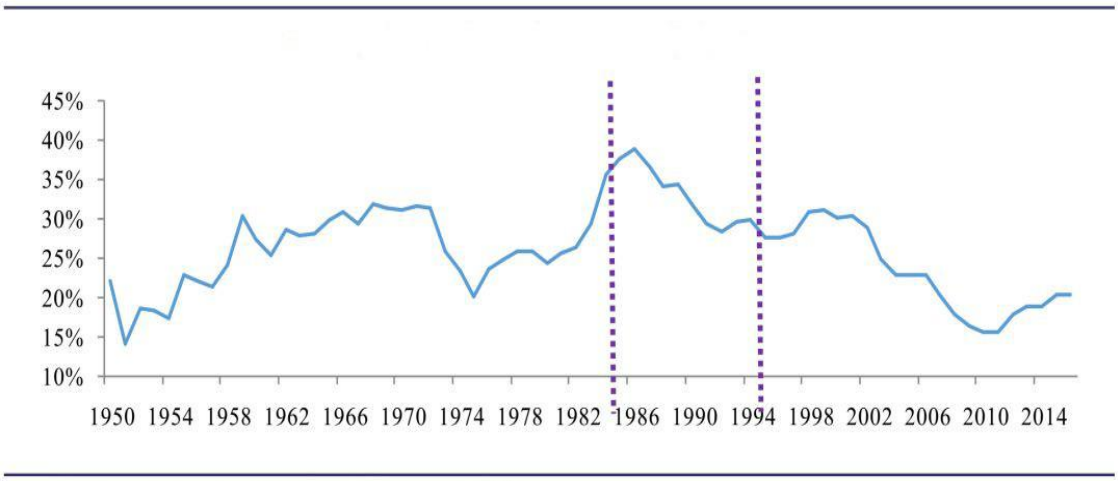

Source: IMF, CEIC

The blue line represents the amount of Japanese exports growth rate (JPY). The orange line represents the amount of Japanese exports growth rate ($).

Comparing the growth rate of Japan's exports to the United States in US dollars and the growth rate of Japan's exports to countries outside the United States, between 1986 and 1995, Japan's export growth to the United States slowed markedly, with an average annual growth rate of 6.2%, the first three years (1986-1988) were 23%, 4%, 6%. In 1986, the growth rate jumped, but then it slowed down noticeably. The growth rate of export value to countries outside the United States has increased, with an average annual growth rate of 11.3%. The first three years (1986-1988) were 17%,

14%, and 19%, and the growth rate was relatively fast.

Figure 5 The Proportion of Japanese Exports to the United States to Japanese Exports




Source: IMF, CEIC

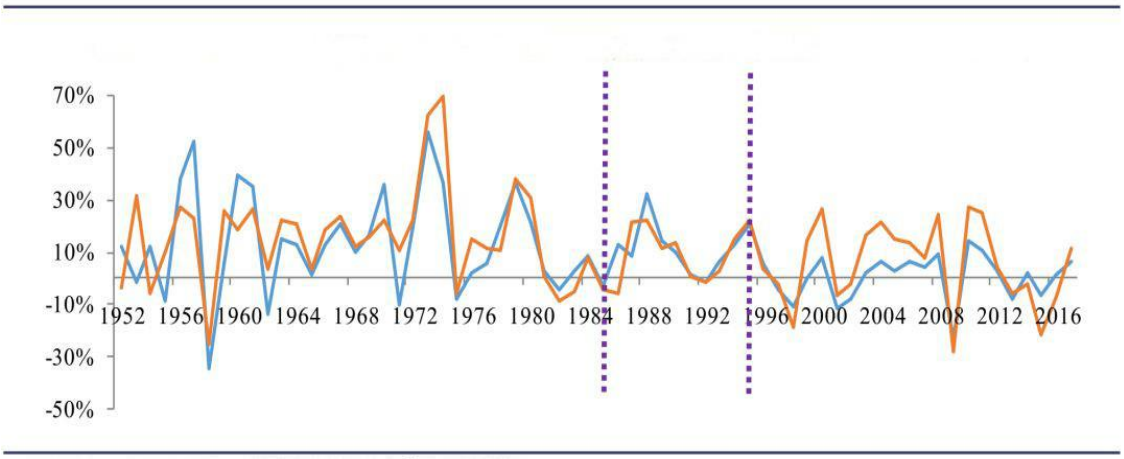
In 1986, Japanese exports to the United States (in US dollars) accounted for 39% of the country's export value, and then entered the downtrend channel, with a ratio of 28% in 1995 and 23% in 2005.

### 2.4.2 The Import of Japan

In terms of the growth rate of Japan's imports from the United States in dollar terms and the growth rate of Japan's imports from countries outside the United States, in the first three years (1986-1988), Japan's imports from the United States increased by 13% and 9%. 32%, the growth rate of imports from countries outside the United States -6%, 21%, 22%, and then in 1995, most of the two countries are consistent. Between 1986 and 1995, the average growth rate of Japanese imports from the United States was 11.3%, slightly higher than the average growth rate of imports from countries outside

the United States of 9.6%.

Figure 6 Japanese Import Growth Rate from the United States and other countries

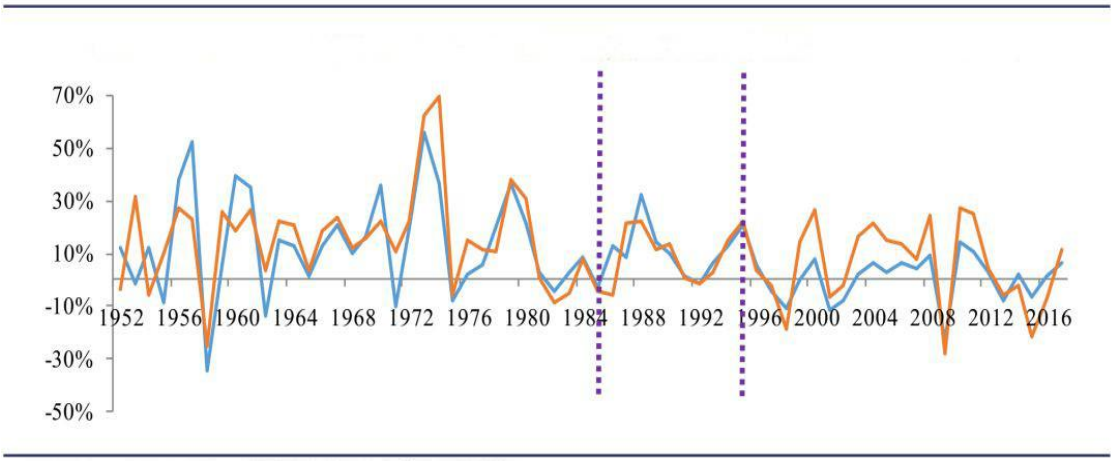



Source: IMF, CEIC

The blue line represents the number of Japanese imports from the United States ($). The orange line represents the number of Japanese imports from countries other than the United States ($).

Between 1986 and 1995, Japan's imports from the United States (in US dollars) accounted for no significant change in the proportion of Japanese imports and remained at 22-23% for most years.

Figure 7 The Proportion of Japanese Imports to the United States to Japanese Imports

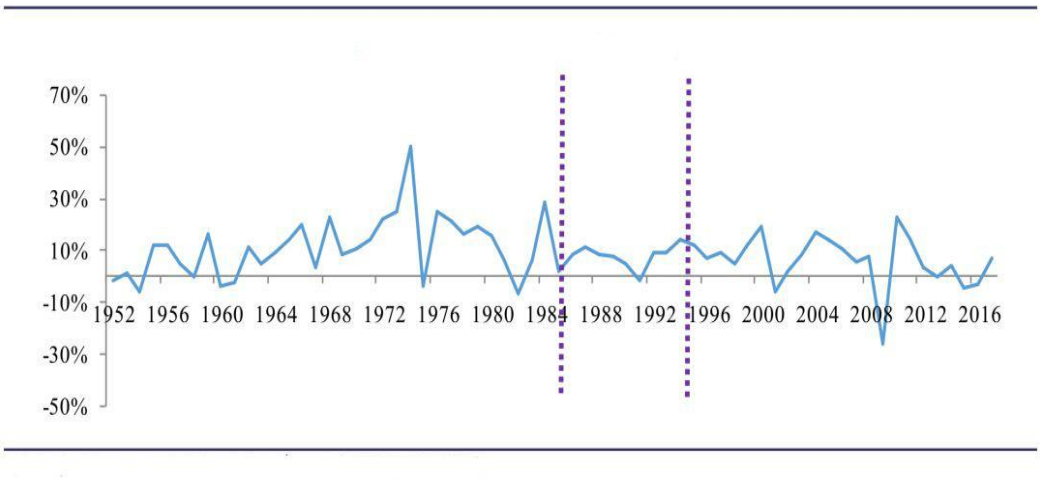



Source: IMF, CEIC

### 2.4.3 The Import of US

From the perspective of the growth rate of US imports, the average annual growth rate of US imports (in US dollars) was 8.1% between 1986 and 1995. Only in the three years of 1990-1992, the growth rate slowed down significantly, 1.8% and 4.9% respectively. -1.7%. In the first three years (1986-1988), the growth rate of US imports was 8.5%, 11%, and 8.3%.

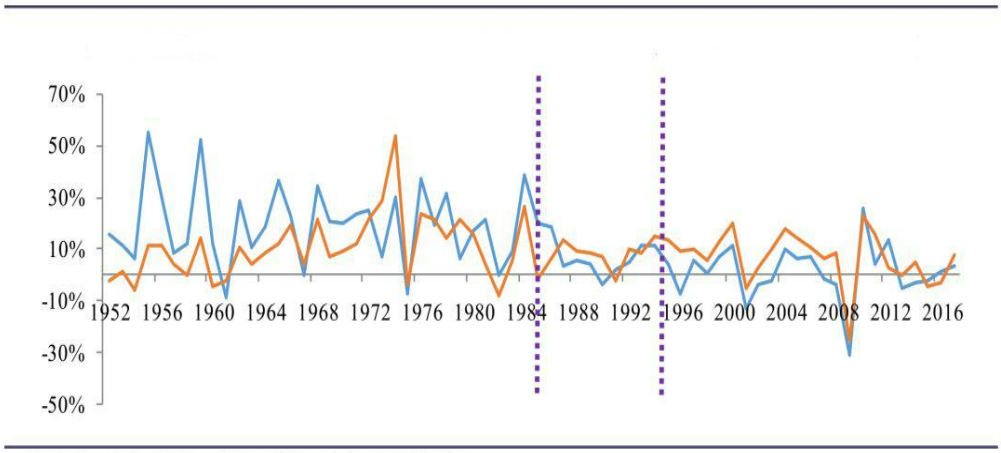
Figure 8 US Import Growth Rate




Source: IMF, CEIC

Comparing the growth rate of US imports from Japan and the growth rate of US imports from countries outside Japan, the growth rate of US imports from Japan has slowed rapidly since 1985, and the growth rate of imports from other countries has been higher in most years. The growth rate of imports from Japan. Between 1986 and 1995, the United States imported an average of 5.8% from Japan (in US dollars), and the average annual growth rate of imports from Japan (in US dollars) was 8.7%. In the first three years (1986-1988), the growth rate of US imports from Japan (in US dollars) was 18%, 3%, and 6%. The growth rate of imports from countries other than Japan (in US dollars) was 6%, 13%, and 9%. In the first year, the growth rate of imports from Japan jumped and then slowed down noticeably.

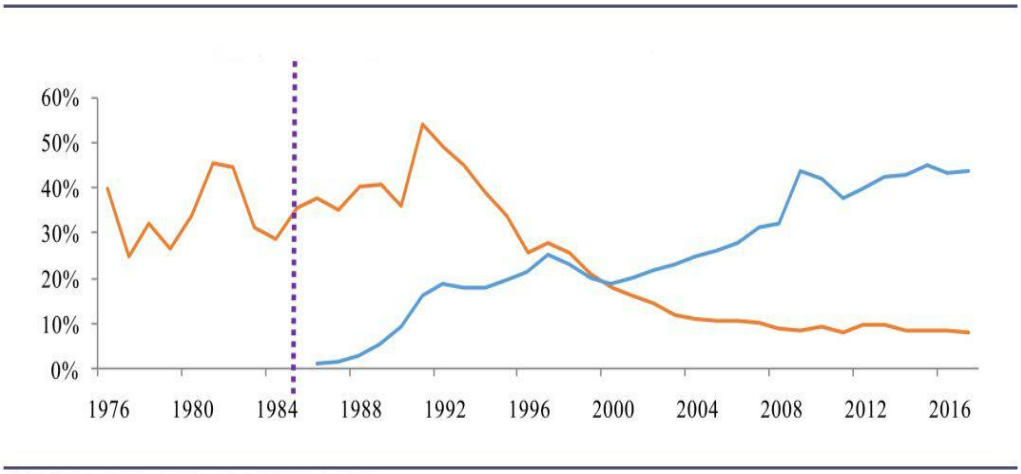
Figure 9 The Growth Rate of US Imports from Japan and Other Countries




Source: IMF, CEIC

After the 1985 Plaza Agreement, the ratio of the Japan-US deficit to the US deficit did not fall immediately, and it began to decline after 1991. In 1986, the US-China deficit accounted for more than 1% of the US deficit, and this percentage has continued to rise since then. After 2001, the US-China deficit accounted for more than the US-Japan deficit.

Figure 10 The Trade Deficit from China and Japan in the US Trade Deficit



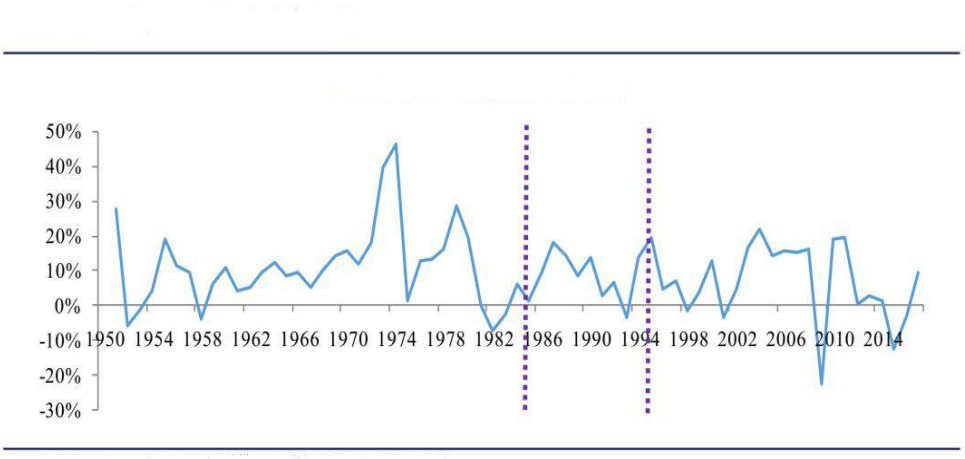
Source: IMF, CEIC

The orange line represents the proportion of US-Japan trade deficit to the US trade deficit, and the blue line is the proportion of US-Sino trade deficit to the US trade deficit.

### 2.4.4 Global Trade and Shipping Market Performance

Between 1986 and 1995, the annual growth rate of global exports was 10.1%. The global trade situation was generally good. The growth rate of the three years only in 1991-1993 was down, at 2.7%, 6.5%, and -3.5%. In the first three years (186-1988), the growth rate of global exports was 9.5%, 18%, and 14.4%, respectively. The performance was strong and was not negatively affected by the trade war between Japan and the United States.

Figure 11 Global Export Growth Rate ($)

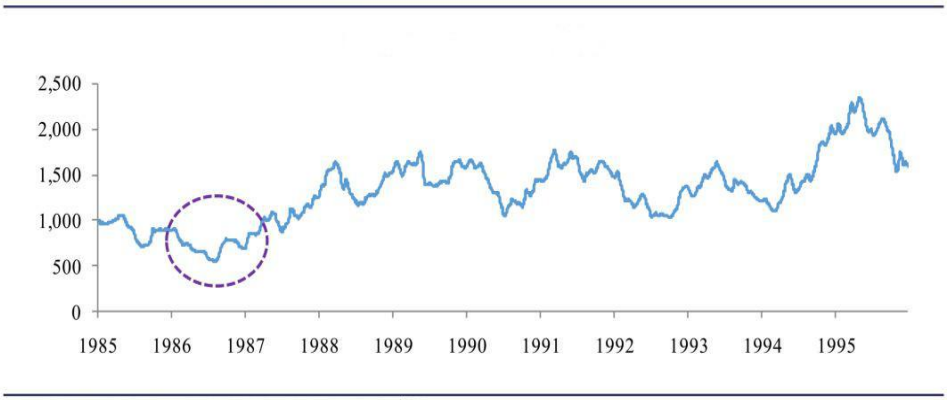



Source: IMF, CEIC

From the trend of the BFI index (predecessor of the BDI index) from 1985 to 1995,

the freight rate of the dry bulk market in the first half of 1986 showed a significant decline. The BFI index fell from 1000 points to a minimum of 500 points, the lowest in the 11 years. But in the second half of the year began a rapid rebound in 1988-1995 running above 1000 points. Judging from these data, the Japanese-US trade war has not had a significant negative impact on the global trade and shipping market.

Figure 12 BFI Index Trend




Source: Clarkson

# 3. Methodology of Correlation Analysis

This chapter will introduce the research methods used in this paper. The author uses regression analysis and correlation analysis to study trade and container transportation indicators and then compared the Sino-US trade conflict with the Japan-US trade dispute period, and the results were obtained.

## 3.1 Comparative analysis

The comparative analysis method is also known as the index comparison method. It is based on the mutual connection and development of objective things, through the different comparison of the same data, to evaluate the certain items. It is the basic method of economic activity analysis. The commonly used methods are as follows:

(1) comparing the completed indicators in the reporting period with the planned indicators, and analyzing the completion of the plan;

(2) Conducting dynamic comparisons. Compare the actual number of the reporting period with the same period of the previous year or the previous year and the same period of the previous year or the best level of history. This is used to study and analyze the development of various factors;

(3) Compare the actual indicators of the company's reporting period with the advanced indicators of similar enterprises, or compare with the average level of the system, or put advanced workshops within the enterprise, the comparison between the completion indicators of the team and the advanced workers and the general indicators can also be compared with the level reached by similar foreign companies. It is a way

to find gaps, tap potential, and point the way to catching up with the advanced level. Comparative analysis methods can be compared using absolute numbers or relative numbers. The absolute number comparison method finds the problem according to the different degree of the absolute number comparison or the degree of change and decrease. The relative number comparison method reveals the rationality and validity of the problem according to the correlation ratio and the degree of change and applies comparative analysis. Law, we must pay attention to the comparability between indicators, only comparable: can be compared. Otherwise, it will produce incorrect conclusions.

### 3.2 Correlation Analysis

Correlation analysis refers to the analysis of two or more related variable elements to measure the closeness of the two variable factors. Correlation elements need to have a certain connection or probability of conducting a correlation analysis.

Relevance does not mean causality, nor is simple personalization. The scope and scope of relevance cover almost all aspects we have seen, and the definitions of relevance in different disciplines are also very different.

### 3.3 Regression Analysis

Regression analysis is a statistical analysis method that determines the quantitative relationship between two or more variables. The application is very extensive, and the regression analysis is divided into one-way regression and multiple regression analysis

according to the variables involved; according to the number of independent variables, it can be divided into simple regression analysis and multiple regression analysis [1]; according to the independent variable and the dependent variable. The types of relationships can be divided into linear regression analysis and nonlinear regression analysis. If in the regression analysis, only one independent variable and one dependent variable are included, and the relationship between the two can be approximated by a straight line, this regression analysis is called a linear regression analysis. If two or more independent variables are included in the regression analysis, and there is a linear correlation between the independent variables, it is called multiple linear regression analysis.

# 4. Correlation Analysis between Container Market and Trade

Container ship transport currently accounts for nearly 20% of the sea and is one of the most important maritime transport. This chapter will focus on the impact of trade on the container ship market.

## 4.1 Japan-US Correlation Analysis between Trade and Container Shipping Market

At the same time as the Japan-US trade dispute was being carried out, the container ship was also developing at the beginning of its birth. The first five generations of container ships appeared during this period. Therefore, we first explore the impact of trade on the container ship market during this period.

### 4.1.1 Data Collection

Table 4 JP-US import and export

| Date | Japan Imports($mn) | Japan Exports($mn) |
|---|---|---|
| 1995 | 64342.7 | 104,942.56 |
| 1996 | 67606.6 | 152,213.96 |
| 1997 | 65548.6 | 177,111.75 |
| 1998 | 57831 | 106,689.72 |
| 1999 | 57466 | 100,726.28 |
| 2000 | 64924.4 | 105,902.55 |

Japan-US import and export trade volume from 1995 to 2000 as a variable affecting the entire shipping market.

Table 5 Total containerships deliveries 1995-2000

| | Total Containerships Deliveries | Total Containerships Deliveries |
|---|---|---|
| Date | No | ,000 CGT |
| 1995 | 203 | 2,989.65 |
| 1996 | 214 | 3,368.89 |
| 1997 | 257 | 4,194.85 |
| 1998 | 267 | 4,349.63 |
| 1999 | 123 | 2,052.56 |
| 2000 | 155 | 3,285.98 |

Values above are the total containerships numbers, and total Compensated Gross Tonnage delivered every year from 1996-2000.

Table 6 Feeder containership TC rate

| Date | Feeder Containership 350 TEU grd 6-12 Month Timecharter Rate | Feeder Containership 725 TEU grd 6-12 Month Timecharter Rate | Feeder Containership 1,000 TEU grd 6-12 Month Timecharter Rate | Feeder Containership 1,700 TEU grd 6-12 Month Timecharter Rate | Feeder Containership 2,000 TEU gls 6-12 Month Timecharter Rate | Feeder Containership 2,750 TEU gls 6-12 Month Timecharter Rate | Narrow Beam Containership 3,500 TEU gls 6-12 Month Timecharter Rate | Containership Timecharter Rate Index |
|---|---|---|---|---|---|---|---|---|
| | $/day | $/day | $/day | $/day | $/day | $/day | $/day | Index |
| 1995 | 7,039 | 8,977 | 11,577 | 16,840 | 19,164 | 21,854 | 27,142 | 107.87 |
| 1996 | 6,838 | 9,263 | 11,038 | 16,689 | 18,608 | 22,442 | 26,837 | 107.07 |
| 1997 | 5,479 | 7,929 | 9,221 | 13,771 | 14,171 | 20,675 | 23,681 | 89.27 |
| 1998 | 4,881 | 6,783 | 7,483 | 10,242 | 9,663 | 16,450 | 20,650 | 73.21 |
| 1999 | 4,167 | 5,346 | 6,100 | 8,983 | 9,946 | 15,475 | 22,083 | 65.58 |
| 2000 | 4,275 | 6,392 | 8,325 | 13,742 | 16,396 | 22,188 | 25,833 | 85.47 |

The above various time charter indices represent the container ship chartering freight index for various routes between 1996 and 2000. The containership time-charter rate index series based on a selection of historical charter market containership sizes. For series representing earnings trends across a wider ‘basket’ including larger vessel sizes.

Table 7 Average containership earnings

| Date | Average Containership Earnings |
|---|---|
| | $/day |
| 1995 | 15,359 |
| 1996 | 14,883 |
| 1997 | 12,589 |
| 1998 | 10,376 |
| 1999 | 9,972 |
| 2000 | 13,323 |

The values in the above table reflect the average income of the container ship charter market per vessel per year from1996 to 2000.

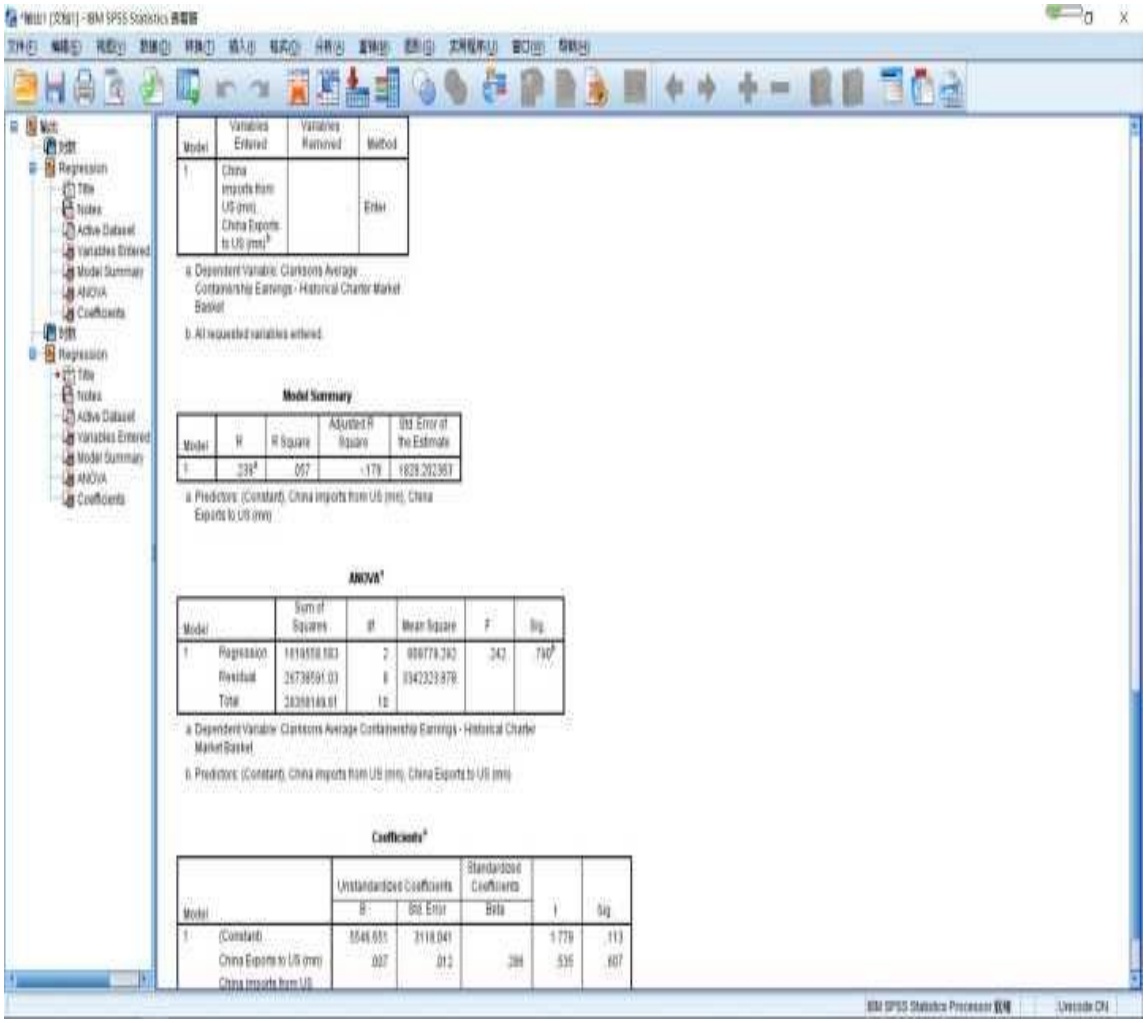
### 4.1.2 Analyzing Tool

SPSS is the world's first statistical software that uses a graphical menu-driven interface. It will display almost all functions in a unified, standardized interface, using the Windows side of the window.

The various functions of managing and analyzing data methods are displayed, and the dialog box displays various function options. SPSS for Windows is a combined software package that combines data entry, organization, and analysis. Users can select modules according to actual needs and functions of the computer to reduce the requirements on the capacity of the system hard disk, which is conducive to the

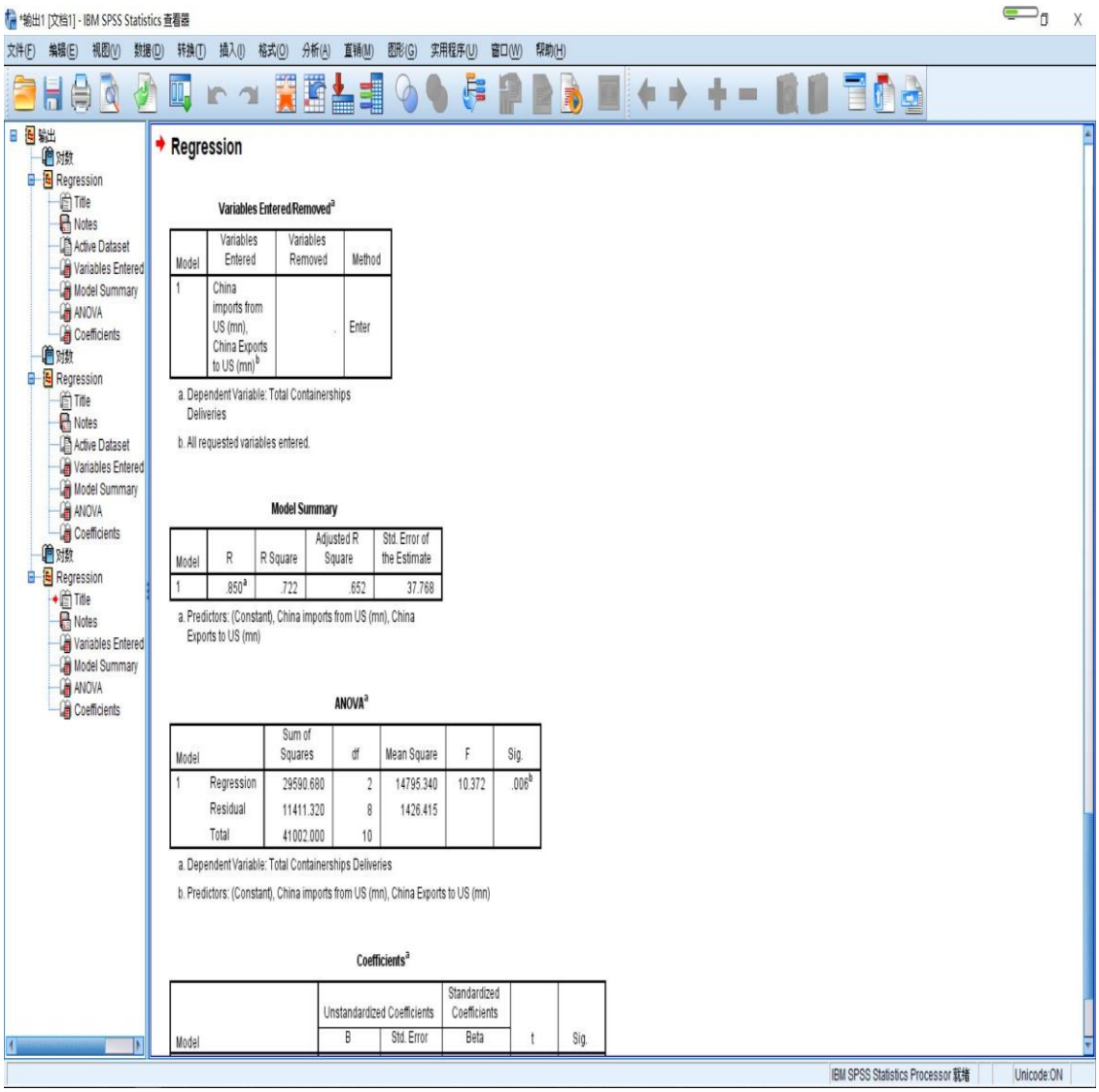
promotion and application of the software. The basic functions of SPSS include data management, statistical analysis, chart analysis, output management, and more. SPSS statistical analysis process includes descriptive statistics, mean comparison, general linear model, correlation analysis, regression analysis, log-linear model, cluster analysis, data simplification, survival analysis, time series analysis, multiple responses, etc. In the regression analysis, there are several statistical processes, such as linear regression analysis, curve estimation, logistic regression, probit regression, weighted estimation, two-stage least squares, nonlinear regression, etc., and each process It also allows the user to select different methods and parameters. SPSS also has a dedicated drawing system that can draw a variety of graphics based on the data. This chapter will use SPSS software to make a correlation analysis and regression analysis on the impact of Sino-US trade war on the shipping market, to express the impact in digital form.

Picture 1 Spss working process



I use the total import and export trade between China and the United States as an independent variable. The various above indicators are used as the dependent variables, and the results are obtained by using SPSS.

Picture 2 Spss working process




### 4.1.3 Formula Introduction

If there is only one independent variable X, and the relationship between the variable Y and the independent variable X is approximately linear, a linear regression equation can be established. The value of the independent variable X is used to predict the value of the dependent variable Y. That is the unary linear regression prediction.

There is a linear correlation between the factor variable Y and the independent variable X, that is to say, for a certain value of the independent variable X, the value corresponding to the variable Y is not uniquely determined, but has many possible values, and they are distributed. Above and below a line, this is because Y is also affected by factors other than the independent variable. The magnitude and direction of the effects of these factors are uncertain and are usually represented by a random variable (denoted as Ɛ), also known as a random disturbance term. Thus, the dependency between Y and X can be expressed as:

$$yi = \alpha + \beta xi + \mathcal{E}i. \qquad (1)$$

Equation (1) is the overall one-dimensional linear regression model. Where α, β is the constant. Random perturbation terms Ɛi are random variables that cannot be directly observed. For regression analysis, it is usually assumed $\varepsilon_i \overset{iid}{\sim} N\left(0, \sigma^2\right)$ that it is assumed Ɛi to be zero mean $\left[E\left(\varepsilon_i\right) = 0\right]$, same variance $\left[D\left(\varepsilon_i\right) = \sigma^2\right]$, independent of each other $\left[Cov\left(\varepsilon_i, \varepsilon_j\right) = 0\right]$ and subject to a normal distribution.

For the average value of equation (1), there are:

$$E(yi) = \alpha + \beta xi. \qquad (2)$$

Equation (2) is often referred to as the overall unary linear regression equation or the overall regression line, use E (yi) to represent the mean or expected value of the dependent variable for a given independent variable value xi. α, β is collectively referred to as the parameters of the overall regression equation. Where α is the constant

term of the population regression equation, which is the intercept of the population regression line on the Y-axis; β is the population regression coefficient and the slope of the population regression line. It is not difficult to understand from equation (2) that the overall regression equation describes the average quantitative relationship between the two variables, Y and X.

In practice, it is usually impossible to collect all the possible values of the variables. The parameters α, β in the overall regression equation are not directly observable and are unknown parameters to be estimated. To do this, we need to estimate based on the sample information. If an appropriate method is used to find the two samples statistic a and b as the estimators of the parameters respectively, then a and b are used instead of the parameters in the overall regression equation to obtain the estimated regression equation, also called the sample regression equation. The one-dimensional linear sample regression equation is also called the sample regression line, and its form is as follows:

$$\hat{y}i = a + bxi. \qquad (3)$$

Yi is an estimate of the mean of the dependent variable E (yi) corresponding to the value of the independent variable xi; a and b are the estimators of the parameters α, β of the population regression equation. a is the constant term of the sample regression equation, which is the intercept of the sample regression line on the Y-axis to indicate the average influence of factors other than the independent variable X on the dependent variable Y; b is the sample regression coefficient, which is the slope of the sample regression line, indicating the average increase of the dependent variable Y for each additional unit of the independent variable X.

After estimating the values of a and b based on the sample observation data, the sample

regression equation (3) can be used as a prediction model, which is a linear regression prediction model.

### 4.1.4 Result Analysis

In this part, I will explain the results of each indicator. Import and export values are as independent variables, and each indicator is as a dependent variable. The value outside the parentheses in the import and export values is the regression coefficient, and the value in parentheses is the significant parameter of the import or export itself to the dependent variable. Both the numerical value of F and the value of significance are used as significant reference indicators for the entire model. Values less than 0.05 are considered meaningful and vice versa. Here mainly refer to significant values. The R-squared value indicates the goodness of fit of the entire model, ranging from 0 to 1. In this model, the R-squared value is greater than 0.6, and the goodness of fit is considered good. Let's check the results one by one.

Table 8 JP Regression result

| Model | Total Containerships Deliveries | Total Containerships Deliveries_1 |
|---|---|---|
| imports($mn) | -0.253（0.705） | -0.038（0.957） |
| exports($mn) | 0.688（0.339） | 0.459（0.538） |
| F Value | 0.711 | 0.353 |
| Significance | 0.559 | 0.728 |
| R2 | 0.322 | 0.191 |

Significance values of whole model of all these indicators are larger than 0.05, which means these models are all meaningless.

Table 9 JP Regression result

| Model | 350 TEU | 725 TEU | 1000 TEU | 1700 TEU | 2500 TEU |
|---|---|---|---|---|---|
| imports($mn) | 0.373 (0.496) | 0.705(0.239) | 0.932(0.113) | 1.081 (0.028) | 0.983(0.127) |
| exports($mn) | 0.465 (0.406) | 0.077(0.882) | -0.203(0.661) | -0.289(0.364) | -0.592(0.295) |
| F Value | 1.990 | 2.001 | 3.123 | 9.617 | 2.205 |
| Significance | 0.282 | 0.280 | 0.185 | 0.050 | 0.258 |
| R2 | 0.570 | 0.572 | 0.676 | 0.865 | 0.595 |

Significance values of the whole model of all these indicators are larger than 0.05, which means these models of 350TEU, 725TEU, 1000TEU, 1700TEU AND 2500TEU are all meaningless.

Table 10 JP Regression result

| Model | 2000 TEU | 2750 TEU | 3500 TEU |
|---|---|---|---|
| imports($mn) | 1.190（0.09） | 0.066（0.001） | 1.209（0.009） |
| exports($mn) | -0.491（0.084） | -0.031（0.039） | -0.582(0.060 |
| F Value | 20.458 | 96.886 | 19.244 |
| Significance | 0.018 | 0.002 | 0.019 |
| R2 | 0.932 | 0.985 | 0.928 |

The significance of these three dependent variables is less than 0.5, which means these three models are meaningful. The significance of 2000 TEU with imports and exports is larger than0.05, which means the significance of imports and exports is not valuable. The significance of imports and exports of 2750 TEU and 3500 TEU are all less than 0.05, means meaningful. Both 2750 TEU and 3500 TEU are positively related to imports and exports. The goodness of fit of all these three models meets the condition.

Table 11 JP Regression result

| Model | Containership Timecharter Rate Index |
|---|---|
| imports($mn) | 1.005(0.067) |
| exports($mn) | -0.247(0.543) |
| F Value | 4.902 |
| Significance | 0.113 |
| R2 | 0.766 |

Significance values of this model are larger than 0.05, which means meaningless.

Table 12 JP Regression result

| Model | Average Containership Earnings |
|---|---|
| imports($mn) | 1.148(0.019) |
| exports($mn) | -0.441(0.176) |
| F Value | 11.502 |
| Significance | 0.039 |
| R2 | 0.885 |

The significance of this model is less than 0.05, means meaningful. The significance of imports is less than 0.05, and the significance of exports is not, it means average containership earnings are positively related to the imports value. The R2 is larger than 0.6, which means the goodness of fit is good.

In summary, between 1996 and 2000, the imports value is positively related to the average containership earnings, feeder containership 2,750 TEU 6-12month time-charter rate and narrow beam containership 3,500 TEU 6-12month time-charter rate. The exports value is negatively related to the average containership earnings, feeder containership 2,750 TEU 6-12month time-charter rate and narrow beam containership 3,500 TEU 6-12month time-charter rate.

## 4.2 Sino-US Correlation Analysis between Trade and Container Shipping Market

Nearly half a century after the Japan-US trade dispute, a serious trade conflict broke out between China and the United States. In this part, I will analyze the related impact of trade between China and the United States on the container transportation market.

### 4.2.1 Data Collection

Table 13 Sino-US import and export

| Date | China Exports to US (mn) | China imports from US (mn) |
|---|---|---|
| 2009 | 220,815.59 | 77,443.19 |
| 2010 | 283,303.72 | 102,037.63 |
| 2011 | 324,492.72 | 122,153.95 |
| 2012 | 351,796.17 | 132,886.35 |
| 2013 | 368,426.76 | 152,575.33 |
| 2014 | 396,082.12 | 159,035.96 |
| 2015 | 409,538.34 | 148,736.70 |
| 2016 | 385,084.75 | 134,402.44 |
| 2017 | 433,146.48 | 155,177.27 |
| 2018 | 479,811.64 | 155,365.85 |
| 2019 | 433,269.91 | 108,134.63 |

Sino-US import and export trade volume from 2009 to 2019 as a variable affecting the entire shipping market。

Table 14 Containership contracting

| Date | Containerships Contracting | Containership (8,000 + TEU) Contracting | Containership (3,000-7,999 TEU) Contracting | Containership (12,000 + TEU) Contracting |
|---|---|---|---|---|
| | No | No | No | No |
| 2009 | 17 | 5 | 3 | 0 |
| 2010 | 119 | 46 | 25 | 4 |
| 2011 | 254 | 111 | 75 | 51 |
| 2012 | 85 | 21 | 31 | 10 |
| 2013 | 289 | 160 | 22 | 52 |
| 2014 | 169 | 72 | 7 | 47 |
| 2015 | 274 | 127 | 21 | 96 |
| 2016 | 99 | 9 | 8 | 9 |
| 2017 | 140 | 31 | 0 | 31 |
| 2018 | 212 | 65 | 10 | 40 |
| 2019 | 53 | 14 | 0 | 10 |

The values in the above table reflect the new shipbuilding orders for container ships of different tonnages per year from 2009 to April 2019.

Table 15 Average Containership earning

| Average Containership Earnings | |
|---|---|
| Date | $/day |
| 2009 | 5,070 |
| 2010 | 8,659 |
| 2011 | 10,663 |
| 2012 | 6,121 |
| 2013 | 6,332 |
| 2014 | 6,805 |
| 2015 | 8,571 |
| 2016 | 5,678 |
| 2017 | 7,091 |
| 2018 | 9,171 |
| 2019 | 7,374 |

The values in the above table reflect the average income of the container ship charter market per vessel per year from 2009 to April 2019.

Table 16 Containership TC rate index

| Containership Timecharter Rate Index | |
|---|---|
| Date | Index |
| 2009 | 35.35 |
| 2010 | 51.29 |
| 2011 | 62.83 |
| 2012 | 42.85 |
| 2013 | 45.90 |
| 2014 | 47.04 |
| 2015 | 52.95 |
| 2016 | 40.55 |
| 2017 | 47.25 |
| 2018 | 60.49 |
| 2019 | 52.10 |

This index reflects the containership earning rate under the time-charter between 2008 and April 2019. Based on $/day per TEU for 1993 = 100.

Table 17 Total containership sales

| Total Containership Sales | |
|---|---|
| Date | No |
| 2009 | 120 |
| 2010 | 166 |
| 2011 | 91 |
| 2012 | 149 |
| 2013 | 150 |
| 2014 | 183 |
| 2015 | 223 |
| 2016 | 137 |
| 2017 | 309 |
| 2018 | 183 |
| 2019 | 44 |

The values in the above table indicate the total number of container ships bought and sold each year from 2009 to April 2019.

Table 18 CCFI China-NA freight index

| CCFI China-WC North America Freight Index | | CCFI China-EC North America Freight Index |
|---|---|---|
| Date | Index | Index |
| 2009 | 879.78 | 1,195.14 |
| 2010 | 1,057.39 | 1,279.79 |
| 2011 | 937.21 | 1,172.77 |
| 2012 | 1,052.64 | 1,242.30 |
| 2013 | 1,058.84 | 1,217.46 |
| 2014 | 984.44 | 1,274.86 |
| 2015 | 899.49 | 1,175.45 |
| 2016 | 676.86 | 843.47 |
| 2017 | 643.73 | 851.79 |
| 2018 | 691.29 | 897.98 |
| 2019 | 686.16 | 893.67 |

CCFI objectively reflects the status of the container market and becomes an important indicator for the world to understand the Chinese shipping market.

Preparation and release of CCFI:

1. Base period. The China Export Container Freight Index is based on January 1, 1998, with a base period index of 1,000 points.

2. The choice of sample route. According to the three basic principles of typicality, regional distribution and correlation, 11 routes were selected as sample routes, namely Hong Kong, South Korea, Japan, Southeast Asia, Australia, New Zealand, Mediterranean, Europe, East and West, West America, and East. South Africa South America route, its domestic departure ports include Dalian, Tianjin, Qingdao, Shanghai, Nanjing, Ningbo, Xiamen, Fuzhou, Shenzhen, Guangzhou, and other top ten ports.

3. Collection of tariff information. At present, there are 16 Chinese and foreign shipping companies with an outstanding reputation and large market share in the route. According to the principle of voluntariness, they form a freight rate index preparation committee to provide freight rate information.

Table 19 Total containerships deliveries 2009-2019

| Date | Total Containerships Deliveries | Total Containerships Deliveries |
|---|---|---|
| | No | ,000 TEU |
| 2009 | 279 | 1,103.66 |
| 2010 | 264 | 1,381.56 |
| 2011 | 194 | 1,225.94 |
| 2012 | 212 | 1,265.92 |
| 2013 | 206 | 1,367.11 |
| 2014 | 207 | 1,522.14 |
| 2015 | 211 | 1,660.87 |
| 2016 | 132 | 908.82 |
| 2017 | 155 | 1,171.84 |
| 2018 | 175 | 1,292.86 |
| 2019 | 44 | 336.51 |

These values show the number of container ships delivered per year and the number of tons between 2009 and April 2009.

Table 20 SCFI comprehensive index 2009-2019

| SCFI Comprehensive Index | |
|---|---|
| Date | Index |
| 2009 | 1,040.16 |
| 2010 | 1,367.45 |
| 2011 | 1,007.00 |
| 2012 | 1,253.58 |
| 2013 | 1,079.60 |
| 2014 | 1,071.95 |
| 2015 | 724.21 |
| 2016 | 648.97 |
| 2017 | 826.91 |
| 2018 | 832.53 |
| 2019 | 827.59 |

SCFI is an index reflecting the changes in the freight rate of the Shanghai export container spot transportation market, including 15 sub-route market freight rates (indexes) and composite indices.

Freight rate in the sub-route market: The freight rate of the sub-route market reflects the sea freight and sea-related surcharge levels of the spot market on each route.

Route: Covers the main trade flows and export areas of Shanghai's export container transportation, namely Europe, Mediterranean, US West, US East, Persian Gulf, ANZ, West Africa, South Africa, South America, Kansai, Japan, Kanto, Southeast Asia, South Korea, Taiwan, and Hong Kong routes.

Destination port: the basic port for the route, such as the Mediterranean - Barcelona /

Valencia / Genoa / Naples; Europe - Hamburg / Rotterdam / Antwerp / Felixstowe / Le Havre; Messi - Los Angeles / Long Beach / Oakland; US East - New York / Savannah / Norfolk / Charleston; Japan Kansai - Osaka / Kobe; Japan Kanto - Tokyo / Yokohama.

Price type: The evaluation price of the mainstream (the mode) transaction price of the general cargo owner's spot market. The transaction price is not affected by the ship type, the age of the ship, the carrier company, or the special volume of the container.

Surcharges include: fuel surcharge (BAF/FAF), emergency fuel surcharge (EBS/EBA), currency surcharge (CAF/YAS), peak season surcharge (PSS), war surcharge (WRS), port congestion surcharge (PCS), canal surcharge (SCS/SCF/PTF/PCC), etc. It does not include terminal operation fees for the port of origin and port of destination, port facility security surcharge, South China area origin surcharge, US automatic customs declaration fee, inland transfer fee, etc.

Billing unit: USD /TEU, US/West, and US East routes are USD/FEU.

Trade and transportation terms: export CIF, CY-CY.

Box type/goods name: Ordinary dry cargo box, the US West and East Coast routes are general cargo.

The base period of the composite index: The composite index was based on October 16, 2009, and the base period index is 1000 points.

Table 21 Containership fleet growth

| Date | Containership 8,000+ TEU Fleet Growth | Containership 3,000-7,999 TEU Fleet Growth | Containership <3,000 TEU Fleet Growth |
|---|---|---|---|
| | % Yr/Yr | % Yr/Yr | % Yr/Yr |
| 2009 | 16.82 | 7.27 | -1.32 |
| 2010 | 27.95 | 8.32 | 0.69 |
| 2011 | 27.87 | 3.80 | 0.25 |
| 2012 | 22.74 | 2.39 | -3.47 |
| 2013 | 19.28 | 1.11 | -2.50 |
| 2014 | 20.90 | 0.20 | -1.80 |
| 2015 | 20.76 | 0.14 | -0.03 |
| 2016 | 9.55 | -6.53 | -1.80 |
| 2017 | 10.99 | -3.58 | 0.11 |
| 2018 | 10.66 | -0.25 | 2.35 |
| 2019 | 5.90 | -1.85 | 0.35 |

These values represent the percentage increase in container fleet size for different TEU intervals.

### 4.2.2 Result Analysis

Table 22 Sino-US Regression result

| Model | Average Containership Earnings |
|---|---|
| imports | 0.286（0.607） |
| exports | -0.066(0.904) |
| F | 0.242 |
| Significance | 0.79 |
| R2 | 0.057 |

All the significance values are larger than 0.05, and the R2 value is less than 0.6. It means that the correlation between the import and export values and average containership earnings is small and meaningless.

Table 23 Sino-US Regression result

| Model | Total Containerships Deliveries | Total Containerships Deliveries |
|---|---|---|
| imports | -1.277（0.002） | -1.078（0.009） |
| exports | 0.757（0.0310） | 1.265（0.004） |
| F | 10.372 | 8.184 |
| Significance | 0.006 | 0.011615 |
| R2 | 0.722 | 0.672 |

The significance value of the whole model and each import and exports are less than 0.05. The R2 value is more than 0.6, which means the goodness of fit meets the conditions. Total containerships deliveries are negatively related to the number of imports and positively related to the number of imports.

Table 24 Sino-US Regression result

| Model | Containership 8,000+ TEU Orderbook % Fleet | Containership 3，000-7,999 TEU Orderbook % Fleet |
|---|---|---|
| imports | -0.975（0.000） | -0.895（0.001） |
| exports | 0.004（0.974） | -0.073（0.671） |
| F | 67.772 | 39.641 |
| Significance | 0.00001 | 0.000071 |
| R2 | 0.944 | 0.908 |

The circumstances of 3-7,999 TEU and 8.000+ TEU Orderbook % Fleet is similar, let's discuss together. The significance values of imports and the whole model of both two dependent variables are less than 0.05, the significance values of R2of both two dependent variables are 0.6, and the significance values of exports of both two dependent variables are larger than 0.05. It means the correlation between imports and these two indicators is meaningless.

Table 25 Sino-US Regression result

| Model | Containership <3,000 TEU Orderbook % Fleet |
|---|---|
| imports | 1.023（0.024） |
| exports | -1.138（0.015） |
| F | 5.019 |
| Significance | 0.038698 |
| R2 | 0.556 |

The significance value of the whole model and each imports and exports are less than 0.05. The R2 value is less than 0.6, which means a little poor goodness of fit. Containership < 3,000 TEU order book % fleet is positively related to the number of imports and negatively related to the number of imports.

Table 26 Sino-US Regression result

| Model | Containerships Contracting | Containership (8,000 + TEU) Contracting | Containership (3,000-7,999 TEU) Contracting | Containership (12,000 + TEU) Contracting | Average Containership Earnings | Total Containership Sales | Containership Timecharter Rate Index |
|---|---|---|---|---|---|---|---|
| imports | -0.384 (0.358) | -0.554 (0.242) | -0.614 (0.259) | -0.197 (0.652) | 0.646 (0.231) | -0.331 (0.462) | 0.536 (0.308) |
| exports | 0.949 (0.042) | 0.913 (0.071) | 0.418 (0.432) | 0.785 (0.099) | -0.400 (0.445) | 0.844 (0.085) | -0.126 (0.804) |
| F | 3.835 | 2.296 | 0.753 | 2.873 | 0.887 | 2.593 | 0.997 |
| Significance | 0.06792 | 0.162968 | 0.501636 | 0.114738 | 0.448889 | 0.135474 | 0.41 |
| R2 | 0.489 | 0.365 | 0.158 | 0.418 | 0.181 | 0.393 | 0.200 |

Significance values of the whole model of all these indicators are larger than 0.05, which means these models are all meaningless.

Table 27 Sino-US Regression result

| Model | Containerships Orderbook |
|---|---|
| imports | -0.731（0.006) |
| exports | -0.249（0.237） |
| F | 28.081 |
| Significance | 0 |
| R2 | 0.875 |

The significance values of the whole model and imports are less than 0.05; the R2 value is more than 0.6. The significance value of exports is larger than 0.05. It means exports meaningless, and the goodness of fit meets the condition.

Table 28 Sino-US Regression result

| Model | Containership 8,000+ TEU Fleet Growth | Containership 3,000-7,999 TEU Fleet Growth |
|---|---|---|
| imports | -1.167(0.012) | -0.742(0.066) |
| exports | 0.772(0.063) | -0.039(0.914) |
| F | 5.456 | 5.924 |
| Significance | 0.032 | 0.026 |
| R2 | 0.577 | 0.597 |

The significance values of the whole model are less than 0.05; the R2 value is less than 0.6. The significance value of exports is larger than 0.05. It means both imports and exports of containership 3,000-7,999 TEU fleet growth and exports of containership 8,000 + TEU fleet growth are meaningless, the goodness of fit is a little poor.

Table 29 Sino-US Regression result

| Model | Containership <3,000 TEU Fleet Growth | SCFI Comprehensive Index | Feeder Containership 2,000-2,999 TEU Orderbook | Containership 12,000+ TEU Orderbook |
|---|---|---|---|---|
| imports | 0.866(0.095) | -0.841(0.085) | 1.084(0.023) | -0.216(0.649) |
| exports | -0.692(0.169) | 0.325(0.470) | -0.976(0.036) | -0.377(0.433) |
| F | 1.796 | 2.606 | 4.093 | 1.824 |
| Significance | 0.227 | 0.134 | 0.06 | 0.222 |
| R2 | 0.310 | 0.395 | 0.506 | 0.313 |

Significance values of the whole model of all these indicators are larger than 0.05, which means these models are all meaningless.

Table 30 Sino-US Regression result

| Model | Containership (8,000 + TEU) Orderbook | Containership (3,000-7,999 TEU) Orderbook |
|---|---|---|
| imports | -1.29(0.001) | -0.953(0.000) |
| exports | 0.627(0.029) | 0.002(0.993) |
| F | 17.822 | 38.246 |
| Significance | 0.001129 | 0 |
| R2 | 0.817 | 0.905 |

The significance values of the whole model and imports are less than 0.05; the R2 value is more than 0.6. The significance value of exports is larger than 0.05. It means exports meaningless, and the goodness of fit meets the condition.

Table 31 Sino-US Regression result

| Model | CCFI China-WC North America Freight Index | CCFI China-EC North America Freight Index |
|---|---|---|
| imports | -1.118(0.018) | -1.159(0.011) |
| exports | 0.736(0.087) | 0.702(0.082) |
| F | 4.520 | 5.718 |
| Significance | 0.049 | 0.029 |
| R2 | 0.413 | 0.588 |

The significance value of the whole model and each imports and exports are less than 0.05. The R2 value is more than 0.6, which means the goodness of fit meets the conditions. Total containerships deliveries are negatively related to the number of imports and positively related to the number of imports.

In summary, the imports value is positively related to the percentage of container ship orders below 3000TEU of total fleet and negatively related to CCFI China-WC North America freight index, CCFI China-EC North America freight Index, 3000-7999 TEU containership order book and 8000+ TEU containership order book, 8000+ TEU containership fleet growth, the total containership order book, total containerships number deliveries, total containerships TEU deliveries, the percentage of container ship orders between 3000- 7999 TEU of total fleet and the percentage of container ship

orders higher than 8000 TEU of total fleet.

The exports value is positively related to total containerships number deliveries, total containerships TEU deliveries and 8000+ TEU containership order book and negatively related to the percentage of container ship orders less than 3000 TEU of the total fleet.

## 4.3 Result Test

If the established regression model has no causal relationship in the economic sense, then this is a pseudo-regression. For example, there is a large correlation coefficient between the annual growth rate of the small roadside tree and the annual growth rate of the national economy, but the established model is spurious regression. If you use data regression directly, there must be a positive correlation, but this is a meaningless regression. Therefore, it is necessary to conduct a stationary test on the regression to avoid the occurrence of pseudo-regression.

### 4.3.1 Stability Test of Time Series

We selected the variables in the above regression analysis and tested them for stationarity.  Data are as follows：

Table 32 Stability Test Data

| Date | Containership <3,000 TEU Orderbook % Fleet | CCFI SINO-WC NA Freight Index | CCFI China-EC North America Freight Index | Containership 8,000+ TEU Fleet Growth | Containerships Orderbook | Total Containerships Deliveries |
|---|---|---|---|---|---|---|
| | % | Index | Index | % Yr/Yr | No | No |
| 2009 | 13.05 | 880.01 | 1,195.14 | 16.82 | 1,197 | 279 |
| 2010 | 7.74 | 1,059.40 | 1,279.79 | 27.95 | 836 | 264 |
| 2011 | 6.25 | 938.68 | 1,172.77 | 27.87 | 621 | 194 |
| 2012 | 5.03 | 1,050.85 | 1,242.30 | 22.74 | 647 | 212 |
| 2013 | 4.83 | 1,059.20 | 1,217.46 | 19.28 | 486 | 206 |
| 2014 | 8.04 | 983.82 | 1,274.86 | 20.90 | 543 | 207 |
| 2015 | 9.12 | 904.37 | 1,175.45 | 20.76 | 488 | 211 |
| 2016 | 10.12 | 680.12 | 843.47 | 9.55 | 523 | 132 |
| 2017 | 10.94 | 644.49 | 851.79 | 10.99 | 467 | 155 |
| 2018 | 11.04 | 692.43 | 897.98 | 10.66 | 428 | 175 |
| 2019 | 13.42 | 713.23 | 893.67 | 5.90 | 443 | 44 |

Table 33 Stability Test Data

| Date | Containership 8,000+ TEU Orderbook % Fleet | Containership 3-7,999 TEU Orderbook % Fleet | Containership (8,000 + TEU) Orderbook | Containership (3,000-7,999 TEU) Orderbook | Total Containerships Deliveries |
|---|---|---|---|---|---|
| | % | % | No | No | ,000 TEU |
| 2009 | 143.58 | 30.11 | 303 | 441 | 1,103.66 |
| 2010 | 104.72 | 17.02 | 270 | 305 | 1,381.56 |
| 2011 | 86.74 | 13.49 | 245 | 186 | 1,225.94 |
| 2012 | 62.90 | 11.58 | 274 | 199 | 1,265.92 |
| 2013 | 52.50 | 8.54 | 214 | 162 | 1,367.11 |
| 2014 | 49.58 | 5.03 | 274 | 102 | 1,522.14 |
| 2015 | 42.74 | 2.03 | 237 | 49 | 1,660.87 |
| 2016 | 35.44 | 1.75 | 240 | 30 | 908.82 |
| 2017 | 25.64 | 1.79 | 182 | 35 | 1,171.84 |
| 2018 | 21.01 | 1.00 | 143 | 25 | 1,292.86 |
| 2019 | 19.08 | 0.78 | 138 | 18 | 336.51 |

The first variable in Table 32 is named as Y, and the second variable is named as X1, followed by X2, X3, X4. I did a stability test on these variables and got the following results:

Table 32-1 Stability Test Result

| Variable | ADF Statistics | Prob. | $\alpha = 0.01$ | $\alpha = 0.05$ | $\alpha = 0.10$ | Result |
|---|---|---|---|---|---|---|
| Y | -4.719519 | 0.0203 | -4.719519 | -4.008157 | -3.460791 | smooth |
| D(Y) | - | - | - | - | - | - |
| X1 | -0.815426 | 0.7694 | -4.297073 | -3.212696 | -2.747676 | unstable |
| D(X1) | -3.572474 | 0.0322 | -4.420595 | -3.259808 | -2.771129 | smooth |
| X2 | -0.634926 | 0.8199 | -4.297073 | -3.212696 | -2.747676 | unstable |
| D(X2) | -4.306792 | 0.0140 | -4.582648 | -3.320969 | -2.801384 | smooth |
| X3 | -4.726937 | 0.0067 | -4.420595 | -3.259808 | -2.771129 | smooth |
| D(X3) | - | - | - | - | - | - |
| X4 | -0.705726 | 0.8011 | -4.297073 | -3.212696 | -2.747676 | unstable |
| D(X4) | -4.220956 | 0.0222 | -4.582648 | -3.320969 | -2.801384 | smooth |

Next, the first variable in Table 33 is named as X1, and the second variable is named as X2, followed by X3, X4, X5. The stability test result is as following:

Table 33-1 Stability Test Result

| Variable | ADF Statistics | Prob. | $\alpha = 0.01$ | $\alpha = 0.05$ | $\alpha = 0.10$ | Result |
|---|---|---|---|---|---|---|
| X1 | -7.167924 | 0.0003 | -4.297073 | -3.212696 | -2.747676 | smooth |
| D(X1) | - | - | - | - | - | - |
| X2 | -6.308666 | 0.0007 | -4.297073 | -3.212696 | -2.747676 | smooth |
| D(X2) | - | - | - | - | - | - |
| X3 | 0.405857 | 0.9693 | -4.420595 | -3.259808 | -2.771129 | unstable |
| D(X3) | -5.174290 | 0.0038 | -4.420595 | -3.259808 | -2.771129 | smooth |
| X4 | -4.446960 | 0.0081 | -4.297073 | -3.212696 | -2.747676 | smooth |
| D(X4) | - | - | - | - | - | - |
| X5 | -1.881968 | 0.5914 | -5.295384 | -4.008157 | -3.460791 | unstable |
| D(X5) | -4.431892 | 0.0414 | -5.835186 | -4.246503 | -3.590496 | smooth |

The ADF statistic is the value obtained by the ADF test of the corresponding variable. When it is smaller than the value corresponding to the $\alpha = 0.5$, it means that it is stationary. The Prob is a so-called P-value that is used to see if it rejects the null

hypothesis. If the P-value of the ADF test is less than 0.5, the null hypothesis is rejected, indicating that the sequence is stationary. If the P-value is greater than 0.5, the null hypothesis is accepted, indicating that the sequence is non-stationary. $\alpha$ is the critical value at the corresponding confidence level. D represents the first order difference. According to Table 32-1 and Table 33-1, some variables are stable, and the remaining variables are smooth after the first-order difference, indicating that the data to be tested is stable, and there is no pseudo-regression problem.

### 4.3.2 Granger Causality Test

If in the stationarity test, all variables are smooth after the first-order difference, the cointegration test can continue. According to the results of Table 32-1 and Table 33-1, some variables are stable, and some variables are smoothed after the first-order difference. In this case, only the Granger causality test can be performed.
The Granger causality test is a statistical chronological order. It does not mean that there is a causal relationship. Whether or not a causal relationship needs to be judged according to theory, experience, and model.

Regarding the Granger causality test, if X is not the Granger reason for Y, this is not to say that there is no relationship between X and Y. The Granger causality test itself is not a causal relationship between the test variables in the true sense, but only the statistical chronological order of the variables. The causal relationship is not the relationship between the cause and the effect we usually understand, but the early change of x can effectively explain the change of y, so it is called "Grange reason."
The results of the Granger causality test on Table 32-1 are as follows:

Table 32-2 Granger causality test results

| Null Hypothesis: | Obs | F-Statistic | Prob. |
|---|---|---|---|
| DX1 does not Granger Cause Y | 9 | 0.10430 | 0.7577 |
| Y does not Granger Cause DX1 | | 0.01669 | 0.9014 |
| DX2 does not Granger Cause Y | 9 | 1.29976 | 0.2977 |
| Y does not Granger Cause DX2 | | 0.06011 | 0.8145 |
| X3 does not Granger Cause Y | 10 | 35.2491 | 0.0006 |
| Y does not Granger Cause X3 | | 0.34547 | 0.5752 |
| DX4 does not Granger Cause Y | 9 | 0.57845 | 0.4757 |
| Y does not Granger Cause DX4 | | 0.70639 | 0.4329 |
| DX2 does not Granger Cause DX1 | 9 | 0.19959 | 0.6707 |
| DX1 does not Granger Cause DX2 | | 0.07033 | 0.7997 |
| X3 does not Granger Cause DX1 | 9 | 0.00656 | 0.9381 |
| DX1 does not Granger Cause X3 | | 0.59935 | 0.4682 |
| DX4 does not Granger Cause DX1 | 9 | 0.17483 | 0.6904 |
| DX1 does not Granger Cause DX4 | | 0.62007 | 0.4610 |
| X3 does not Granger Cause DX2 | 9 | 0.36820 | 0.5662 |
| DX2 does not Granger Cause X3 | | 0.11161 | 0.7497 |
| DX4 does not Granger Cause DX2 | 9 | 0.16331 | 0.7001 |
| DX2 does not Granger Cause DX4 | | 0.62710 | 0.4586 |
| DX4 does not Granger Cause X3 | 9 | 1.58865 | 0.2543 |
| X3 does not Granger Cause DX4 | | 0.04071 | 0.8468 |

Let’s put eyes on the Prob value, which is similar to the P-value in the stability test. If the P-value is less than 0.05, the null hypothesis is rejected. For example, in Table 32-2, the P-value of “X3 does not Granger Cause Y” is less than 0.05, which means X3 is the Granger reason for Y. That is, the historical data of X3 has a predictive effect on Y.

Table 33-2 Granger causality test results

| Null Hypothesis: | Obs | F-Statistic | Prob. |
|---|---|---|---|
| X2 does not Granger Cause X1 | 9 | 6.18500 | 0.0597 |
| X1 does not Granger Cause X2 | | 3.41645 | 0.1363 |
| DX3 does not Granger Cause X1 | 8 | 0.26971 | 0.7803 |
| X1 does not Granger Cause DX3 | | 4.10966 | 0.1383 |
| X4 does not Granger Cause X1 | 9 | 8.20585 | 0.0384 |
| X1 does not Granger Cause X4 | | 2.29757 | 0.2166 |
| DX5 does not Granger Cause X1 | 8 | 0.67826 | 0.5714 |
| X1 does not Granger Cause DX5 | | 2.73739 | 0.2106 |
| DX3 does not Granger Cause X2 | 8 | 0.11683 | 0.8936 |
| X2 does not Granger Cause DX3 | | 16.5870 | 0.0239 |
| X4 does not Granger Cause X2 | 9 | 9.78439 | 0.0288 |
| X2 does not Granger Cause X4 | | 53.8286 | 0.0013 |
| DX5 does not Granger Cause X2 | 8 | 0.51551 | 0.6420 |
| X2 does not Granger Cause DX5 | | 3.42252 | 0.1682 |
| X4 does not Granger Cause DX3 | 8 | 2.94221 | 0.1962 |
| DX3 does not Granger Cause X4 | | 0.40971 | 0.6961 |
| DX5 does not Granger Cause DX3 | 8 | 2.17350 | 0.2609 |
| DX3 does not Granger Cause DX5 | | 0.37503 | 0.7155 |
| DX5 does not Granger Cause X4 | 8 | 0.60001 | 0.6037 |
| X4 does not Granger Cause DX5 | | 2.41472 | 0.2372 |

As same, X4 is the Granger reason for X1; X2 is the Granger reason for DX3; X4 is the Granger reason for X2; X2 is the Granger reason for X4.

As a result, the historical data of containership 8,000 + TEU fleet growth has a

predictive effect on containership < 3,000 TEU order book % fleet; the historical data of containership (3,000-7,999 TEU) order book has a predictive effect on containership 8,000+ TEU order book % fleet and containership (8,000 + TEU) order book; the historical data of containership (8,000 + TEU) order book has a predictive effect on containership (3,000-7,999 TEU) order book.

# 5. Conclusion

## 5.1 Analysis Results

From the analysis results, the United States has almost occupied an overwhelming advantage over Japan in the container ship transportation market after the Japan-US trade dispute. Various container ship transportation indicators are positively related to Japan's imports from the United States, indicating that the United States has reached the purpose of launching tariff sanctions against Japan, and the shipping market is also completely changed according to the US import and export to Japan.

Looking at the current Sino-US trade conflict, the result is different from the Japan-US trade dispute. First of all, the import and export between China and the United States have an impact on the container shipping indicators, rather than the United States. Secondly, when the ship is getting larger today, the Sino-US trade conflict has a greater impact on the container ship transportation market. Most of the indicators have been impacted, indicating that Sino-US trade is more important to the world container shipping market.

## 5.2 Differences between Sino-US Trade Conflicts and Japan-US Trade Disputes and Their Influences on Shipping

Sino-US trade conflicts and Japan-US trade disputes have been separated by nearly

half a century. There are many differences between the two events, and the impact on the shipping industry is not the same. This part of the author will summarize the differences between the two events and their possible impact on the shipping industry.

### 5.2.1 Difference of World Situation

Between 1960 and 1990, there were seven trade disputes between textiles, color wars, steel wars, bus stations, exchange rate wars, semiconductor wars, and structural obstacles. It lasted for 30 years. In this historical period, the development of the world was generally the stage of unilateralism led by the United States. Political, economic, military, and diplomatic are all Americans. At present, with the adjustment of the world economy, politics, military, and diplomatic structure, the development of the European Community, the rise of China, and Russia have gradually stepped out of recession, forming regional and global countries such as the United States, the European Union, China, Russia, and the Middle East. Sexual multilateral confrontation and cooperation, globalization and multilateralism have become irreversible trends. It is impossible for the United States to control the flow of merchandise trade unilaterally. China has already countered US tariff sanctions and may turn to South American countries to import agricultural products, which will affect not only transatlantic routes but also many other routes. It is incomparable with the Japan-US trade dispute period.

### 5.2.2 National Differences

From the perspective of national space, Japan is an island country with a narrow geographical area, insufficient strategic depth, and limited space for self-development.

China is a territorial sea and a territorial power with large strategic depth and a large space for self-development. From the perspective of resource endowment, Japan is a resource-dependent country with import, export, and processing. The resource dependence is strong, the resource supply system is naturally lacking, the endogenous development momentum is insufficient, and the ability to resist pressure is weak. China is generally self-sufficient in resources. In countries with a full industrial chain and a global industrial system, except for a small number of resources and technologies that need to be imported, most resources and industries can be self-sufficient, with strong resistance to stress and self-healing capabilities. From the perspective of energy import dependence, Japan is a major energy importer. Oil security is mainly imported, and only one way of maritime transportation is easy to be blocked by the United States. China is the largest oil importer, but China's energy supply is multi-channel.

On the one hand, China is an oil-producing country. In 2017, crude oil production was 190 million tons, and imports were 420 million tons (of which Russia accounted for 14.2%). With Sino-Russian crude oil pipelines, Sino-Kazakhstan oil pipelines, Central Asian natural gas pipelines, The Myanmar oil and gas pipeline has been put into use one after another, and the import channel of China's crude oil land has increased, reducing the dependence on shipping. On the other hand, China has accelerated its energy strategy adjustment in recent years. Wind power, photovoltaic power generation, hydropower, and nuclear power have taken a multi-pronged approach. Electricity has shown an excess trend. China supports electric vehicle development from the national level. Electricity has replaced oil steadily expanding. The dependence is getting lower and lower. At the same time, China focused on energy breakthroughs, invested in the construction of Gwadar Port in Pakistan, landed in Kashgar, Xinjiang, and used Xinjiang as an estuary; promoted China-EU railway connectivity, enhanced land transportation capacity, and guaranteed large quantities of oil and gas to land by land transportation to Japan. Unmatched energy supply

advantage. These measures may also change the tanker industry to a certain extent.

### 5.2.3 Institutional Difference

Japan is a purely capitalist country. Maximizing profits is the eternal pursuit of the market. After World War II, Japan adopted a dominant economic system and gradually established a free competition mechanism based on market regulation. The government grasped economic and social plans and economic policies through market intervention. The decision-making power forms a government-led market economy, but it cannot break the monopoly economy based on the consortium. It cannot completely compensate for market failure. The state's regulation of economic development is effective but limited. China is a socialist country, following the decisive role of market allocation of resources and the unification of market allocation resources and government regulation mechanisms that better play the role of the government. Through the intervention of national strategy, China can effectively and effectively regulate the market, promote the adjustment of market relations, and reduce the spontaneous blindness of the market. That is the main reason for the limited impact of the 1997 Southeast Asian financial crisis and the 2008 global financial crisis on China's economy.

### 5.2.4 Trade Difference

Picture 3 New Orleans top 10 merchandises exports to China

Japan and the United States trade disputes the most intense in the 1980s, Japan's trade dependence on the United States is very serious. In 1985, Japan's exports to the United States accounted for 37% of Japan's total exports, accounting for more than one-third of Japan's total exports. From the perspective of trade relations, the trade relationship between Japan and the United States is characterized by competitiveness. Taking semiconductors as an example, from 1978 to 1986, the global market share of US semiconductors dropped from 55% to 40%. In the same period, Japan’s semiconductor market share increased from 28% to 46%. The competitive relationship is the main reason for US trade sanctions against Japan. From the perspective of Sino-US trade, China exported 15.33 trillion yuan in 2017, of which 2.91 trillion yuan was exported to the United States, accounting for 18.9% of total exports. The proportion is about half of Japan’s exports to the United States in 1985. The degree is relatively low. From the perspective of trade relations, China's trade with the United States is complementary. China's exports to the United States are concentrated in labor-intensive industries. The United States' exports to China are concentrated in technology-intensive industries and agriculture. The United States imposes sanctions on China's technology-based trade. At the same time, it will cause damage to US technology companies; China will impose sanctions on low-end manufacturing in the United States, and the United States will face upward pressure on inflation. In general, Sino-US trade relations are complementary and highly integrated. That is a great possibility to reflect that the Sino-US trade dispute cannot last forever. The change to the shipping industry should be short-term and medium-term.

Picture 4 San Diego top 10 merchandises imports from China


### 5.2.5 Exchange Rate Difference

In 1985, the United States, Japan, Germany, the United Kingdom, and other seven

countries signed a square agreement at the New York Plaza Hotel, forcing the yen to appreciate. Due to the wrong judgment of the Bank of Japan, from 1986 to 1987, the implementation of extremely loose monetary policy pushed up the Japanese stock market and house prices, causing the currency exchange rate to go out of control. From 1989 to 1990, Japan began to tighten monetary policy, and the inflated asset bubble burst instantly, causing the long-term sluggishness of the Japanese economy. China has implemented a market-controlled exchange rate system that is effectively controlled by the state. Also, as of March 2017, China's foreign exchange reserves of 3.14 trillion US dollars, the trade surplus has stabilized the scale of foreign exchange reserves, which can effectively resist external risks. Even if the United States intervenes in the RMB exchange rate, China can adopt a more independent, independent, and correct monetary policy than Japan, and the Chinese market is limited by the exchange rate and monetary policy. At the same time, China has raised its control and prevention of financial risks into a national strategy, and adjusted the "moderately loose" monetary policy to "appropriate and moderate monetary policy", treating both risks and risks, strengthening financial risks, internal control and financial supervision, and preventing and defusing financial risks. Local government debt risk, improving financial services, real economic measures, "completely able to hold the bottom line without systemic risks."

### 5.3 Research Conclusion

At present, the direct impact of the Sino-US trade conflict on shipping demand is limited.

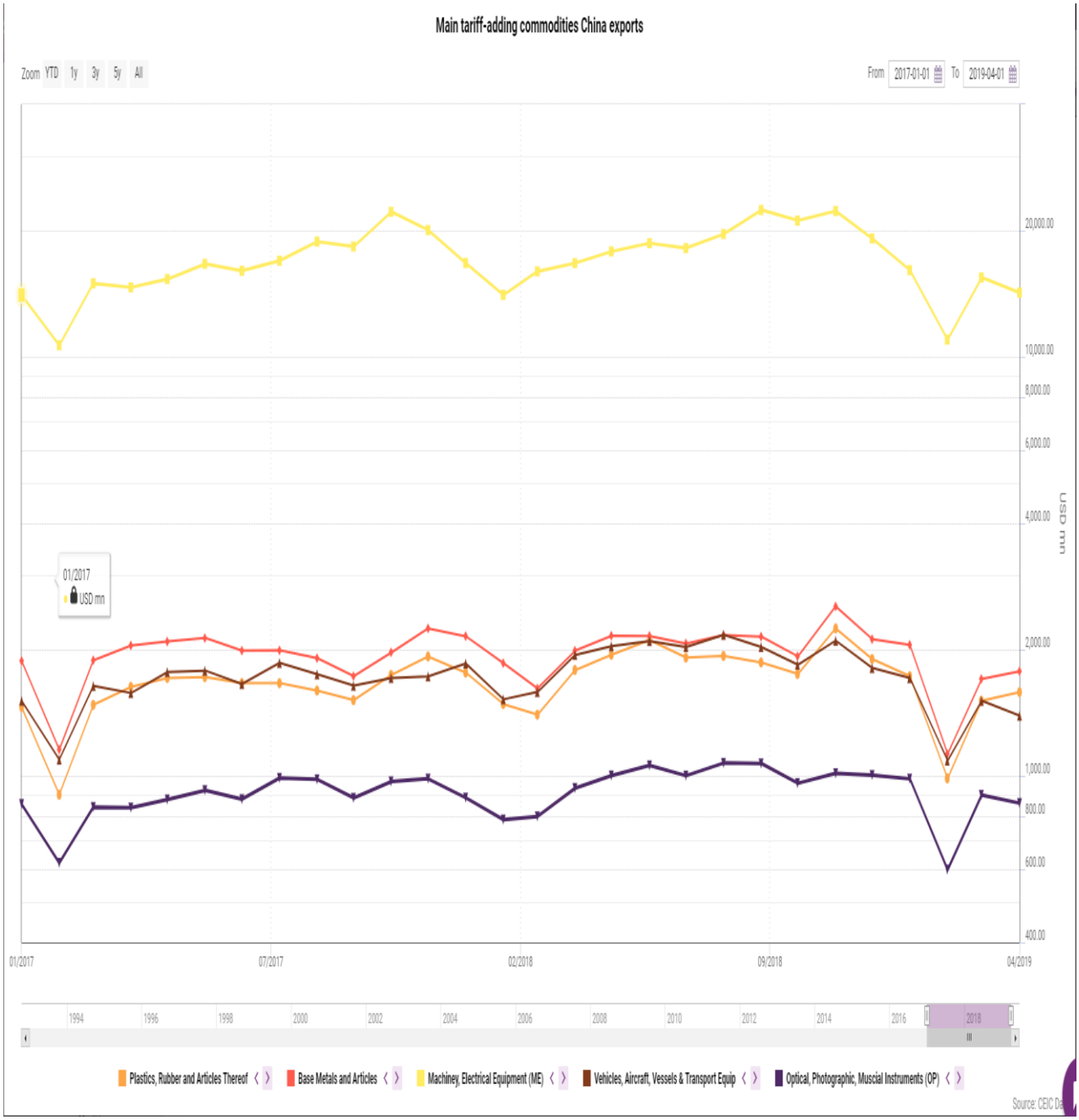
1) The current trade in commodities involves a small proportion of global seaborne

shipments. Taking into account the potential, the current trade war involves merchandise corresponding to only 3.9% of the total global shipping volume;

2) the commodities involved in the trade war are mainly imposed with tariffs, which theoretically will bring up the price of this part of the commodity, resulting in The corresponding demand has declined to a certain extent;

3) The situation of the Japanese-US trade war has not had a significant negative impact on the bilateral and global trade situation. However, if the trade war continues to deteriorate and has a certain negative impact on global economic growth, it may have an indirect negative impact on shipping demand.

Figure 11 Main Tariff-Adding Commodities China Exports




In the short term, Sino-US trade disputes will have a certain impact on the container shipping market. The total number of imports and exports of commodities involved in the increase in Sino-US tariffs has declined to some extent. The freight rate performance of the US line is bright. We believe that the main reason is that the US

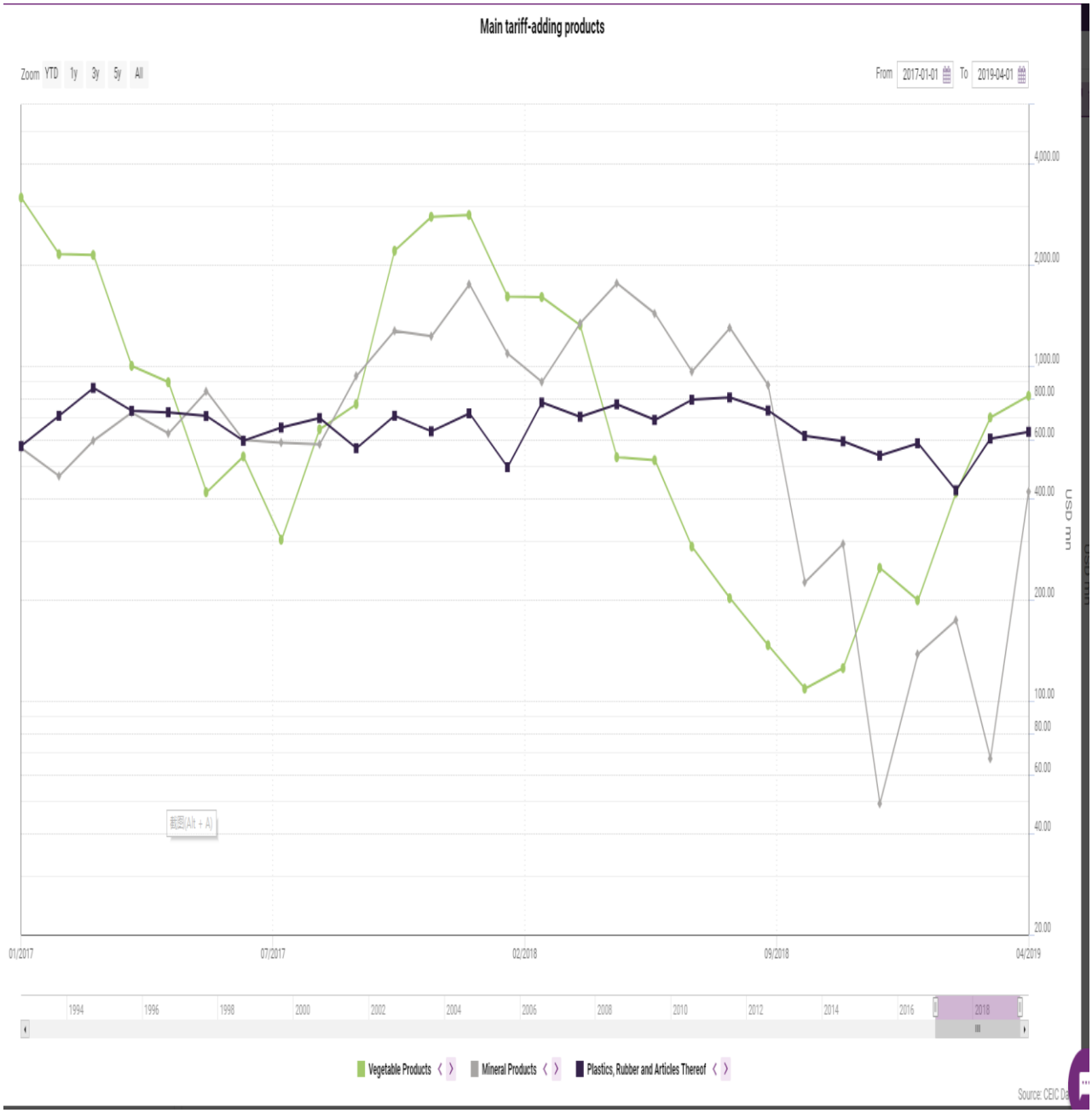
import demand is strong. In July 2018, container traffic in the Far East to North America increased by 6.7% year-on-year, an increase of 2.2 percentage points over the same period of last year. That is because the US economy is better, and there is also the possibility of a trade war between China and the United States. The advance shipment of goods will bring demand to the front.

On the other hand, the Sino-US trade war has the most direct impact on the US line. Concerns about the war, some of the shipping companies in the peak season, but reduced the capacity configuration of the US line, the three major shipping alliances have canceled a US West route, it is estimated that the US West Line capacity reduced by about 4-5%. The performance of the US line market reflects a substantial increase in the concentration of the container shipping market. The control of the supply company has been strengthened. Even if the Sino-US trade war has indeed impacted the demand of the US line, the shipping company can adjust the supply. To a certain extent, the freight rate is stabilized, and the capacity that has been withdrawn can be invested in other markets, or it can be withdrawn through the form of rent retreat and dismantling.

In the medium term, the supply growth rate of the shipping industry will continue to slow down in the next year, the peak season in the third quarter will perform well. In general, it is expected that the market is expected to continue upward in 2019-2020 and continue the recovery.

In the long-term, the demand-side trade war will accelerate the transfer of Chinese industries and support the medium and long-term demand for shipping; Compared with the historically low level, the international environmental protection policy is tightened, and the dismantling of old ships is expected to accelerate in the future. There are positive factors in both the demand side and the supply side.

Figure 12 Main Tariff-Adding Products China Imports




Looking to 2019, box trade is expected to grow by a still relatively healthy 4.4% in the 'base case', however risks are building and a much 'lower case' scenario exists comprising the potential for escalation of US-China trade tensions to impact the Transpacific trade (although there remain uncertainties surrounding the impact of

tariffs on short-term demand sentiment, the sensitivity of demand to tariffs impacted pricing and the potential for substitution by other trade flows), slowing Far East-Europe trade volumes, and challenges in some emerging economies. On a more macro scale, there remain positive trends which appear likely to help support box trade growth in the longer term, including firm growth in the developing world and aspects of China's 'One Belt, One Road' program.

## 5.4 Research Shortcomings

Limited by the data that can be collected, the specific quantity of the tariff-improved products imported and exported by China and the United States cannot be obtained. Therefore, the total import and export volume of China and the United States is selected as the independent variable of the model. On the other hand, because the model is relatively simple, it cannot be the complete expression of each dependent variable parameter is affected by the independent variable. Generally speaking, the trade disputes of the two most important countries in the world have a certain influence on the shipping market, but the analysis results of many dependent variables in the model are meaningless. I think it is affected by the accuracy of the data and the limitations of the model. So that the final result does not fully reflect the key to the problem. In the stationarity test, since the time series of historical data of Japan and the United States is too short, it is impossible to check the stationarity.

## 5.5 Outlook

The first is uncertainty. BIMCO recently pointed out that the trade war has brought painful uncertainty to the shipping industry because it has distorted the free flow of goods and changed the trade channel, making it difficult for shipping companies to effectively locate ships in the market. The general manager of a freight forwarding company in China said that some large liner companies had announced the closure of some Pacific routes due to the recent Sino-US trade war. It is expected that in the next few months, import and export enterprises that are mainly engaged in the US market will be greatly affected, and import and export enterprises will seek more alternative products from Canada, South America, and other countries and regions, resulting in the freight volume of such routes. It is possible to increase. Second is or will affect the industry recovery. In the container shipping market, the liner company has reached a consensus on the capacity of the market after integration, and the freight rate that has been deviating from the value will eventually approach the normal range. If the Sino-US trade war is fully upgraded, the United States will expand the list of tariff-seeking products to low-value-added goods, which will bring the dual pressure of freight and freight rates to the liner companies, which will break the momentum of the recovery of the container market cycle. As the downward trend continues to advance, the container shipping market will spread to the bulk and oil transportation markets, which will further affect the entire shipping market.

Finally, I hope that this Sino-US trade conflict will soon reach a consensus, not to repeat the results of the Japan-US trade dispute, so that the global integration of trade will continue smoothly.

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