

# THE IMPACT OF THE CONCENTRATION RATE OF THE INTERNATIONAL CONTAINER LINER MARKET ON CHINESE CONTAINER FREIGHT INDEX

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**Keywords:** Container liner market, Market concentration rate, CCFI.

**Abstract:** At the beginning of the 21st century, a wave of company merging was stirred up in the global container liner market. The relationship between market concentration and China container freight index (CCFI) was analyzed through economic theory from the year 2000 to 2005 when container liner freighting industry reached the high point of the merging wave. It was found that the increasing market share of the top 20 shippers did not affect CCFI to some extent. But the high degree of monopoly had impaired the fairness of shipping market and also affected the free competition of Chinese shipping market. Some policy suggestions were given to deal with the potential mergers.

## 1 INTRODUCTION

In recent years, the role of independent carriers in shipping market has become more and more important along with as the containerization and globalization of liner transport. The wave of merger and consortium was raised by the large liner corporations all over the world which made the market concentration of container market continuously rises. Three important merger cases around 2005 resulted in the capacity of the top twenty liner corporations increase to 82.5 percent. Although this figure fluctuated in 2006, it was 79.92 percent in 2009, only decreasing a little. But the latest data show that the year growth rate of the capacity of the top twenty liner corporations is 14 percent. So it may be a signal for a new round of merger and consortium.

As a major international trading nation, China has contributed a lot to international container liner shipping since the trade volume continuously increases for the past few years. Meanwhile, it makes Asia-Pacific area a market which is fought for most furiously by the large container liner corporations in the process of merger and consortium. Comparatively speaking, the merger and consortium may influence Chinese container transport market. We studied the relationship

between the market concentration of the global container liner market and China container freight index and proposed some suggestions to deal with the new round of potential merger.

## 2 MARKET CONCENTRATION OF THE GLOBAL CONTAINER LINER MARKET

Market concentration is the comparative scale structure possessed or controlled by buyers or sellers in a certain specific industry or market. It can be measured by absolute concentration, relative concentration and Herfindahl-Hirschman Index.

### 2.1 Market Absolute Concentration Rate

The market concentration rate discussed in this paper is referred to the comparative scale structure possessed or controlled by freight capacity providers who are the actual carriers and denoted by the market absolute concentration rate  $CR_m$ , i.e. the sum of market shares of the top  $m$  corporations in the global container liner industry. The concentration status from 1997 to 2009 is shown in Table 1.

Table 1: Market Concentration Rates of International Container Liner Shipping Market from 1997 to 2009.

Year	CR4	CR8	CR16	CR20
1997	17.04%	30.25%	45.67%	50.69%
2000	22.97%	34.49%	50.10%	50.69%
2001	28.50%	43.70%	63.00%	69.90%
2002	30.40%	45.50%	65.40%	72.00%
2003	31.10%	46.20%	66.60%	74.10%
2004	30.90%	46.80%	68.00%	76.20%
2005	37.10%	51.60%	72.10%	79.40%
2006	38.30%	53.50%	74.80%	80.90%
2007	39.80%	56.42%	79.20%	85.40%
2008	39.17%	55.05%	77.20%	82.90%
2009	41.16%	53.39%	72.98%	79.92%

From Table 1 we can see that the market concentration rate CR20 of international container liner shipping market changed from 50.69 percent in 2000 to 79.92 percent in 2009. The index increased rapidly during 2000 to 2007 and dropped from 2008 subject to the economic crisis. But totally it can still be made out that big and small liner companies were constantly conducting merge and integration since 2000.

## 2.2 Herfindahl-Hirschman Index

Although the absolute market concentration rate can reflect the market share of the largest corporation in the market, it cannot sufficiently reflect the internal scale structure within the largest corporation. Herfindahl- Hirschman Index emerged at the right moment. It is the sum of squares of all the corporations' market shares, denoted by the equation as following.

$$\begin{cases} HHI = \sum_{i=1}^m S_i^2 \\ \sum_{i=1}^m S_i = 1 \end{cases}$$

The value of HHI is usually multiplied by 10000, therefore between 10000/m and 10000. The higher the value of HHI that the higher of market concentration rate. This index is very sensitive to the market share variation of the larger scale corporations and the comparative adjustment of scale structure of larger corporations.

We calculated the values of HHI of the international container liner shipping market from

2000 to 2009 according to the market shares correspondingly. The market shares of all the corporations in the market are needed to calculate HHI while the market shares of many small shipping corporations cannot be achieved. The market shares which cannot be achieved are very small and influence total HHI very little after being squared. Therefore, we used the market shares of the top 20 corporations in the international container liner shipping market to calculate HHI. The values of HHI of the international container liner shipping market from 2000 to 2009 are shown as Table 2.

Table 2: HHI of the International Container Liner Shipping Market from 2000 to 2009.

Year	2000	2001	2002	2003	2004
HHI <sub>20</sub>	222.82	351.97	375.22	394.41	410.56
Year	2005	2006	2007	2008	2009
HHI <sub>20</sub>	576.74	573.21	605.79	583.61	609.72

The HHI of the international container liner shipping market has been on the rise from 2000, especially in 2005 after P&O Nedlloyd Ltd. was acquired by the A. P. Moller-Maersk Group (Maersk). So the acquisition of Maersk influenced the structure of the international container liner shipping market strongly.

## 3 THE RELATIONSHIP BETWEEN CONCENTRATION RATE AND CHINA CONTAINER FREIGHT INDEX

### 3.1 China Container Freight Index

Chinese foreign trade especially the export trade has developed rapidly since the reform and open policy was implemented. But in foreign trade especially the export trade Chinese corporations usually use FOB trade terms, i.e. buyers are responsible for booking shipping space while buyers usually choose the liner shipping corporations of their own countries or international famous corporations such as Maersk Sealand and Mediterranean Shipping Company. Therefore, the wave of merger and restructuring of international large liner companies certainly will impact on Chinese trade transportation market especially the export trade transportation market.

China Container Freight Index, CCFI for short, is formed by Shanghai Shipping Exchange every Friday based on the export container freight price on Jan 1st 1998. The base is designated as 1000. According to the weekly data released by Shanghai Shipping Exchange, the annual average data of CCFI from 2000 to 2005 is compared by Figure 1.

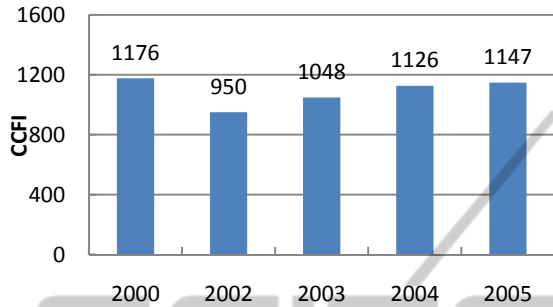


Figure 1: Annual Average of CCFI from 2000 to 2005

From Figure 1 it can be seen that CCFI dropped drastically from 2000 to 2002 but have risen since 2002, not larger than the value in 2000.

### 3.2 CCFI and CRm of the International Container Liner Shipping Market

The market concentration rates of container liner market from 2000 to 2005 are shown by Figure 3.

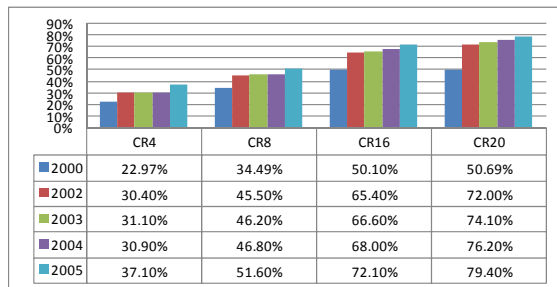


Figure 2: The Market Concentration Rates of Container Liner Market from 2000 to 2005.

From Figure 2 it is can be seen that the concentration rates of container liner market went steadily upward from 2000 to 2005 except for a little decrease in 2004. Integrated the values of CR8, CR16 and CR20, we can also draw the conclusion that the concentration rates of container liner market tends to grow from 2000 to 2005.

Without regard to the influence of other factors such as social economic situation, trade volume and

fuel prices and ignoring the yearly variation of CCFI, here we think the big variation of CCFI is caused only by the concentration rate of container liner market. Then the situation of container liner market is fit for the theory of industrial organization i.e. SCP paradigm except for the abnormal condition in 2000.

The market concentration rate was low while the freight price was high in 2000. The reasons may be as following.

1) When CR8 is less than 45 percent in container liner market and the whole industry is in the period of atom type, increase of market concentration will cause CCFI fall because the freight price of container liner market is determined by cost plus pricing. During the period when the market concentration increase within a certain extent, scaling up and reasonable integration of major corporations certainly cause their operations cost drop for the natural monopoly industry. So the price based on cost will drop undoubtedly.

2) When CR8 is no less than 45 percent in container liner market and the whole industry is in the period of medium/low concentrated oligopolistic type, increase of market concentration will cause freight price increase because the numbers of corporations in the market reduces and the market share of major shipping corporations increases so that they have stronger monopoly power and more ability to affect the price. Regarding to the influence of monopoly power of monopoly corporations based on the cost plus pricing, then the price in the shipping market was led to increase.

### 3.3 CCFI and HHI of the International Container Liner Market

The values of HHI of Container Liner Market from 2000 to 2005 are shown by Figure 3.

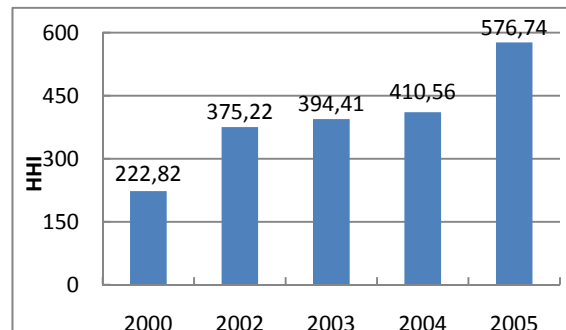


Figure 3: HHI of Container Liner Market from 2000 to 2005.

Comparing Figure 4 and Figure 2, we can draw the conclusion similar to the analysis of CRm that the values of HHI from 2000 to 2002 shows the concentration rate of the shipping market increased rapidly while the shipping price dropped greatly. As the concentration rate of the shipping market increased from 2002 to 2004 the shipping price also increased, fitting for the SCP paradigm.

#### 4 THE RELATIONSHIP BETWEEN CONCENTRATION RATES AND THE MODIFIED CCFI

The market concentration is not the only factor that influences the liner shipping market in the reality. The relationship between supply and demand is the key factor affecting market price.

The most influential factor of the demand in the container liner shipping market is still international trade volume which is affected by many factors including the global economic development and changes. In the rising period of global economy the international trade is prosperous so that the shipping market grows prosperously. Seasonality is another major factor influencing the international trade volume. In China, the period from July to October is the boom of trade because of the suitable climate for production and working. So the situation of the shipping market is comparatively better. Moreover, the factors impacting on the international trade volume and further on the shipping market contain trade barrier, intellectual property protection and appreciation of the RMB, etc.

Major influential factors of the supply in the container liner shipping market include global fuel price and technology level besides the market concentration we have mentioned. Particularly the effect of fuel price should not be underestimated. For example, the hurricane of the Mexico Gulf severely damaged the production of petroleum in 2005 and brought about huge panic to petroleum market. The price of crude oil futures once surged to 70 dollars for one barrel. It influenced the shipping market greatly.

Therefore, we cannot simply compare the trend of CCFI and the concentration rate of the container liner shipping market in order to study the effect of the concentration rate on CCFI. We need to eliminate the other major influential factors of CCFI

and then compare it to the concentration rate of the container liner shipping market.

The primary factor influencing CCFI is global economic factors. The lowest points are around the first period in 1998 and the 51st period in 2002 when the global economy was in trough while the rising periods of CCFI including the 26th to 31st periods in 2000 and the 61st period in 2003 were the times when the global economy took a turn for the better. And from Figure 1 we can see that CCFI had obvious seasonality in a year. So eliminating the large fluctuation brought by the great depression and excessive booming of an economic cycle and the periodic wave brought by the seasonal factor, we get to know that CCFI tended to drop for a long term.

After eliminating the economic cycle, seasonal cycle and other instable factors, we think the decreasing trend of CCFI was influenced only by the global fuel price and the concentration rate of the international liner market. The trend of global fuel price can be reflected by Singapore high sulfur fuel oil which is presented by Figure 4.

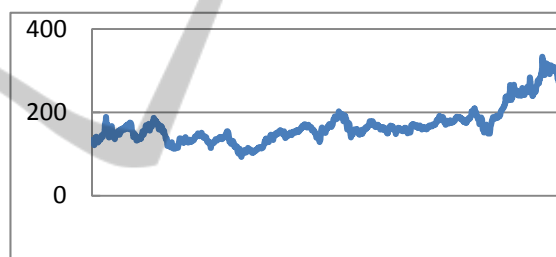


Figure 4: The Trend of Price of Singapore High Sulfur Fuel Oil from 2000 to 2005.

From Figure 4 it can be seen that the general trend of Singapore HSFO was increasing from 2000 to 2005. The increasing fuel price would necessarily result in the increase of the liner shipping cost and the price. But CCFI presented a decreasing trend for a long term. This phenomenon illustrates that the trend of CCFI was caused by the concentration rate of the international liner market. So we can find out the relationship between the concentration market and CCFI. CCFI decreased as the concentration rate CRm increased. That is to say, the merger and reorganization of the international liner corporations led to the drop of CCFI. This conclusion contradicts to the theory of industrial organization. The contradiction can be explained by the following.

The resource integration and technology improvement brought by the mergers made the cost of liner shipping corporations lower. For the years of

2004 and 2005, although the market concentration rate CR4 was close to 40 percent and CR8 close to 80 percent the whole industry was not affected by the major corporations. When the merger and reconstructing constantly happened the shipping capacity and resources could be integrated better and preferable technology be applied widely. The cost of container liner shipping industry was reduced and then resulted in the decrease of the price in the whole shipping market. But this cannot reject the situation that the monopoly of liner shipping corporations grows as the concentration rate increases further and the price in the shipping market increase again.

The decline and perish of liner society made the power of industry market weaker. The liner society played a monopoly role in the shipping market since the 1870s through many policies such as common freight rates, unified operations arrangement and united service to make the shipping liners a huge cartel. The market concentration rate was much higher than that calculated by the market shares of the corporations in the market because of the existence of the liner society. In the 1970s the power of the liner society began to decline but still affected some ship routes especially the Far East route. In the end of the last century the decline of liner society was intensified. The European Community abolished 4056/86 regulation providing immunity of anti-monopoly for the liner society on Sep.25 2006 so that ended the special status of the liner society from the legislation point. During the period of perishing, the monopoly power was weakened constantly and the market concentration rate contributed by the liner society also decreased. Therefore, it can explain the reversing change of the concentration rate and the price in the liner market.

## 5 POLICY SUGGESTIONS

In order to deal with a new wave of merger possibly emerging at all times, Chinese government should take some measures to impose restrictions on them and ensure the fair competition in the market so as not to waste social resources. Meanwhile, the domestic shippers can be protected and the profit space can be preserved. The specific policies include three aspects as following.

1) To adopt CIF or CFR and the similar trade terms in the export trade. It is estimated that 80 percent to 90 percent of the trade volume use FOB

trade terms with which the foreign purchasers appoint freighters. The export trade plays a leading role in Chinese international trade. Therefore, the power of the shipping corporations like Maersk possessing large market share in China will be strengthened further thus influence the freedom of Chinese shipping market if we do not change the situation of using FOB trade terms in the export trade.

2) To support domestic shipping corporations. The fundamental goal of restricting the monopoly power is to increase market competition in order to make market resources allocation optimized. So we need to support domestic shipping corporations to contend against the major international corporations and forming the situation of multiple pillars confrontation to optimize resources according to the theory oligarch competition.

3) To formulate anti-monopoly policies. The government should draft anti-monopoly policies correspondingly to realize macro control and ensure well-organized operations of Chinese shipping market.

## 6 CONCLUSIONS

The following conclusions about the influence of shipping market mergers on Chinese export container market can be drawn through the study in this paper.

In recent years the market concentration of the international container liner shipping market has continuously risen as the merger and consortium of the large international liners happened.

CCFI appeared increasing gradually between 2000 and 2005, excepting for a little decrease in 2002. But after economic cycle and seasonality eliminated, CCFI tended to decrease for a long term.

The mergers of international liner shipping corporations influenced Chinese export container shipping price in two ways. Firstly, the mergers made the market concentration rate of Chinese liner market rise and the monopoly power of international liners in Chinese shipping market strengthened. Secondly, the mergers made scale economy play a part in reducing the shipping cost with more effective technologies and management methods.

For the administrators and regulators of Chinese shipping market should make relevant policies to ensure the market develop healthily and well-



organized. The policies include encouraging to adopt CIF or CFR and the similar trade terms in the export trade, supporting domestic shipping corporations and formulating anti-monopoly policies.

The merger of international shipping corporations especially the liner shipping corporations is in no sense dreadful or panicky. It is an edged sword with the bad edge to form market monopoly and the good edge of scale effect. Only if the administrators of the industry utilize policies well to supervise and guide can the merger of shipping corporations play its good function and avoid its shortcomings.

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