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WORLD MARITIME UNIVERSITY

Malmö, Sweden

**REREARCH ON IMPACT OF COVID-19 ON
CHINESE INTERNATIONAL SHIPPING
COMPANIES AND COUNTERMEASURES**

By

XIAORU DONG

China

A dissertation submitted to the World Maritime University in partial
Fulfilment of the requirements for the award of the degree of

MASTER OF SCIENCE

In

MARITIME AFFAIRS

(INTERNATIONAL TRANSPORTATION AND LOGISITICS)

2021

DECLARATION

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

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

Name: Xiaoru DONG

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Supervised by: Prof. Chuan ZHANG.

World Maritime University

Acknowledgement

First and foremost, I would like to thank the faculty and staff of the World Maritime University for their support, help and encouragement throughout my academic years.

Deep appreciation to my supervisor, Professor Chuan ZHANG; without her endless optimism, enthusiasm and encouragement, this paper would be difficult to complete.

Then I am grateful to Professor Xin SHI, the person in charge of the International Transportation and Logistics (ITL) Shanghai Program, for his valuable guidance and great efforts to provide endless help and suggestions on the completion of this research.

Moreover, it is necessary to give my sincere thanks to Daisy ZHANG, who constantly and persuasively conveys the spirit of dedicating on our own works, which is the most amazing thing in the whole life.

Finally, I would like to express my profound appreciation to Professor Dong-Wook Song, who has expanded my knowledge, helped me observe the shipping world in a view of part of global supply chain, and knocked my awareness to care about own country as well as the world. His guidance and support have been invaluable to my personal growth.

Of course, this acknowledgement would not be complete without thanking my family and friends, who supported me throughout my studies, and all who were not mentioned but, in their special ways to help me finish this dissertation.

Abstract

Title of Dissertation: **Research on Impact of COVID-19 on Chinese Shipping Companies and Countermeasures**

Degree: **Master of Science**

This study would like to contribute to multiple related fields. First of all, in the context of economic crisis caused by COVID-19 pandemic, a growing number of literature focused on macro-perspectives to explore and analyze factors, consequences, relations and countermeasures. Only a few of paper focused on the impact of the COVID-19 outbreak to microeconomic units, the firms.

KEYWORDS : COVID-19, Impact, International Shipping Companies, Financial Flexibility, Performance Measurement, Operational Risk, Financial Risk,

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WORLD MARITIME UNIVERSITY

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Title of Dissertation: Research on Impact of COVID-19 on Chinese International Shipping Companies and Countermeasures

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This completed form is to be submitted to the faculty Assistants (Daisy or Jie ZHANG, as at 10th July 2021.)

CHAPTER 1: INTRODUCTION

Background Context

At the end of 2019, an unknown virus was creeping in Wuhan of China and firstly confirmed as one of the coronavirus group, meanwhile, it was given a name which is a novel SARS Coronavirus (hereinafter as *SARS-CoV*) (Sohrabi, et al., 2020). That was the first case reported in Hubei, China, and at that time, however, the virus was not known until 7th January 2020, then, it was formally named severe acute respiratory syndrome coronavirus-2 (*SARS-CoV-2*). Later, the World Health Organization (WHO) announced this disease as coronavirus disease 2019 (COVID-19), and upgrade it to a Public Health Emergency of International Concern (*PHEIC*) on 30th January 2020. The public health emergency is usually referred to (Wang & Zhang, 2020):

- 1) The major infection epidemic which occurred suddenly and may cause a series of damage to the public health;
- 2) The mass diseases of uncertain etiology;
- 3) The serious food poisoning.

The novel coronavirus is known for its high infectivity, which was evidenced after this newly reported group of viruses spread out whole mainland in China just with an impressive speed. And it is exactly due to this feature, the action or order at the beginning of the epidemic took by governments was usually travel limitation for citizen or people. Although, compared with the normal SARS virus, the novel SARS-Cove is considered less fatal, there is also a survey report shows that the proportion of deaths nearly reaching at 2.5% among all cases (Xu, et al., 2020).

As of 14th March 2021, there have more than 119 million cases been confirmed, with nearly three million of deaths attributed to COVID-19, making it one of the deadliest pandemics in history (Fig.1).Subsequently, more and more countries as well as regions issued immigration-control regulations along with setting up strict standards of entry and quarantine inspections for preventing those infected or potentially infected

personnel to come in or out (Fig.2).

Figure 1: Daily Increased New Cases and Stringency Index of COVID-19 in China

Source: Oxford Coronavirus Government Response Tracker

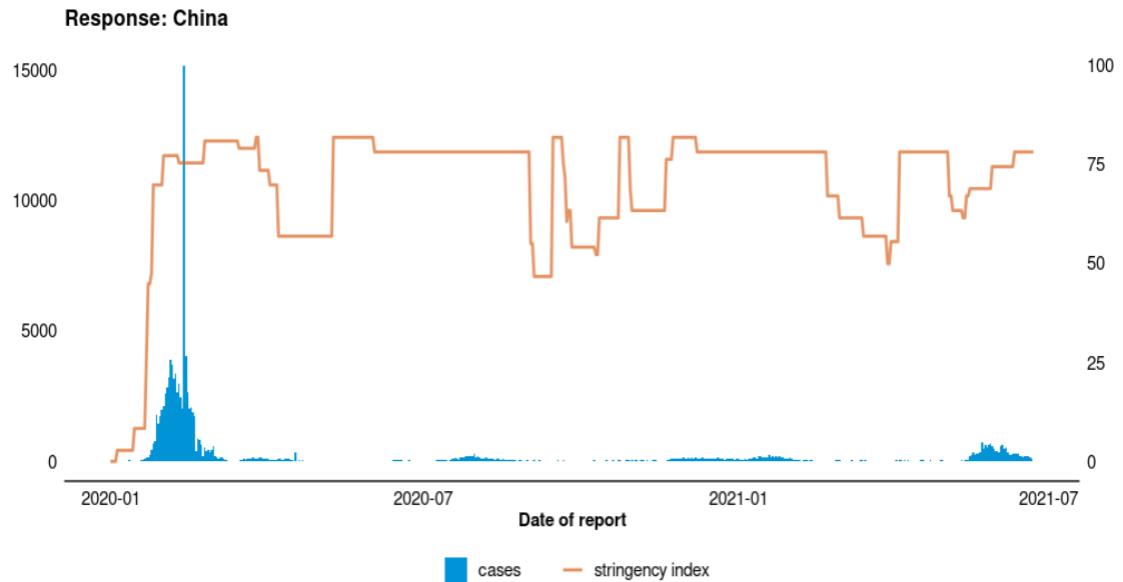
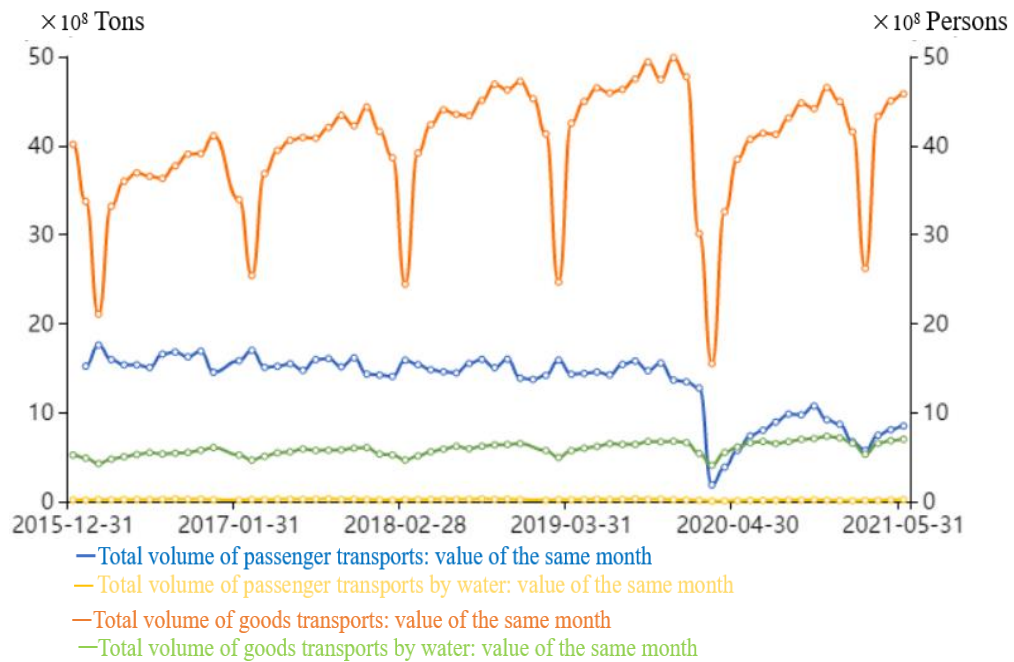


Figure 2: Total Passenger and Freight Volume from 2015/12/31 to 2021/5/31

Source: iFind Financial Data Terminal



Because the coronavirus pandemic (COVID-19) is caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), this kind of viruses were previously linked with several major diseases' outbreaks and accounted for nearly 15% of worldwide common diseases (Perlman S., 2009). At present, a novel coronavirus emerged in the end of 2019, and till this day, that leads the ongoing pandemic all over the world and also becomes a headache to many politicians and entrepreneurs(Rodriguez-Morales, et al., 2020).

Due to the worldwide outbreak of the COVID-19 pandemic, the manufacturing came to a standstill (Fi.3), the purchasing demand was frustrated, and the global trade activities as well as supply chains were disrupted, accordingly, all of which have heavily hit the shipping transportation. While the shipping companies, as a vital unit of the whole industry, were the first to be affected. Therefore, by analyzing the impact of COVID-19 on Chinese shipping enterprises, managers can target to the critical factors which can assist them to formulate more effective strategies and guide them to make more proved decisions, and those can help shipping enterprise step out of the influences of epidemic crisis earlier.

Figure 3: Purchasing Managers' Index (PMI) in China from 2016/1/1 to 2021/6/1

Source: iFind Financial Data Terminal



Impact of COVID-19

It shown that an exogenous event strongly affects cash flows in shipping companies, but literatures pay little attention extensively on event studies. Therefore, to fill in the blanks, this paper will focus on the analysis of how this pandemic impact on the shipping company operations and the suggestions for them.

The unique replication mechanism of coronavirus enables them to have high rate of infection. In 2003, severe acute respiratory syndrome (SARS) broke out and then quickly spread across the world, which spread as fast as context of COVID-19. Because of their highly contagious and limit studies of SARS-CoV-2 treatment solutions, governments cannot help but suggest people to reduce traveling and entertainment to avoid all possible routes of viral transmission.

On 11th March 2020, the COVID-19 was specified as a pandemic by WHO , after that, there are more and more states had issued regulations of staying at home and pausing non-essential business operations. The Stay-at-home orders continued to be implemented through April 6th, and most orders were extended through May 15th or May 30th (2021). These COVID-19 related shutdowns impacted small businesses leading to business closures and employee layoffs. For every three new hires, ten layoffs occurred. According to the Atlanta Federal Reserve survey, 70% of the businesses requested some form of financial assistance from a bank, family, friends, or other sources. Only 45% of small businesses surveyed by National Federation of Independent Business (NFIB) reported in July 2020 that they were operating above 75% capacity; 55% of businesses were operating at or below 75% capacity compared to pre-pandemic levels.

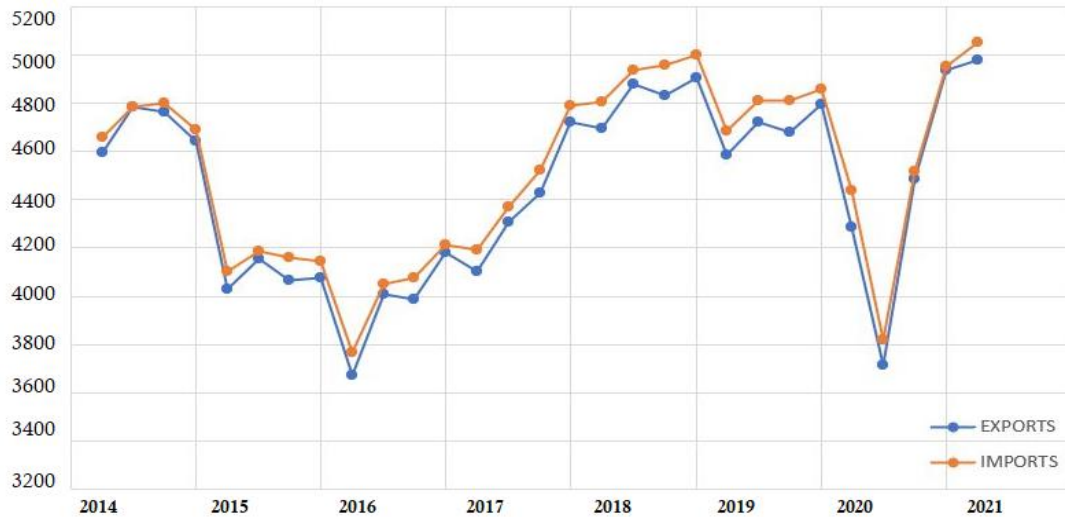
In January 2020 the majority of confirmed COVID-19 cases were in China, with countries outside China less affected by the outbreak. There have been 262 new deaths, all of those are in China. Then came to 16 January, confirmations of COVID-19 have been reported on all continents since, with South America the last of the five continents to have confirmed cases. So far, all five continents have been affected. China still had

the world highest number of new confirmed cases in February. Europe had the largest number of new diagnoses after Asia, with Italy accounting for the largest proportion. In March, there were major changes in the global epidemic situation. North America was the continent with the largest number of newly confirmed cases. Up to April, the epidemic in China has gradually stabilized, with both the number of newly confirmed cases and the number of new deaths tending to be at a relatively low level. New confirmed cases in Asia have also declined as the outbreak in China has been brought under control. North and South America have been the hardest hit, with large outbreaks of confirmed cases in the United States and Brazil. Throughout the first half of 2020, the global epidemic situation fluctuated relatively high. Two peaks occurred in February and May, with the other months accounting for the largest proportion of new diagnoses.

COVID-19 quickly outbroke around the world, it has had an impact on global economic and trade activities, also on shipping transportation, which is the most important part of global seaborne trade as well as the global supply chain (SC), has also been hit by the epidemic. As COVID-19 is an ongoing pandemic, the most of industries will be covered under a prolonged economic downturn, also, the shipping businesses, due to their critical roles in the global supply chain, must prepare to fight a long-term war with this pandemic. The impact of the epidemic directly on economic growth, since this outbreak occurred before the Chinese Spring Festival, which has had a negative impact on consumption side (Fig 5).

Figure 5: World Total Merchandise Exports / Imports - Quarterly (Billion US Dollars) from 2014 Q1 to 2021 Q1

Source: iFind Financial Data Terminal



And many enterprises have been unable to start production on time and production orders have been cancelled due to the pandemic, that is why freight rates have in different degrees dropped in major segments (Fig 6 & 7).

Figure 6: BDI, BCTI and BDTI from 2016/01/01 to 2021/05/01 (Line Chart)

Source: iFind Financial Data Terminal

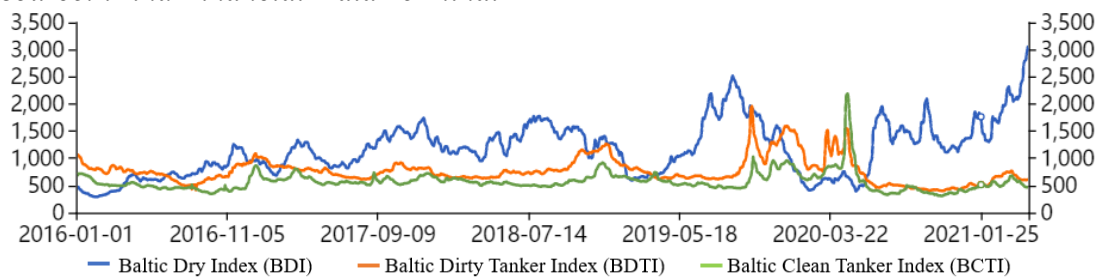
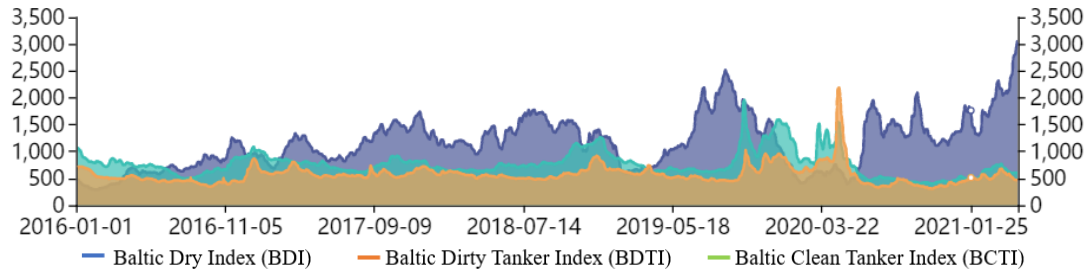


Figure 7: BDI, BCTI and BDTI from 2016/01/01 to 2021/05/01 (Area Chart)

Source: iFind Financial Data Terminal



Research Objects and Periods

In this paper, when studying the performance of the shipping industry, listed companies in Chinese A-share shipping industry are selected as the samples for performance evaluation and analysis, mainly consists the following reasons:

First of all, taking the total shipping capacity of China's container market in 2014 as an example, the C-scale reached 73.30%, and the freight volume concentration of listed companies within the time range studied in this paper also reached 50%. The shipping industry is an oligopolistic and cyclical industry.

Secondly, listed companies are the leading firms of state-owned enterprises to be listed, which are more representative.

Finally, because the performance analysis and evaluation is based on data, given the availability of the data and the integrity and the listed company on annual report and financial statements to the outside, can search data with data as a result, this paper takes the listed company of our country as a market performance effect of the sample to make qualitative and quantitative analysis, will be shipping the performance of listed companies as the industry performance

In the *Sina financial database*, there are totally 10 listed companies (as of 1st May, 2021) in the A-share *shipping II* section (*Shen Yin Wan Guo Industry Category*): *COSCO Holdings*, *COSCO Specialized*, *Ningbo Marine*, *COSCO Development*, *China Merchants Shipping*, *Nanjing Energy*, *COSCO Energy*, *Bohai Ferry*, *Chang Jiang*

Phoenix Shipping and Strait Marine.

However, due to the limitation of the research objectives, in this paper, Bohai Ferry and Strait Marine are both engaged in passenger transportation, so that they are not included in this research samples.

The time span of this study is from 1st January 2016 to 31st March 2021. And in this dissertation, it would include two time periods: mainly objective interval and sub-period. So the period from 2016-01-01 to 2019-12-31 is the period seen as the *Pre COVID-19*, while the period from 2020-01-01 to 2021-03-31 is the main period of *COVID-19*.

Shipping Industry

The shipping is not exactly a production department as manufacturing industry, strictly speaking, the shipping industry is a service-and-production department that carries passengers and goods across water by ship and thus need to build ships and relative facilities to support such service. But the shipping is mainly and usually regarded as operation that directly engaged in service of transportation, so that from the narrow sense, the shipping industry is essentially a service industry (Chen, 2007).

Shipping, whose ability is to offer cost-effective and relatively efficient operation mode for long-distance transport puts it at the centre of the global trade and economy. Such capacity of shipping to transfer materials and/or goods from places of production to places of sale underpins contemporary world (2021). Moreover, every year, nearly 2 billion tons of crude oil, 1 billion tons of iron ore and 350 million tons of grain are carried by ships, and there is no possible to transport these goods via road, rail or air. As the nature of those cargo shipped by sea, people or even countries need them to continuously add value and finally can output higher valued products, which is the lifeblood of a country to develop and prosper, also the gateway of a person to make a fortune. Therefore, not only for a single individual but also for a country, the shipping industry can be called as a ‘throat’ to prosperity.

International Shipping

A little different from the general shipping and the coastal shipping, the ocean shipping usually consists of those transoceanic shipments, namely, the cargo carriage is at least between two continents, so that it must be completed across sea and oceans by ships, by contrast with the coast shipment to carry goods within one continent or even only one country.

Accordingly, those firms who are engaged in ocean transportation via their owned or employed vessels are regarded as ocean-shipping companies or international shipping companies. As the main objectives are international shipping enterprises, hence, this paper excluded general shipping, coastal shipping, inland-water transport firms, as well as ports and shipyards, accordingly.

As Chen (2007) had concluded, the shipping enterprises generally had three characteristics, and based on these, this paper would like to give the features of international shipping companies.

1) Diversity of operation activities – Complex and Unstable

From the point of big, there are weather factors and ocean current can be varied; from the point of small, the master along with the cargo status could also be different for each time. Hence, such complexity can bring a lot of potential risks and damages to a international shipping enterprise.

2) Long-distance Shipment – Remote and Uncertainty

Same with the character of complexity, because operational activities are usually based on the long distance, then such remote would offer more uncertainties and unpredictability to their shipments.

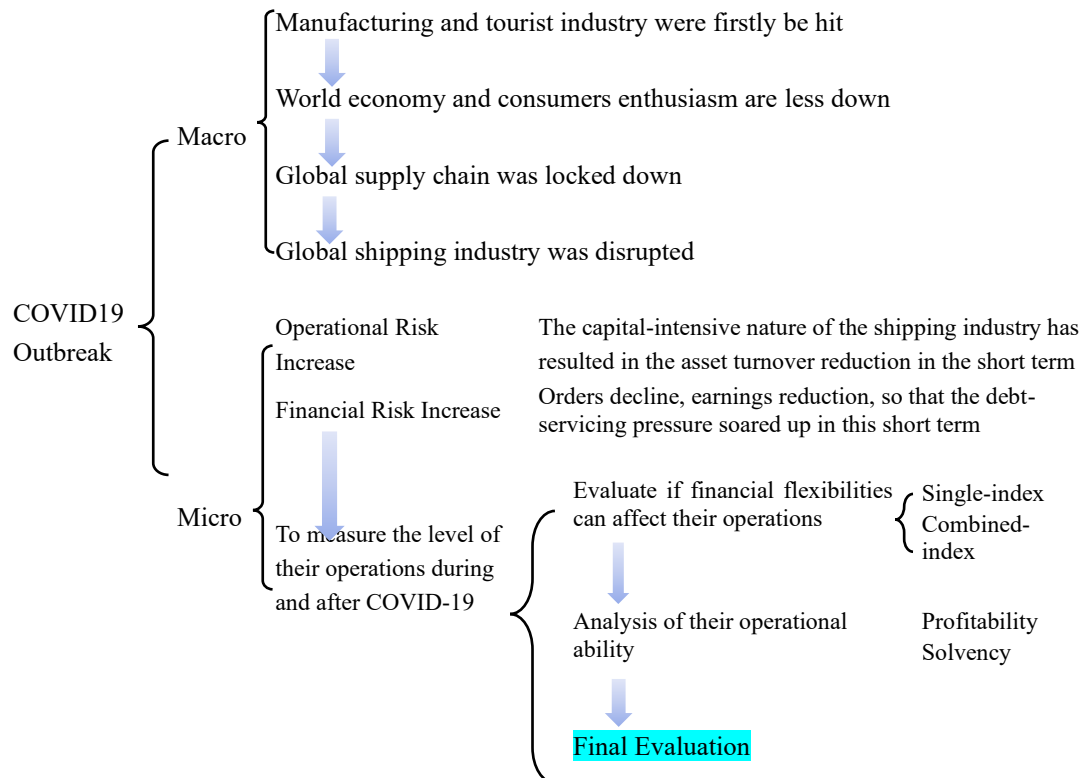
3) High Barrier to Entry – Technology and Capital

It is precisely because of above two features, an internationally shipping enterprise is most likely to develop and apply more technologies on board or in their management activities. And which also put forward more and higher requirements of capital to those firms, although shipping is an wholly capital-intensive industry.

Obviously, small enterprises cannot compete with large enterprises, namely, the size of their business scale always determines final outcomes within their commercial competition. So, intention to compare among the objective companies must consider

about their business size, or may say the capital strength.

Research Structure



Research Methodology

Single-variable analysis (for judgement of finance-flexibility company);

Combined-variables analysis (for judgement of finance-flexibility company);

Case analysis;

Comparison analysis.

CHAPTER 2: LITERATURE REVIEW

Transport of the People's Republic of Chinese official website in China from 2019 to 2020 statistical bulletin of transportation industry development of "national with water transport vessel net weight" and "national completed at the end of the waterway freight volume" at the end of the data, respectively, both as a total capacity of our country's shipping industry index and the total traffic volume index, and by calculating the rate of change of the two to reflect the development trend of supply and demand in Chinese shipping market, that is to reflect the relationship between the total shipping capacity and the total demand of Chinese shipping industry and its changes. The following figure shows the total supply and demand table of Chinese shipping industry and the change trend chart of the total supply and demand of Chinese shipping industry.

As Zeng (2013) has shown that when the global financial crisis brings both adverse impact and favorable opportunities, the financial flexible enterprises can not only better resist the negative impact brought by the crisis, but also make better use of the valuable investment opportunities brought by the crisis impact, and realize more investment or less investment decline. If the financial flexible enterprises decide to take advantage of the investment opportunities brought by exogenous financial crisis to increase investment and achieve development, it indicates that the marginal value created by increasing investment in the crisis should be greater than the marginal value reserved for the use of the financial flexibility in the future.

In the past, the focus of maritime transportation mostly on the influence of endogenous variables such as oil, supply of goods and technologies on shipment, while little attention was paid to exogenous events. And COVID-19 can be determined as the biggest Black Swan Event through 2019, namely the most serious exogenous event that force the public turn eyesight on it and the related reactions.

However, most of the research literatures pay attention to the whole shipping market and its several major segments, like dry bulk market, clean oil tanker market etc., rather than the shipping enterprises as so far. Moreover, as the first country to take a set of

effective controls of this pandemic spread, China has a safer and more stable context for entrepreneurs to recover their business.

Maritime shipment plays an important role in global economics, but there has no research of relationships between macro-economic variables and shipping markets until 2002, which firstly established connections between stock markets and shipping segments . And Nectarous and Kostis (Michail & Melas, 2020) employs a Bayesian Vector Autoregressive methodology to determine the relationship between seaborne trade and maritime industry (namely freight rates). Through COVID-19 outbreak, the increasing demand of medical goods started to pull the shipping industry slowly up. And demand is not only for medical goods, but for necessities after August 2020, which drive the Chinese export growth and accordingly stimulate the recovery of liner shipping. On the other hand, the pandemic also promoted the process of digitalization in shipping industry, it also boosted the development and usage of new technologies like container terminal automation, Big Data, IoT and so on.

As mentioned by Nektarios and Kostis (Michail & Melas, 2020), the COVID-19 was an exogenous emergency that gave many managers a wake-up bell call. And this has reminded many successful entrepreneurs, although, risk must be the sword hanging over their beds which they should be prepared to response at any time, at any place. Moreover, the impact of this outbreak on China and other countries is actually an effect on a rapidly changing global supply chain, and thus, so many countries are involved in and so hard situation we have to face.

In addition to the widespread spread of the novel coronavirus, there are reports showed developments that indicated a downward trend in the global manufacturing (2020). Changes in the local economy have had a negative impact on employees, reflecting corresponding changes in consumer buying patterns. Finally, the rapidly changing global political response to the spread of the epidemic has had an impact on supply chains.

Taken together, all these factors make it clear that this is not just an Asian problem. The impact on the international supply chain has been and will continue to be

significant. Despite the apparent manufacturing recovery in China, international trade participants still need to be fully and systematically prepared.

In order to make a sense of this outbreak, the foreign scholars (Michail & Melas, 2020) built a GARCH (1,1)-and-VAR model which is basically used in regression analysis to establish and explained the relationship between COVID-19 and three main segments in shipping markets, namely the dry bulk, clean tanker, dirty tanker, and they found the COVID-19 has different effects on those segments by three stages: In the first stage, such exogenous events could directly hit both the dry bulk and the dirty tanker markets; Then, the second stage was occurred in oil markets which is influenced by the pandemic outbreak; Finally, those latter two ripple effects were the leading power to affect dirty tanker and container transportation.

Otherwise, Nectarous and Kostis (2020) used a regression model with GARCH errors to examine how COVID-19 effects on freight rates during a short period. And changes in freight rates affected negatively shipping companies to turnover cash flows, also have a strong substitution effect between various of segments (M.G. & I.D., 2016) as well as between the various sizes of vessels (Tsouknidis, 2016), left the shipping business big risks. Also, Chinese researcher Zhang (2019) built up a regression to examine how operating risks and finance risks affect decisions of cost strategies in logistics companies. While Chen (2007) employed modal analysis to evaluate COSCO performance appraisal systems and proposal the Chinese shipping companies should positively employ the Strategic Cost Management.

They show that both dry bulk carriers and clean tankers are highly affected on the demand side of the economy, while ships carrying crude oil do not have the same relationship, directly affecting dry bulk carriers and dirty vessels. In addition, the results suggest that second-round effects (mainly through the fall in oil prices) and third-round effects (in some cases, through the influence of the stock market) also exist.

Another argument is similar to the one developed in Çolak et al. (2018). Based on this argumentation, in certain countries we may see quicker adjustments to the target leverage ratios, especially when the benefits of moving faster toward the target

leverage zone outweigh any increases in the adjustment costs due to economic uncertainty related to COVID-19. Needless to say, the above does not mean that the firm's cost of capital after the adjustment becomes lower. Most likely the overall cost of capital will be higher due to the growing economic uncertainty.

In the early research on cost behavior, the logarithm of cost functions was usually used, as it may alleviate the heteroscedasticity problem. Holzacker (2015) focused on the operational risks caused by downside-demand used the calculation as logarithms of changes in cost and found there is a positive relation between demand risks and cost elasticity. The changes of main business cost include the inter-annual capacity adjustment of the enterprise, and produces the first-order difference of the logarithm of cost, which is beneficial to eliminate the potential deviation of the unobservable heterogeneity and the serial-related problems of residuals. Li and Wu (2020) discussed how COVID-19 influenced international dry bulk shipping enterprises by affecting operating expenses of those firms.

Figure 8: Dry-Bulk Market - Baltic Dry-bulk Index (BDI) from 2015-1-1 to 2021-6-1

Source: iFind Financial Data Terminal



Figure 9: Dirty-oil Tanker Market - BDTI from 2015/01/01 to 2021/06/01

Source: iFind Financial Data Terminal

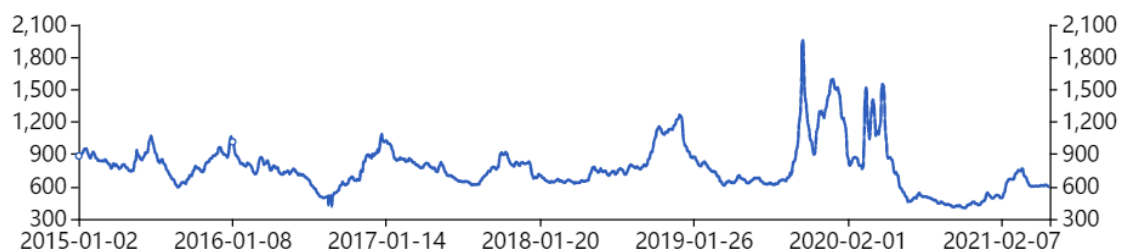


Figure 10: Clean-oil Tanker Market - BCTI from 2015/01/01 to 2021/06/01

Source: *iFind Financial Data Terminal*

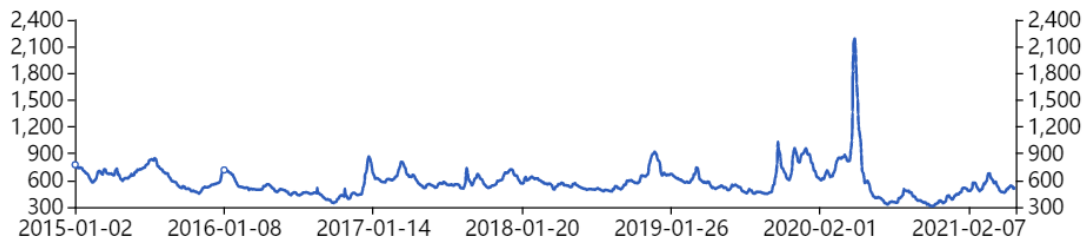


Figure 10: Container Market - SCFI from 2015/01/01 to 2021/06/01

Source: *iFind Financial Data Terminal*



Chen and Zhang (2007) under economic crisis background, adopted stochastic frontier analysis to evaluate performance of six shipping enterprises within the Yangtze River Delta from 2007 to 2012. Zhang (2019) represented the performance of Chinese listed motor companies by three indicators: return on total assets (ROA), return on equity (ROE) and Tobin's Q. Zhang (2019) used the financial data of 11 listed shipping companies in China and used the DEA-TOBIT two-stage method to dig out and evaluate those firms' comprehensive business efficiency including three input measures and four output indexes from 2008 to 2012. And earnings per share (EPS) is one of the main indicators to predict if a listed company has sustainable growth ability of finance, which can directly reflect returns of shareholders' capital investment and is closely related to the value of firms, so that stakeholders often regard it as an important parameter to assist them making financial decisions (Meng, Fang, & Zhu, 2018). Cost viscosity refers to the costs vary with business volume of asymmetry, show the costs are increasing in volume change rate is greater than the volume decrease the change rate (Anderaon, Banker, & Janakiraman, 2003). As also shown from amounts of results of domestic and foreign scholars, the shipping industry has its nature that are more likely to face more risks compared to others. The operational risk is essentially

reflected by the fluctuation of income (Zhang C. , 2019). Previous studies (Comin & Mulani, 2006) used the standard deviation of the variable to obtain the degree of volatility. The advantage of using SD of the logarithm quantity is that the stable trend of the data is unlikely to artificially exaggerate the risk.

Financial risk may cause the company unable to afford or cover the necessary financial obligations in the future potential (Gison, 1989), the financial risk of enterprise produce direct and indirect adverse consequences, the negative influence on enterprise's survival and development opportunities, financial risk direct consequences include raising money problems, higher cost of capital and legal costs, indirect effects include don't want to and one on the brink of bankruptcy to trade the company customer churn caused lower revenue and profits, key suppliers and the loss of valuable employee (Piortroski, 2000), financial risk also increased the possibility of the following problems: suppliers will not be willing to extend the trade credit, product market competition will be more aggressively fight for market share, company managers will face in communication with the providers of capital letters With losses, the enterprise risk response is made up of risk-averse managers actions to implement, therefore, the financial risk managers will drive a series of management action to deal with. On the one hand, the response to the financial risk of direct management behavior is to change the existing enterprise financial policy, managers when facing financial pressure, on the other hand, may have to reduce costs to achieve profit objectives (Hong & Liu, 2007) by empirical evidence that the company can through the restructuring has had to cope with the increase of the financial risk.

CHAPTER 3: THEORY AND HYPOTHESIS

Operation Risk & Financial Risk

Operating risk of accounting performance is directly operating income fluctuations, the management risk, the greater the more likely they are to make the enterprise to be break-even situation. Exposed to the risks at the same time, the company management accounting performance indicators such as profit or operating cash flow) in the larger noise produced greater risk compensation, and increase the likelihood of impossible to achieve the budget performance, as a result, in the face of the increase of operating risk, management may try to change the policy of their company's cost structure, the first change is to change the cost of elasticity, cost elasticity is volume percentage change caused by the percentage of the changes in the cost of the second change is to reduce the cost of viscous which also known as cost asymmetry degree.

Financial risk refers to the possibility that an enterprise will be required to assume financial obligations at the end of future payment. Previous studies show that the accounting ratio based on financial risk is a reliable indicator to measure the degree of financial distress or bankruptcy risk of an enterprise. The essence of the existence of financial risk is due to the liability management so that the liability burden of that part of the operating risk transferred to equity capital. Based on above, this paper puts forward the following assumptions:

[H1] The COVID-19 brings greater financial risks to Chinese ocean-shipping companies.

[H2] The COVID-19 brings greater operational risks to Chinese ocean-shipping companies.

Financial Flexibility Theory

1. Financial Flexibility

Financial flexibilities mean that there are variables and uncertainties in the financial activities among the financing operations of a company. And in the contemporary world, a company has to face more and more challenges and risks, in addition, overcome them and even better to turn around the condition to benefit its profitability as well as growth. In response to those changes and uncertainties from the external world, firms gradually develop abilities to dynamically adjust their finance management, those flexible and active responses to the variabilities can essentially interpret the finance flexibility.

In view of the basic meaning of flexibility, it refers to two aspects. On the one hand, the environment must exist changes and those cannot be predicted their future tracks in a long period; On the other hand, the subject must take flexible, dynamic and also positive actions to solve above problems caused by uncertainties from the environment. And according to studies on the theory by previous scholars (Zeng, Zhang, & Wei, 2013), an enterprise usually has three accesses to obtain and enhance financial flexibilities which are:

- 1) Rely on internal funds, including cash stocks, operating cash flow, in does not affect continuing operations situation of disposal of the reasonable arrangement of enterprise assets as well as to the payment policy.
- 2) Acquire the external capital, including the rights and interests of enterprises can raise capital, debt capital (including bank loans, issuing commercial paper and corporate bonds, etc.).
- 3) The manager's management skill. Due to the uncertainty within the operating cash flow itself is the premise of flexible financial decisions,

Asset disposal and equity fund-raising activities happen relatively less, and management skills are relatively hard to quantify. Summarized in terms of existing literature on how to obtain and maintain financial flexibility research mainly focus on cash policy, capital structure and payment policy that set up by government and so on.

-
- i. Through high-cash holdings for financial flexibility. The optimal sequence financing theory is that the company holding large amounts of cash can effectively avoid the undervalued stock offering to raise, thus able to provide enterprises with high flexibility and low-cost capital. As known to all that in a turbulent business environment, plenty of cash to help enterprises seize the favorable investment opportunities.
 - ii. By keeping low financial leverage to obtain financial flexibility.
 - iii. Via selecting the appropriate pay policies for financial flexibility.
 - iv. By means of a lot of financial policies to obtain financial flexible.

DeAngelo (2009) pointed out that the enterprise should through the comprehensive arrangement of cash holdings policy and payment policy and capital structure in order to get financial flexibility, in order to meet the future adverse shocks or encounter valuable investment opportunities are caused by unexpected needs. And at the same time, there are also three methods to judge whether a named firm is finance-flexibility, based on the above definition of '*flexible*'.

1) Single-index method

This method only based on single enterprise financial indexes, such as financial leverage or cash holdings flexible discretion determine enterprise's financial strength. For example, the financial leverage ratio is less than or cash holdings above a certain standard, such as the industry median, mean or mouth values of enterprise decision for flexible financial enterprises.

2) Combined-index method

According to the view of DeAngelo (2009), also combined with multiple financial indexes, such as financial leverage ratio and cash holdings, which is more reasonable for flexibility judgement of a company. By combining financial leverage ratio and cash holdings at the same time, Zeng Aimin et al. (2013) judged the degree of financial flexibility of enterprises - enterprises with high cash holdings and low financial leverage were judged as high financial flexibility enterprises, while those with low cash holdings and high financial leverage were judged as low financial flexibility enterprises. This method simultaneously considers a number of financial indicators reflecting the financial flexibility of the enterprise, and gives different weights to different indicators to calculate a comprehensive score, based on which the strength of the financial flexibility of the enterprise can be judged.

3) Comprehensive-index method

In this method, multiple financial indicators reflecting the financial flexibility of enterprises are considered at the same time, and a comprehensive score is obtained by

assigning different weights to different indicators, and the strength of the financial flexibility of enterprises is judged accordingly. Therefore, this paper only uses the single index judgment method and the multi-index combination method to define the financial flexible enterprises from the two aspects of debt financing flexibility which reflects the enterprise's ability to obtain external funds and cash flexibility which reflects the enterprise's ability to invoke internal funds in order to obtain the research results that have both theoretical value and practical guidance meaning. Specifically, when using the single indicator judgment method, this paper adopts the percentile judgment method. It should also be noted that we adopted the same financial flexibility measurement method with Zeng Aimin et al (2013), namely, use both the single index and combined index methods.

2. Financial-Flexibility Companies

There are two main sources of funds that contribute to the enterprise investment. The one is internal capital, while the other one is external capital. The amount of internal capital of an enterprise is closely related to the sales income and profit situation of the enterprise. With the shortage of endogenous funds, the funds needed by enterprises for investment mainly depend on the stock market or bank credit. After the full outbreak of the financial crisis, the liquidity of the capital market has also been severely tested. For example, in 2009, Chinese stock market was faced with perhaps the most severe test in history. The management issued a series of favorable policies, but it was still difficult to prevent the sharp decline of the Shanghai Composite Index, and the capital scale of the stock market shrank significantly. At the same time, it was difficult for enterprises to raise equity funds through issuing shares. Due to the continuous increase of credit risk, financial institutions to the maximum extent to reduce credit risk, the scale of financial credit significantly tightened, making it more difficult for enterprises to obtain debt funds from banks. Therefore, enterprises in the financial crisis in the general capital is not enough, investment activities are significantly troubled by financing constraints.

Chen and Zhang (2013) under 2008 economic crisis background, adopted stochastic frontier analysis to evaluate performance of six shipping enterprises within the Yangtze River Delta from 2007 to 2012. Zhang (2019) represented the performance of Chinese listed motor companies by three indicators: return on total assets (ROA), return on

equity (ROE) and Tobin's Q. Zhang (2019) used the financial data of eleven listed shipping companies in China and used the DEA-TOBIT method with two stages in order to dig out and evaluate those firms' comprehensive business efficiencies including three input measures and four output indexes from 2008 to 2012.

According to the background of the equity of listed companies' refinancing qualifications in our country, such as the time as well as quantities are tightly controlled by the CSRC (China Securities Regulatory Commission), has the right to decide when to release and How much equity securities issued enterprise rarely, so with equity financing of flexible enterprise rarely, so that this paper referred to the results from Zeng Aimin (2013), which shown that the financial flexibility of a company can be measured by cash flexibility, debt flexibility and the combination of both two variables. In this method, the samples would be totally divided to three classes: the enterprises with the top 30% of the highest level of cash flexibilities; the second would rely on the top 30% firms with debt-financing flexibilities; and the combined with, the third group must account the 30% of both sides. The sustainable growth of earnings per share (EPS) can reflect the sustainable development ability of the enterprise and evaluate the business performance, which is of great significance to accelerate the realization of the financial goals of the company. EPS shows the profit enjoyed per share of common stock.

The larger the earnings per share, the better the operating effect of the enterprise, the more capable it is to pay dividends, and thus the higher the returns investors get and the higher the rate of return on the company's stock. Earnings per share is one of the main indicators of performance evaluation of listed companies, due to it is closely related to the company's share price and its value (Xu Q. , 2007). As known to all that the non-systemic risks of companies mostly lead the volatility of stock prices (Zhang J. , 2007). It is mentioned by a scholar (2007) that the key to a company's success is always their inner qualities such as the firm's structures, function or culture within business operation activities and also including the managers' characters or charm which indirectly affect the business performances, although our outside world is such

uncertain and full of unknown challenges.

Analysis of Operation Capacity

1. Definition & meanings

Operation ability is also called the efficient use of assets "refers to the enterprise asset utilization effectiveness and sufficiency. Adequacy and effectiveness of the utilization of assets refers to the use of consequences, is refers to the assets adequately use, have not been idle, was dumped in generating revenue.

Enterprise operation ability analysis is based on the indicators reflect the enterprise assets operation efficiency and benefit calculation and analysis, evaluation of enterprise operating capacity, improve the economic benefit for the enterprise direction.

2. Significance

The meaning of analyzing asset utilization efficiency or operational capacity usually consists of three aspects:

1) For shareholders

Used to determine the enterprise's financial security and the profitability of assets, for the corresponding investment decisions.

(2) For creditors

To ensure the material used to determine its creditor's rights. In general, the higher the efficient use of assets, the creditor, the higher the degree of material guarantee the creditor's rights and the safety of the stronger.

3) For managers

Can find idle assets and use of inadequate assets, thus the disposal of idle assets in order to save money, improve the utilization efficiency of assets to improve business performance.

3. Purpose

First, the operating capacity analysis aims to evaluate the efficiency of enterprise assets operation. Second, operation ability analysis to find the problems existing in the enterprise in operating assets. Third, operation ability analysis is the basis of the profitability and solvency analysis and supplement. So that, the analysis of operation capability of a specific firm is beneficial to get a clear understanding over the profitability as well as the dept status, or maybe say the risk for bankruptcy.

4. Content

According to the meaning and purpose of the operation ability analysis, the content of the enterprise operation ability analysis mainly includes the following aspects

(1) All assets operation ability analysis.

The content of total assets operation ability analysis includes:

- Total assets output rate analysis;
- The total asset income rate analysis;
- Total assets turnover ratio analysis.

(2) Current assets operation ability analysis.

The content of current assets operation ability analysis includes:

- Total current assets turnover analysis;
- Total current assets advance expenditure turnover analysis;
- Current assets turnover speed effect analysis;
- Analysis of inventory turnover;
- Accounts receivable turnover ratio analysis.

(3) fixed assets operation ability analysis

The content of fixed assets operation ability analysis includes:

- Fixed assets output rate analysis
- Fixed asset income rate analysis.

5. Principles of choosing evaluation index

There were many ways to reflect the enterprise's assets operation ability, namely, the indicators, in order to correct analysis and evaluation enterprise assets operation ability,

must first correct design evaluation index system of assets operation ability.

- i. Assets operation ability indicators should meet the requirement of improving the essence of the assets operation ability. The essence of the enterprise assets operation ability, it is to be with as few assets, turnover of the shortest possible time to produce the product as much as possible, as much sales revenue, net income of create as much as possible.
- ii. Assets operation ability indicators should embody the characteristics of a variety of assets. Enterprise's assets include fixed assets and current assets, they each have its characteristics. Its use should be considered for fixed assets value and values from the characteristics of the index calculation, from two aspects into consideration; For liquid assets, mainly should manifest the characteristics of its liquid.
- iii. Capital of operation ability index should be conducive to the assessment analysis should as far as possible under the current system of appraisal indicators, or according to the analysis of the existing accounting information can be calculated and facilitate indicators, otherwise, again good also does not have practical significance.

As mentioned above, the evaluation of the operation is, in essential, to calculate and evaluate both the profitability and solvency. And the targets would turn on the measurements to judge and analyze both two abilities of an enterprise.

Profitability of Enterprise

"Assets = liabilities + owner's equity" this accounting equation is not only the theoretical basis of double entry, it is also the entry point for the profitability analysis. In accounting, such as type of various property rights relationship as the starting point, with the aid of the balance sheet and income statement data, Return on Asset (ROA) and Return on Capital (ROC), those two indicators are key to reveal the enterprise's profitability ability.

$$\begin{aligned} ROA &= \frac{\text{Net Profit}}{\text{Total Assets}} \times 100\% \\ &= \frac{\text{Net Profit}}{\text{Net Sales}} \times \frac{\text{Net Sales}}{\text{Total Assets}} \end{aligned}$$

Obviously, the return on assets (ROA) is actually made up of sales profit margin and asset turnover up of these two factors. To achieve more profits, should not only one thousand to reduce the product cost, increase sales, improve product margins; Using operating funds as well as economic, efforts to improve the asset turnover. The sales profit margins and asset turnover in May have significant differences between different industries. But come up from theory analysis, different companies to adopt different management structure and policy, in general, can achieve the same yield.

The above formula is analyzed the main factors influencing the return on assets. Enterprise profitability analysis in addition to reveal the influence of the main factors, but also through the longitudinal analysis method, further analysis of the main factors of influence of various auxiliary factors, in order to take corresponding measures to improve the enterprise management.

Return on capital (ROC) is enterprise management efficiency and important indicators of business performance, financial system, is the ultimate sign of enterprise profit ability, computation formula is:

$$ROC = \frac{\text{Net Profit}}{\text{Paid-in Capital}} \times 100\%$$

This ratio reflects the capital acquired during the period of a certain unit of net income, the higher the ratio, show that the stronger the profitability. According to the "*Assets = liabilities + owners' equity*" (assuming equals to *Paid-in Capital*), the equation can be transformed to the following formula:

$$ROC = \frac{ROA}{1 - \text{Asset Liability Ratio}}$$

The discretion of the formula shows that the return on capital is not only depends on the discretion of the return on assets, also directly related to and the asset-liability ratio. Because the return on assets is return on sales and total asset turnover of the product, so the height of the return on capital and return on sales, asset turnover, asset-liability ratio three factors. If the first two factors are kept constant, the more debt, and the

higher return on capital. So, faced with the contradiction between enterprise development and shortage of funds, in order to enhance the enterprise market competition ability, improve the return on equity capital, enterprise operators tend to leverage. Of course, this is the premise of business sentiment, if not, the more is the debt, the greater the loss. From formula can also see, in the case of return on assets is established, can according to the assets and liabilities ratio to determine the financing plan, to ensure to achieve the goal of return on capital.

[H3] Enterprises with higher financial flexibility would incline to enhance their operating capacity by increasing profitability in the short period after the epidemic.

Cost Performance

Since the end of 19th century, ratio analysis has been to good corporate governance practices in judging the company's operating results to win one of the important tools. In addition, using the financial ratios and traditionally used input-and-output indicators for transportation industry operating performance evaluation.

Although different researches adopt different cost measurement, this paper takes the operating cost of logistics enterprises as the cost measurement, and adopts the logarithmic measurement of the change of main business cost of logistics enterprises by referring to the research of on cost behavior. The change of main business cost includes the inter-annual capacity adjustment of the enterprise, and produces the first-order difference of the logarithm of cost, which is beneficial to eliminate the potential deviation of the unobservable heterogeneity and the serial-related problems of residuals.

[H4] Enterprises with higher financial flexibility would incline to enhance their operating capacity by reducing operation expenses (OPEX) in the short period after the epidemic.

CHAPTER 4: ANALYSIS

Data and Samples

All macro-economy variables come from the website of *World Bank*, whereas the pandemic-related measures are sourced from the *World Health Organization (WHO)* database. Further, all variables were winsorized at the 1% in order to eliminate extreme values, which was inspired by previous experiences from foreign (2018) and Chinese scholars (2019),.

All firm-related data is sourced from the *iFind* finance database. As for the intention of exploring the financial flexibility of Chinese shipping companies and how to influence firms' further measurements once facing emergencies, like the COVID-19 pandemic. In consideration of whether firms' financial flexibilities affected their operational performance, therefore, the variables used to justify if a company can be confirmed as financing flexible were chosen from a period that three (3) years prior to the COVID-19 outbreak, namely, among Q1 2016 to Q4 2019 (Pre-COVID-19); and set the time span from Q1 2020 to Q1 2021 (COVID-19) to further evaluate how previous financing structure influence present business measures, as well as differ their performance from others' under such an emergency.

The target companies, namely the research samples, were selected from the *Shipping II* which is a sub-classification under the *Transportation (Industry)* of *iFind Industry Classification*. This research regarded the companies identified as *Shipping II* under *Tonghuashun Industry Classification*, which issued A- and/or B-shares in Shanghai or Shenzhen stock markets before 2016, as research objectives. In addition, the samples have to be selected according to below principles:

- 1) Exclude financial companies, because financial companies hold large amounts of cash due to its own business characteristics;
- 2) Eliminate the enterprise with a continuous loss, namely, the ST, PT companies. Because this paper aimed to examine, under a normal operating condition, the company cash holdings behavior, unless it would lead to an abnormal result in the

cash holdings;

3) Pick off firms that had non continuous data.

After referring to companies of *Shipping II* from the start of selection as well as above constraints, finally this paper consisted of 8 listed shipping companies in Shanghai and Shenzhen stock markets, observed objectives in this research, which are listed as follows and the full name as well as introduction of each company have been presented in Appendix A.

Table 1: The sampled listed firms in China International shipping industry

Source: iFind Financial Data Terminal

STOCK CODE	ABBREVIATION
601919.SH	ZYHK
600026.SH	ZYHN
601866.SH	ZYHF
601872.SH	ZSLC
600798.SH	NBHY
601975.SH	ZSNY
000520.SZ	CHFH
600428.SH	ZYHT

Operational and Financial Risk Judgement

Furthermore, taking a glance at the operational risk and finance risk between ocean-transportation enterprises and all the other firms issued in Shanghai & Shengzhen A stock markets, but excluded out the ST well as the financial type of firms. As talked above, the enterprises that focus on the water and/or ocean carriage business would be picked from the ‘Shipping II’ category among the ‘SYWG’ industry classification.

The operational risks are mainly and finally reflected on the fluctuation of the company’s revenue, moreover the fixed assets are the core reason for occurring the operation leverage, meanwhile, the leverage is the most comprehensive factor of the operational risks. In addition, as tested by Zhang (2019), the operating risks of an enterprise can be measured by $\frac{\text{Fixed Assets}}{\text{Total Assets}}$, and ‘Turnover of fixed assets’, then, run the T-test of those two measurements in order to evident the operational risks within

the Chinese shipping companies.

As for financial risk, it is referred to the risk that an enterprise cannot afford its due debt in the future, and it is also regarded as the measurement to judge if an enterprise had possibility to bankruptcy in a hard time. So that the finance risk is associated with the firm's liability.

Operational and Financial Risk Analysis

As mentioned above, in order to judge whether shipping companies have more risks compared to other firms that issued A shares in Shanghai-and-Shenzhen stock markets.

Table 2: The results of T-test between International shipping firms and Other firms in A stock market

Source: iFind Financial Data Terminal

Measures		2016		2017		2018		2019		2020		Five-year Average	
		A Shares	Shipping II	A Shares	Shipping II	A Shares	Shipping II	A Shares	Shipping II	A Shares	Shipping II	A Shares	Shipping II
Fixed assets/Total assets (%)	Ave	20.47	42.73	20.06	43.63	20.50	45.88	20.67	45.16	20.24	44.61	20.39	44.40
	t	-4.246		-4.428		-4.973		-4.891		-4.85		-4.68	
	P	0.000		0.000		0.000		0.000		0.000		0.000	
Fixed-asset turnover (times)	Ave	24.82	1.50	26.592	1.72	28.24	1.08	28.04	0.88	29.89	0.85	27.52	1.21
	t	6.89		7.52		8.97		9.02		9.04		8.29	
	P	0.005		0.004		0.002		0.002		0.003		0.00	
Stockholders' equity/Total liabilities (%)	Ave	256.62	364.58	264.62	367.73	277.26	305.21	214.64	350.42	2942.31	398.84	791.09	357.36
	t	-3.754		-3.016		-2.694		-3.981		-3.25		-3.34	
	P	0.000		0.000		0.001		0.002		0.001		0.00	
Total market value/Total liabilities (%)	Ave	1562.16	769.30	2687.15	815.93	2817.24	1534.11	3092.71	1002.28	3408.22	684.10	2713.50	961.14
	t	2.039		3.178		1.863		3.011		4.986		3.02	
	P	0.000		0.000		0.001		0.003		0.002		0.00	
Operating assets/Total assets (%)	Ave	25.25	7.82	26.54	11.451	28.01	2.96	29.34	7.74	28.96	10.92	27.62	8.18
	t	3.88		2.98		13.99		4.39		2.85		5.62	1.21
	P	0.000		0.000		0.001		0.002		0.002		0.00	

From table 1, we can see that during the last five years, the average 'fixed assets/total assets' and 'fixed asset turnover' of all listed Chinese listed companies were 20.39%

and 27.52 times respectively; Shipping enterprise' accounted for 44.40% and 1.21 times, the T test shown that the proportion of fixed assets was significantly higher than the A-shares listed companies ($T = 4.68$, $p = 0.000$); and the fixed asset turnover was clearly lower than the those listed companies ($T = 8.29$, $P = 0.000$). As same as these, the 'Stockholders' equity/Total liabilities' of all A-listed companies accounted 791.09% and 2713.50% on average; as for shipping companies the averages are 357.36% and 961.14%; the T test shown that those three indicators of A-shared Chinese firms were all higher than the shipping companies' within the last five years ($T = 3.34$, $p = 0.000$; $T = 3.02$, $p = 0.000$; $T = 5.62$, $p = 0.000$).

Finance-flexibility Pre-judgement

Basically, as mentioned before, there are three ways to access to a given company's financial flexibility:

a) Single-index method

This method evaluates the level or degree of the financial flexibility by using only one single financial index (such as financial leverage ratio or cash holdings). Furthermore, if the firm's financial leverage ratio lower or cash holdings higher than one specific standard figures which are usually agreed among their country or industry, then this firm can be confirmed as a finance-flexibility company. And this method is more simplified and more easier to employ, Zeng (2013) and Arslan (2013) are adopted it in their papers.

b) Multi-index combination method

According to the view of DeAngelo (2009), also combined with multiple financial indexes, such as financial leverage ratio and cash holdings, which is more reasonable for flexibility judgement of a company. By combining financial leverage ratio and cash holdings at the same time, Zeng Aimin et al (2013) judged the degree of financial flexibility of an enterprise. Enterprises with high cash holdings and low financial leverage were judged as high financial flexibility enterprises, while those with low cash holdings and high financial leverage were judged as low financial flexibility enterprises.

c) Multi-index comprehensive method

This method simultaneously considers a number of financial indicators reflecting the financial flexibility of the enterprise, and gives different weights to different indicators to calculate a comprehensive score, based on which the strength of the financial

flexibility of the enterprise can be judged. For example, Therefore, using the research of Zeng Aimin et al (2013) for reference, this paper only uses the single index judgment method and the multi-index combination method to define the financial flexible enterprises from the two aspects of debt financing flexibility which reflects the enterprise's ability to obtain external funds and cash flexibility which reflects the enterprise's ability to invoke internal funds.

In order to obtain the research results that have both theoretical value and practical guidance meaning. Specifically, when using the single indicator judgment method, this paper adopts the percentile judgment method,

In this paper, a single index such as debt financing flexibility or cash flexibility is used as the determination index of financial flexible enterprises. Taking the debt financing flexibility as an example, the sample enterprises with the highest debt-debt financing flexibility in the overall distribution are judged as financial flexible enterprises, but in order to reflect the maintenance of debt financing.

Capital flexibility is a kind of financial policy of enterprises, rather than the influence of accidental factors. We require enterprises to reserve high debt financing flexibility in the year before the crisis to be defined as financial flexibility enterprises. This paper aims to examine the financial flexibility level that enterprises reserve before the crisis to enterprises in the crisis period. Therefore, no matter which method is adopted to determine the financial flexibility of enterprises, this paper only determines the financial flexibility of enterprises in the whole research period according to their financial flexibility level before the crisis.

According to the previous experience (2013) on calculation of cash flexibilities and debt financing flexibilities, there are equations:

$$CF = CR_E - \overline{CR}$$

$$DF = \text{MAX} (0, \overline{DR} - DR_E)$$

Where, CF refers to the cash flexibility; CR_E is represented as the objective firm's cash ratio; while \overline{CR} expresses as the average cash ratio within the industry, in this paper, thus on behalf of the average cash ratio of Chinese shipping industry.

Table 3: The ranking of cash, dept and both cash-and-dept flexibility respectively within total eight objective companies.

Source: iFind Financial Data Terminal

Rank	Cash flexibility	Debt-financing flexibility	Both cash & dept flexibility
1	ZSLC	ZSLC	ZSLC
2	NBNY	ZSNY	ZSNY
3	ZSLC	NBHY	NBHY
4	ZYHN	ZSNY	CHFH
5	ZSNY	ZYHN	ZSHN
6	ZYHF	ZYHT	ZSHF
7	CHFH	ZYHK	ZSHN
8	ZYHK	ZYHF	ZSHT

While the above table 3 is the final results of the overall eight firms and we can know, that the ZSLC is the most flexible, and NBHY is the second-flexible in cash-flow; while the ZSNY is the second-flexible in debt financing. As for the details are totally listed in table 4, in which the data was sequenced with ‘●’ to take an easier observation, and used to counted the frequency that a company has been named as ‘flexible’ across the period; *CFF* column refers to ‘if the company has cash flexibilities’, and *DFF* column represents ‘if the objective firm is debt-financing flexible or not’. Subsequently, the result shows that ZYHK (COSCO SHIPPING Holdings Co., Ltd.) ranks the first among total eight enterprises, while ZYHT (COSCO SHIPPING Specialized Carriers Co., Ltd.) was the only one that had zero times, and following this, we will move forward to compared those two enterprises’ performance and response under COVID-19 pandemic period.

Table 3: Frequency of the firms that have been named as “flexible”

Source: iFind Financial Data Terminal

Cash Flexibility	1	2	3	4	5	6	7	8
	CHFH	NBHY	ZSLC	ZSNY	ZYHT	ZYHN	ZYHF	ZYHK
2019 Q4		●	●					
2019 Q3				●				
2019 Q2	●			●				
2019 Q1	●		●					
2018 Q4		●		●				
2018 Q3		●	●					
2018 Q2		●						
2018 Q1		●		●				
2017 Q4		●		●				
2017 Q3		●						
2017 Q2	●			●				
2017 Q1	●		●					
Dept Financing Flexibility	1	2	3	4	5	6	7	8
	CHFH	NBHY	ZSLC	ZSNY	ZYHT	ZYHN	ZYHF	ZYHK
2019 Q4		●	●					
2019 Q3			●	●				
2019 Q2			●	●				
2019 Q1			●	●				
2018 Q4	●					●		
2018 Q3	●			●				
2018 Q2		●		●				
2018 Q1			●					●
2017 Q4		●						●
2017 Q3		●						●
2017 Q2							●	
2017 Q1	●		●					

Analysis of Profitability

Figure 12: Earnings Per Share (EPS) of objective firms from 2017 Q1 to 2021 Q1.

Source: iFind Financial Data Terminal

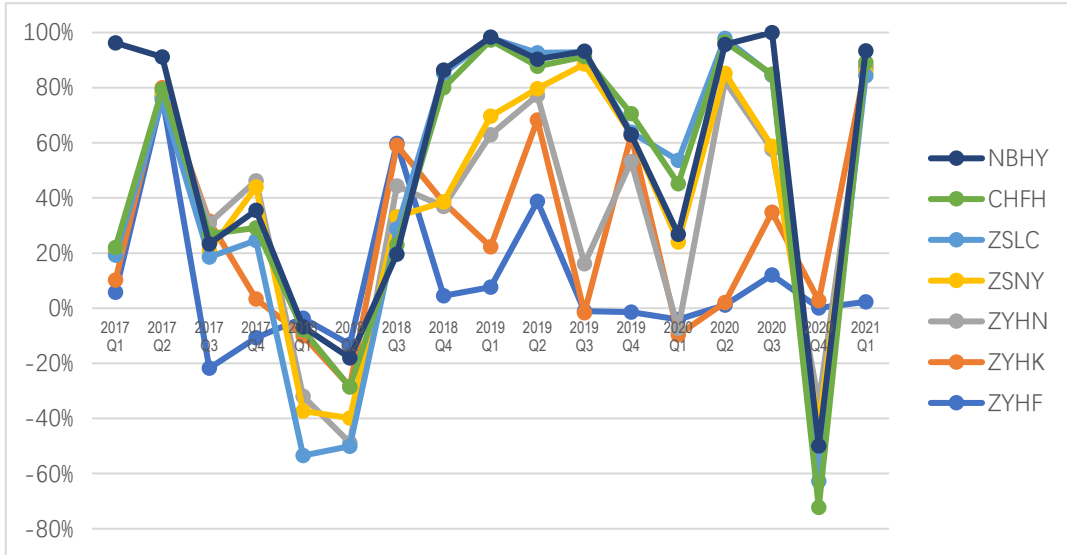


Figure 13: Gross Margin YoY Growth Rate

Source: iFind Financial Data Terminal

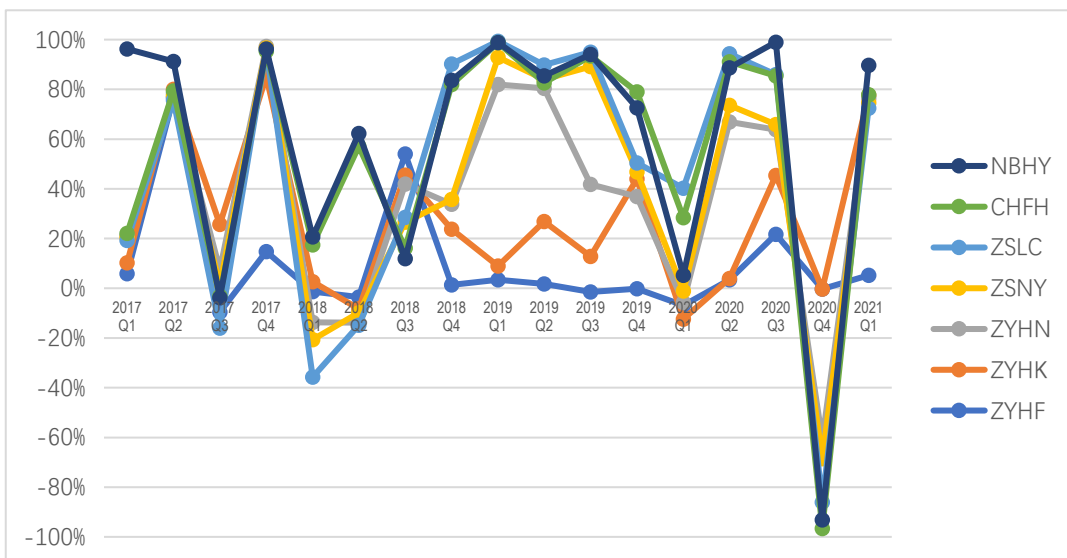


Figure 14: Net Profit Growth Rate

Source: iFind Financial Data Terminal

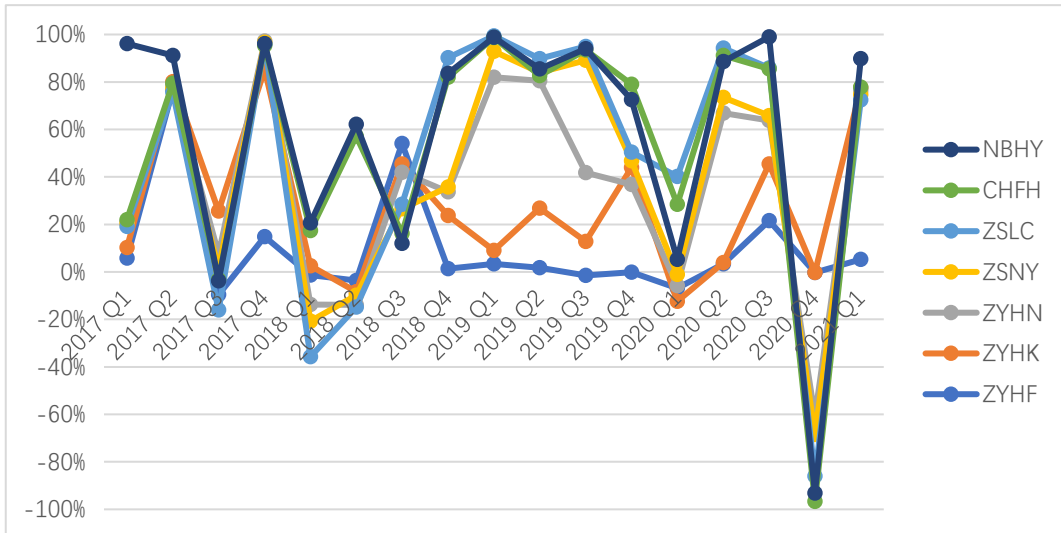
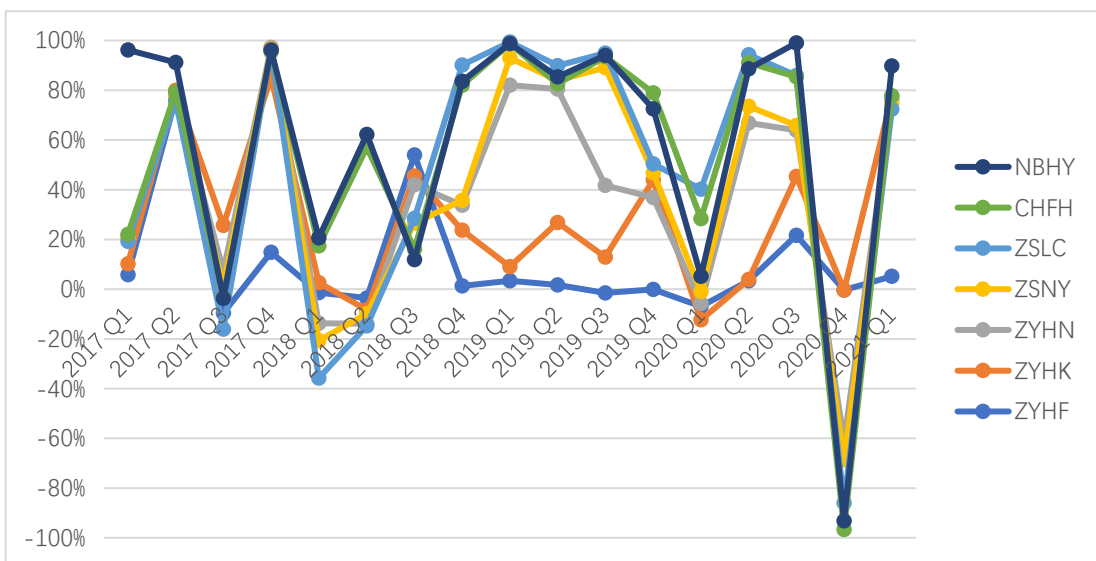


Figure 15: Operation Profit Growth Rate

Source: iFind Financial Data Terminal

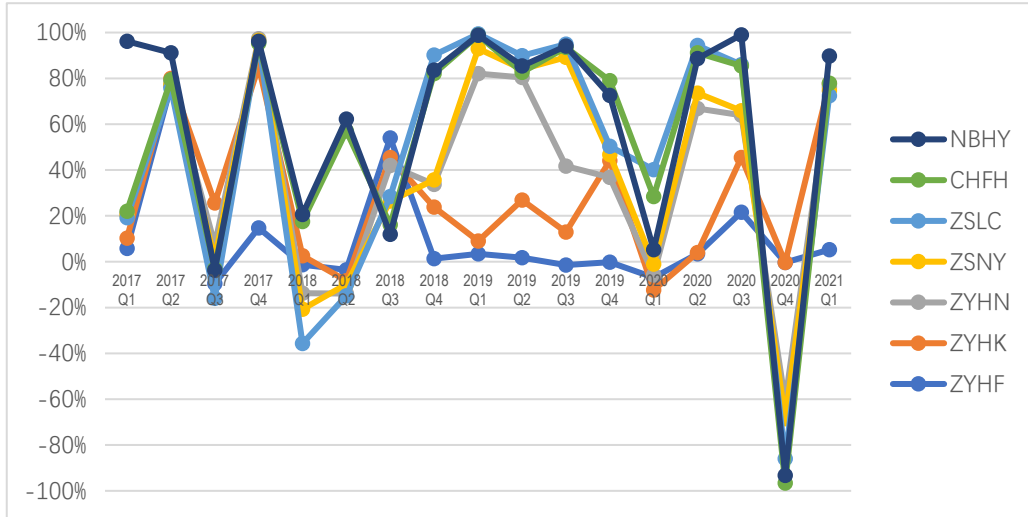


As shown from the fig.13, 14 and 15, since the start of 2020, the NBHY has shown a higher growth rate of its gross margin as well as net profit, that can evidence the higher profitability during COVID-19. Besides, we didn't discuss in details about the different segments, that was a disadvantage of this paper and sincerely expect other scholars can make up for it.

Analysis of Debt-payment Ability & Cost Behavior

Figure 16: Operating Expenses (OPEX) YoY Growth Rate

Source: iFind Financial Data Terminal



From the fig.16, it clearly shows that the NBHY has a significant down trend than others, namely, the NBHY has a stronger intention to reduce its OPEX.

Figure 17: Debt ratio (quarterly) of those eight Chinese International shipping companies from 2016 Q1 to 2021 Q1.

Source: iFind Financial Data Terminal

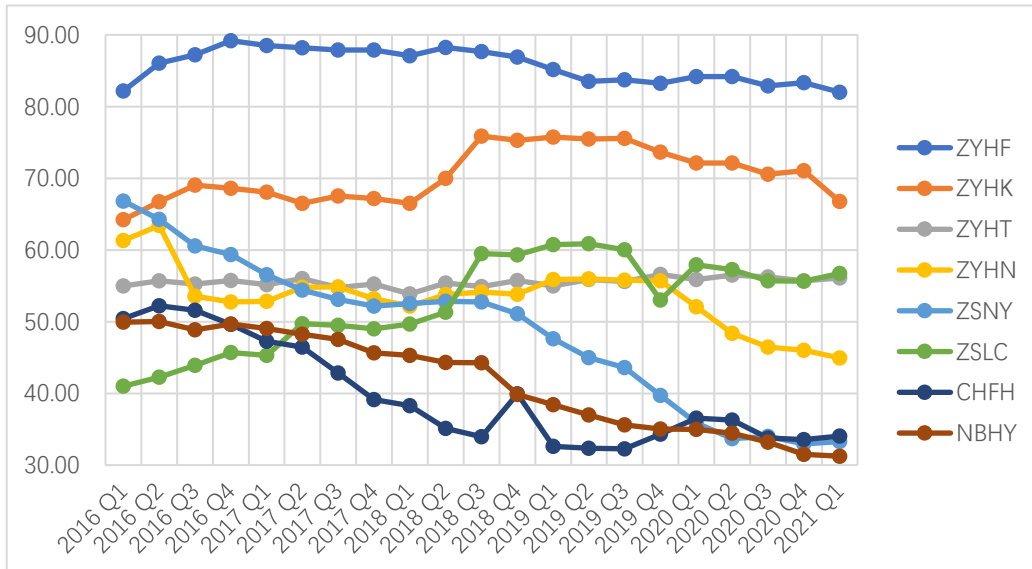
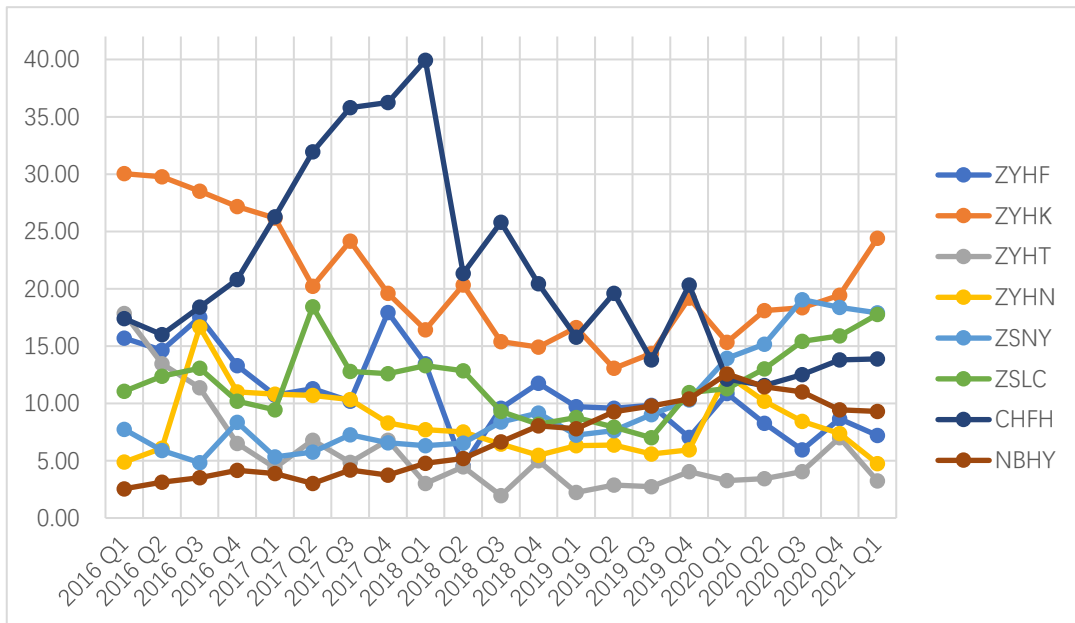


Figure 18: Cash Ratio (quarterly) of those eight Chinese International shipping companies from 2016 Q1 to 2021 Q1.

Source: iFind Financial Data Terminal



CHAPTER 5: CONCLUSION & COUNTERMEASURES

The international shipping industry was still struggling from the new IMO (International Maritime Organization) legislation of sulfur-limitation (Zis & Cullinane, 2020) as well as the Sino-US trade war, then ran up against COVID-19 at the end of 2019, and this can be regarded as the biggest *Black Swan* event in a decade.

Travelling and manufacturing are the first to be hit, and then, is the shipping. International shipping companies, as the basic rocks in the global supply chain, are disturbed by this epidemic without hesitation. And as the pandemic outbreak around the world, then, from the consideration of epidemic prevention, policies were more and more strict. As for Chinese sea-going firms, they met many challenges, but also some chances.

By considering and reviewing previous researches, this paper has preliminarily evident that the shipping companies do meet bigger problems when COVID-19 occurred. Then, inspired and related to the similarity of the 2008 economic crisis, focused on if and how the financial flexibility could affect the shipping companies and their performance after pandemic. Then, one key aspect to analyze and measure one specific firm is to analyze its operating capacity, so that the target was turned to the other hand – namely, the profitability. Finally, by using the thoughts of cost performance analysis, and observe those companies' cost behavior in this epidemic, can find that the

Based on above analysis of the risk performances and profitability as well as cost behavior within the specific period to observe the variation form 2019 to the end of 2020, this paper has got below conclusions:

1. The COVID-19 brings greater financial risks to Chinese ocean-shipping companies, which is compared with all the other firms issued A stocks.
2. The COVID-19 brings greater operational risks to Chinese ocean-shipping

companies compared to other listed companies, other than the financing and ST* because of their specialities with high risk.

3. Enterprises with higher financial flexibility would incline to enhance their profitability (operating capacity) in the short period after the epidemic.
4. Enterprises with higher financial flexibility would incline to reduce their operating costs (OPEX) in the short period after the epidemic.

And all above mean when facing an exogenous emergency like COVID-19 pandemic, the shipping industry, based on its capital- and technic-intensities intrinsic properties, is more likely to face more challenges. But enterprises with higher financing flexibilities would like to show higher profitability and also to lower their cost in operations. Therefore, these would be some inspiration for other shipping companies firms in other industries.

Appendix A.

STOCK NO.	ABBREVIATION	FULL NAME
601919.SH	ZYHK	COSCO SHIPPING HOLDINGS CO., LTD.
600026.SH	ZYHN	COSCO SHIPPING ENERGY TRANSPORTATION CO., LTD.
601866.SH	ZYHF	COSCO SHIPPING DEVELOPMENT COMPANY LIMITED
601872.SH	ZSLC	CHINA MERCHANTS ENERGY SHIPPING CO., LTD.
600798.SH	NBHY	NINGBO MARINE COMPANY LIMITED
601975.SH	ZSNY	NANJING TANKER CORPORATION
000520.SZ	CHFH	CHANG JIANG SHIPPING GROUP PHOENIX CO., LTD.
600428.SH	ZYHT	COSCO SHIPPING SPECILIZED CO., LTD.

1. ZYHK 601919.SH (<http://hold.coscoshipping.com/>)

COSCO SHIPPING HOLDINGS CO., LTD. (hereinafter with *COSCO Shipping Holding*), a subsidiary of COSCO SHIPPING CORPORATION LIMITED (COSCO Shipping), was established on March 3rd, 2005.

COSCO was successfully listed in the Hong Kong Stock Exchange (Stock Code: 01919) on June 30th, 2005 and on the Shanghai Stock Exchange (Stock Code :601919) on June 26th, 2007.

(1) Container Shipping Segment

[COSCO SHIPPING Lines Co., Ltd](#)

COSCO SHIPPING Lines is a fully-owned subsidiary of COSCO SHIPPING Holding Co., Ltd, was registered in China (Shanghai) Free-trade Experimental Area. The company is mainly engaged in domestic and international maritime container transport

services and their related business, which are the group's core business. By the end of December 2019, COSCO SHIPPING Lines had a total of 235 corporate enterprises, including 97 domestic enterprises and 138 enterprises abroad.

[Orient Overseas \(International\) Limited](#)

“ORIENT OVERSEAS CONTAINER LINE” and “OOCL” are trade names for transportation provided separately by: ORIENT OVERSEAS CONTAINER LINE LIMITED (“OOCL”) and OOCL (EUROPE) LIMITED respectively, and both are wholly-owned subsidiaries of ORIENT OVERSEAS (INTERNATIONAL) LIMITED, a public company listed in Hong Kong Stock Exchange. OOCL is one of the largest integrated international container transportation and logistics companies in the world. As one of the most recognized global brands in Hong Kong, OOCL provides customers with fully-integrated logistics, along with containerized transportation services, which are realized by a network which encompasses total five continents over the whole world.

OOCL is well respected in the shipping, or container, industry with a reputation for providing customer-focused solutions, quality-through-excellence approach and continual innovation. OOCL is one of the leading international carriers in China, serving a full range of logistics services and transportation accesses throughout the country. It is also a leader in the use of IT, digital and e-commerce technology to manage and track for the entire process of the cargo.

(2) Terminal Operation

[COSCO SHIPPING Ports Limited](#)

COSCO SHIPPING Ports Limited (Stock Code: 1199.HK) a leading ports operator in the world; its terminals portfolio covers the five main port regions in Mainland China, Southeast Asia, Europe, the Mediterranean and the Black Sea. As at 31 December 2019, CSP operated and managed 290 berths at 36 ports worldwide, of which 197 were for containers, with a combined annual handling capacity of 113 million.

2. **ZYHN 600026.SH** (<http://energy.coscoshipping.com/>)

COSCO SHIPPING ENERGY CO., LTD. (the "COSCO SHIPPING Energy") is a professional seaborne trade carrier of oil, natural gas and other energy products formed by the merger of CHINA OCEAN SHIPPING COMPANY ENERGY TRANSPORTATION BRANCH and CHINA OCEAN SHIPPING COMPANY ENERGY TRANSPORTATION BRANCH. As founded in Shanghai on June 6th, 2016 the company was committed to become a whole-process energy transportation solution provider, to provide customers with all-type, all-area and all-round energy transporting services. The COSCO SHIPPING Energy focuses on two core businesses: oil transportation and liquefied natural gas transportation.

The company has many years of professional experience and good reputation, in the industry has formed a good corporate image. The company's tanker fleet ranks first in the world, covering all the mainstream tanker models, and the tanker variety is complete, which stands out in the world.

The company actively develop large tanker pool, improve fleet operation efficiency, and strive to achieve a win-win situation between customers and ship owners.

The company is also a leader in LNG transportation in China and is now a major player in the global market.

COSCO Shipping LNG Investment (Shanghai) Co., Ltd. and China LNG Shipping (Holding) Co., Ltd., a wholly-owned subsidiary of the company, are the only two large LNG transportation companies in China.

They currently mainly service Chinese projects importing liquefied natural gas from Australia, Papua New Guinea and Russia.

3. **ZYHF 601866.SH** (<http://development.coscoshipping.com/>)

COSCO SHIPPING DEVELOPMENT CO., LTD. (hereinafter referred to the "Company"), a subsidiary of CHINA OCEAN SHIPPING GROUP CO., LTD. (hereinafter referred to as the "COSCO Group"), is specialized in supply chain

transportation and it was founded in 1997, headquartered in Shanghai.

Centering on the main line of integrated logistics industry, the company is committed to shipping leasing, container leasing and container manufacturing business as the core. At the same time, with the support of investment management, we will expand the supplementary front of shipping logistics supply chain financial services and realize the integrated development of industry and finance.

The company's ship leasing business refers to the operating leasing or financing leasing business of container ships, dry bulk carriers, special ships, LNG ships and other types of ships, with more than 180 vessels under management and assets were up to more than 45 billion yuan. Container leasing business refers to a series of services such as leasing, trading, management and second-hand container sales of all kinds of containers.

The company's container manufacturing business refers to the research, development, production and sales of international standard dry containers, special containers, refrigerated containers, housing containers. The annual design and production capacity ranks in the forefront of the world. Its customers include world-renowned liner companies and large container leasing companies. At the same time, relying on the global transportation network of COSCO Group, we provide customers with value-added services for global port container delivery.

Adhering to the concept of "excellence", with the mission of "finance helps the industry and creates value through development", and with the core values of "integrity, efficiency, initiative and win-win",

The company gives full play to the advantages of the shipping industry, expands the value of the capital flow of the shipping logistics ecosystem, and becomes an excellent industry financial service provider with the characteristics of COSCO shipping.

4. ZSLC 601872.SH (<https://www.cmenergyshipping.com/>)

Inheriting the century-old foundation of Chinese shipping business, CHINA

MERCHANTS ENERGY SHIPPING CO., LTD. ("CMES Shipping") was established in 2004, and listed on the A-share in 2006 (stock code: 601872). Its stock code incorporates the founding year of China Merchants Steam Navigation Company to imply a new starting point for inheriting the century-old shipping industry. The company operates and manages the most established and the most experienced maritime oil tanker fleet in China. As a leading VLCC fleet operator in Greater China and a major participant in domestic LNG transportation projects, it owns the world's largest fleets of VLCC (Very Large Crude Carrier) and VLOC (Very Large Ore Carrier), with leading domestic LNG (liquefied natural gas) and ro-ro fleets. After years of development, CMES has configured a diversified business pattern of "Oil, Bulk, Gas, Special, Crew, Network" in its full format. Its main business covers oil transportation, dry bulk transportation, gas transportation, and special transportation, achieving unique advantages in terms of crew management and overseas branches services.

5. NBHY 600798.SH (<http://www.nbmc.com.cn/>)

NINGBO MARINE COMPANY LIMITED is mainly engaged in domestic and international general cargo, dry bulk cargo (especially coal) transportation. In addition, Ningbo City Ring Highway (West Section) Project by its holding subsidiary Mingzhou Expressway investment and construction. Therefore, Ningbo Shipping Company's main business includes waterway cargo transportation and toll road operation business. At present, the company has formed a light, Panama-type ship fleet, has a certain bulk cargo transport competitiveness, and enjoys a high reputation at home and abroad.

6. ZSNY 601975.SH (<http://www.njtc.com.cn/>)

NANJING TANKER CORPORATION (NJTC), formerly known as NANJING WATER TRANSPORTATION INDUSTRY CO., LTD., was established in 1993 as a subsidiary of China Yangtze River Shipping (Group) Corporation. Located in the historical city known as "the ancient capital of the six dynasties" - Nanjing, engaged in professional tanker transportation. NJTC is positioned as a global transportation service provider

for petrochemical products. The main business of the company is liquid cargo transportation. Relying on the comparative advantages of domestic and international refined oil, crude oil, chemical and natural gas transportation, the company is actively expanding the ship management market, seafarer labor market, logistics market, logistics market, logistics market, logistics market and other business areas. Oil trading market and other related and diversified business.

At present, the company has a total of 58 ships of various types, with a deadweight tonnage of more than 2.2 million deadweight tons, and an annual transport capacity of more than 40 million tons. Adhering to the concept of basing itself on China and serving the global petrochemical industry, the company has maintained a good cooperative relationship with large petroleum and petrochemical enterprises at home and abroad. The company is committed to building a strong competitiveness, healthy and sustainable profitable development of the international first-class shipping enterprises.

7. CHFH 000520.SZ (<http://zgchfh.sinotrans-csc.com>)

CHANG JIANG SHIPPING GROUP PHOENIX CO., LTD. is the largest inland-water transportation enterprise which is mainly carrying about dry bulk in China and the it is the most powerful logistics enterprise in Jianghai. Its parent company is CHINA CHANGJIANG SHIPPING (GROUP) CORPORATION, which is directly managed by the central government.

The company owns and controls 1,500 dry bulk vessels with a capacity of 2.6 million tons and a main engine power of 340,000 kilowatts. Changjiang Shipping Group Phoenix Co., Ltd. is mainly engaged in dry bulk shipping and port logistics services, including dry bulk transportation, shipping agency, freight forwarding, integrated logistics and special bulk transportation; chartering; crew labor, property management, etc.

After years of operation, the company has an important influence in the industry, has been unanimously recognized by customers, in the industry to establish a good

visibility and credibility, with a certain brand advantage. has been mainly engaged in the national and international transportation of general cargo and dry bulk (especially the coal); in addition, the Ningbo Ring Expressway (West Section) project was invested by the Mingzhou Expressway which was its holding subsidiary. Therefore, the main business of NINGBO MARINE COMPANY includes the cargo carriage by the waterway as well as toll road operation business etc. At present, the firm has formed a fleet equipped with handy size and panamax type of ships and such a fleet with certain competitiveness of bulk cargo transport has a reputation in both domestic and world.

as a subsidiary of China Changjiang National Shipping (Group) Corporation, formerly Nanjing Water Transportation Industry Co., Ltd., was incorporated in 1993, which was engaged in professional tanker transportation and located in a famous and historical city which has its reputation as six dynasties' ancient capital of China – Nanjing. NJTC is positioned itself as a global transportation service provider of petrochemical products. Based on the main business of liquid cargo transportation, the firm focuses on the comparative advantages in national and international transportation of Refined Oil Products, Crude Oil, Chemicals and Gas, while it is actively expanding the business areas, such as ship management market, seafarer labor market, oil trade market and other relative as well as diversified business and sustainable profit development of the international first-class shipping enterprise.

8. ZYHT 600428.SH (<http://spe.coscoshipping.com/main/index>)

As one of the core members of China COSCO SHIPPING CORPORATION LIMITED COMPANY, COSCO SHIPPING SPECIALIZED CARRIERS CO., LTD. (COSCO SHIPPING Specialized) is dedicated to the operations and management of more than a hundred vessels, including multi-purpose and heavy lift vessels, semi-submersible vessels, pure car carriers, logs carriers as well as asphalt carriers. The scale of this specialized shipping fleet ranks it as the largest in the world.

COSCO SHIPPING Specialized Carriers Co., Ltd. owns an energy-efficient fleet well suited to a large variety of cargoes. COSCO SHIPPING Specialized Carriers is

committed to the transportation of overlength, oversize and overweight cargoes, including RIGs, engineering vessels, port machinery, locomotives, windmills, bridge cranes, complete equipment, etc. By virtue of its preeminent strength, COSCO SHIPPING Specialized Carriers Co., Ltd. has facilitated the successful completion of hundreds of significant international projects.

COSCO SHIPPING Specialized Carriers Co., Ltd. has an established business service network throughout the world, centering on the Far East, bringing the advantages of stable and reliable liner shipping on many trade routes, including the Far East-Southeast Asia/India, Far East- Mediterranean Sea/Europe, Far East-Persian Gulf/Red Sea, Far East-Africa, Far East—America, and Far East-Australia.

COSCO SHIPPING Specialized Carriers Co., Ltd. has implemented a management system compatible with the international advanced standards, and has further cooperation with eminent scientific research institutions, colleges and universities in China and abroad.

COSCO SHIPPING Specialized Carriers Co., Ltd. has as well set up Asia's first freight technology center based on the requirements of international mandatory regulations like ISM, ISPS and MLC-2006. COSCO SHIPPING Specialized Carriers Co., Ltd. has implemented management system standards like ISO9001, ISO14001 and OHSAS18001, and established QHSE management system focusing on the security demands of clients and management improvement.

With high-level international and professional management, COSCO SHIPPING Specialized Carriers Co., Ltd. has established sustained and steady security guarantee as well as environmental protection mechanism, consistently providing the stable and reliable specialized shipping services for all clients.

COSCO SHIPPING Specialized Carriers Co., Ltd. has a team of crew with high quality in services. By education and training, they achieve the excellent experiences in operating various vessels. Their professionalism earns them a good reputation in the shipping industry. With global marketing network and excellent management system,

COSCO SHIPPING Specialized Carriers Co., Ltd. has been transforming into a complete logistics service company that can deal with Transportation & Installation of complex offshore structures. The company has paid great efforts on advanced technology development, and provided tailor made solution for different clients.

Today, COSCO SHIPPING Specialized Carriers Co., Ltd. is going all out to perform “the Belt and Road Initiatives” and is providing a strong boost for the “Going Out” of Chinese major equipment. While concentrating mainly on the shipping business, COSCO SHIPPING Specialized Carriers Co., Ltd. also aims to develop diversity and deals successfully in real estates, ship catering, hotel and trading, ship repairing, communication equipment repairs, education and crew service export.

COSCO SHIPPING Specialized Carriers Co., Ltd. formerly known as Guangzhou Ocean Shipping Co., Ltd., established on April 27, 1961, is the first state-owned ocean shipping enterprise of new China. COSCO SHIPPING Specialized Carriers Co., Ltd. has made indelible historical contributions to the establishment and development of Chinese ocean shipping business.

Appendix B.

The *Cash Ratio* of sampled enterprises

	2016 Q1	2016 Q2	2016 Q3	2016 Q4	2017 Q1	2017 Q2	2017 Q3	2017 Q4
ZYHF	15.70	14.64	17.51	13.28	10.72	11.28	10.18	17.94
ZYHK	30.03	29.75	28.51	27.17	26.17	20.22	24.15	19.59
ZYHT	17.83	13.45	11.37	6.51	4.37	6.78	4.84	6.79
ZYHN	4.90	6.09	16.66	11.01	10.80	10.71	10.32	8.29
ZSNY	7.74	5.90	4.83	8.34	5.35	5.76	7.25	6.57
ZSLC	11.06	12.38	13.07	10.18	9.42	18.44	12.78	12.60
CHFH	17.40	16.01	18.41	20.81	26.29	31.95	35.80	36.23
NBHY	2.55	3.13	3.53	4.15	3.87	3.01	4.19	3.74
	2018 Q1	2018 Q2	2018 Q3	2018 Q4	2019 Q1	2019 Q2	2019 Q3	2019 Q4
ZYHF	13.46	4.55	9.59	11.75	9.72	9.58	9.84	7.03
ZYHK	16.43	20.32	15.39	14.90	16.60	13.05	14.35	19.19
ZYHT	3.00	4.47	1.96	4.99	2.23	2.88	2.75	4.06
ZYHN	7.71	7.52	6.46	5.47	6.30	6.37	5.58	5.95
ZSNY	6.30	6.53	8.36	9.15	7.22	7.61	9.03	10.31
ZSLC	13.30	12.85	9.29	8.17	8.76	7.92	7.00	10.94
CHFH	39.93	21.33	25.81	20.43	15.78	19.59	13.79	20.34
NBHY	4.77	5.18	6.64	8.04	7.78	9.26	9.78	10.37

The *Debt Ratio* of sampled enterprises

		2016 Q1	2016 Q2	2016 Q3	2016 Q4	2017 Q1	2017 Q2	2017 Q3	2017 Q4
ZYHF	<i>COSCO SHIPPING Development</i>	82.16	86.03	87.19	89.19	88.52	88.20	87.90	87.86
ZYHK	<i>COSCO SHIPPING Holdings</i>	64.21	66.72	69.07	68.62	68.04	66.52	67.55	67.18
ZYHT	<i>COSCO SHIPPING Specialized</i>	54.96	55.68	55.25	55.76	55.14	56.00	54.74	55.25
ZYHN	<i>COSCO SHIPPING Energy</i>	61.33	63.40	53.56	52.74	52.83	54.82	54.86	53.20
ZSNY	<i>NANJING TANKER Corporation</i>	66.82	64.26	60.58	59.36	56.56	54.40	53.10	52.17
ZSLC	<i>CHINA MERCHANTS Energy Shipping</i>	41.00	42.28	43.91	45.69	45.31	49.71	49.50	49.02
CHFH	<i>CHANG JIANG Shipping</i>	50.44	52.22	51.60	49.63	47.26	46.47	42.82	39.12
NBHY	<i>NINGBO Marine</i>	49.94	50.02	48.86	49.65	49.03	48.25	47.54	45.64
		2018 Q1	2018 Q2	2018 Q3	2018 Q4	2019 Q1	2019 Q2	2019 Q3	2019 Q4
ZYHF	<i>COSCO SHIPPING Development</i>	87.09	88.25	87.66	86.91	85.17	83.49	83.72	83.25
ZYHK	<i>COSCO SHIPPING Holdings</i>	66.48	69.96	75.87	75.30	75.76	75.47	75.58	73.64
ZYHT	<i>COSCO SHIPPING Specialized</i>	53.87	55.40	54.90	55.76	55.00	55.89	55.63	56.58
ZYHN	<i>COSCO SHIPPING Energy</i>	52.19	53.78	54.15	53.84	55.89	55.95	55.78	55.70
ZSNY	<i>NANJING TANKER Corporation</i>	52.53	52.83	52.75	51.08	47.62	44.97	43.59	39.69
ZSLC	<i>CHINA MERCHANTS Energy Shipping</i>	49.66	51.34	59.51	59.31	60.72	60.87	60.03	53.03
CHFH	<i>CHANG JIANG Shipping</i>	38.30	35.11	33.98	39.94	32.60	32.35	32.27	34.31
NBHY	<i>NINGBO Marine</i>	45.32	44.30	44.28	39.86	38.43	36.99	35.61	35.04

Appendix C.

Earnings Per Share	2017 Q1	2017 Q2	2017 Q3	2017 Q4	2018 Q1	2018 Q2	2018 Q3	2018 Q4	2019 Q1	2019 Q2	2019 Q3	2019 Q4	2020 Q1	2020 Q2	2020 Q3	2020 Q4	2021 Q1
ZYHF	140.3533	3,681.250	-58.5227	-67.8696	-19.1919	-93.3884	461.6438	80.0725	112.5000	562.5000	-18.5366	-21.7304	-42.1569	66.4151	111.0778	1.5424	141.6949
ZYHK	106.0150	158.4708	143.3943	89.2697	-32.9545	-108.7821	-5.8548	600.0000	216.9492	427.7372	-10.8209	953.0556	-57.5758	53.6748	209.7629	30.5460	5,195.798 ₃
ZYHT	1,200.000	1,681.250	211.1940	342.5000	76.9231	-35.0877	-22.0624	-156.4972	56.5217	72.4324	-32.0000	-7.0000	-85.4167	-1.2539	33.4842	78.5047	385.7143
ZYHN	263.8021	-82.6918	-1.8981	272.0588	-115.1038	-145.4545	-113.2383	-28.0497	603.3175	131.0769	316.9231	-140.4968	24.2938	4,636.633	210.2837	-432.8000	-45.5303
ZSNY	-17.8808	-47.9853	-26.8966	-14.0562	-27.8226	63.3803	-86.7925	29.9065	100.0000	34.9138	1,289.285	147.1223	322.0670	163.8978	11.3111	-97.3799	-85.8372
ZSLC	-28.0303	-81.3707	-6.1828	-122.9730	-84.3860	-72.8395	-34.0974	826.0606	421.3483	188.1818	78.2609	10.2671	304.9569	733.4385	237.5610	-235.0492	-69.8244
CHFH	68.0000	179.5580	22.4000	28.1250	238.0952	153.4722	-44.4444	-92.0732	-11.9718	-70.4110	-30.5882	100.0000	-87.2000	-72.2222	3.3898	-111.5385	293.7500
NBHY	1,791.666	566.0000	-9.5949	40.6728	5.7269	75.0751	-25.9434	113.2609	17.0833	36.8782	36.9427	-113.6595	-189.3238	-51.8797	139.5349	260.4478	259.3625
Operate Expense	2017 Q1	2017 Q2	2017 Q3	2017 Q4	2018 Q1	2018 Q2	2018 Q3	2018 Q4	2019 Q1	2019 Q2	2019 Q3	2019 Q4	2020 Q1	2020 Q2	2020 Q3	2020 Q4	2021 Q1
ZYHF	-46.7760	19.6970	19.6363	11.5386	-9.9198	23.2730	15.7933	-40.0859	-8.2695	-25.5002	-38.1774	42.6093	-2.3230	19.8819	59.4355	59.6998	67.0359
ZYHK	34.8498	11.0057	13.4655	6.2522	8.8241	4.0640	53.4944	65.5452	54.2843	50.9309	3.4566	2.6841	5.5768	3.5048	5.2379	20.7730	31.6697
ZYHT	17.6610	9.3463	-2.1464	-13.2926	1.1296	5.5265	32.9435	43.9266	17.9215	18.7261	-5.9153	10.2171	5.1236	-9.1200	-19.9976	-34.1631	-22.8529
ZYHN	-44.9577	-48.0668	11.0225	31.8780	18.1885	44.9710	48.4987	37.4733	34.1311	13.1612	-0.5227	-5.8056	5.6444	8.4771	1.6621	-2.3675	-11.9585
ZSNY	-33.3512	-42.4139	-36.1878	-35.3651	-1.5570	-8.2117	-8.3040	-15.5903	-3.1915	9.4628	4.6621	7.9380	4.3904	-12.8225	-12.4510	-10.7630	-1.8893
ZSLC	28.0647	38.5474	25.2391	16.3141	8.4189	-1.1292	21.6286	23.0284	28.4888	37.3775	24.9547	15.6450	0.9684	-4.0603	-28.3594	-1.4059	-7.9192
CHFH	19.7444	24.9484	27.0437	11.7960	10.8890	1.4488	-10.6932	-9.0657	-5.4876	6.6369	18.0344	-8.6515	-14.1768	-19.9915	-16.2022	17.4517	26.9961
NBHY	62.0170	61.4518	22.3018	51.3800	34.1315	14.6611	34.5597	17.7945	-13.8659	-21.4473	-13.2595	8.2741	-0.1837	1.2266	10.4161	9.3745	8.5259

Gross Margin	2017 Q1	2017 Q2	2017 Q3	2017 Q4	2018 Q1	2018 Q2	2018 Q3	2018 Q4	2019 Q1	2019 Q2	2019 Q3	2019 Q4	2020 Q1	2020 Q2	2020 Q3	2020 Q4	2021 Q1
ZYHF	323.8707	16.1149	38.3253	22.3475	28.4843	-12.7108	20.1212	72.8073	-23.0875	3.4759	-6.8319	-5.5857	41.7391	20.0774	14.7499	45.4464	19.4751
ZYHK	905.9490	266.3339	457.9989	42.8993	11.9395	-46.4227	54.3324	107.1773	126.5786	219.3959	42.2586	-4.4030	-17.9499	-6.1111	53.0664	167.6057	569.4782
ZYHT	19.0854	56.6953	279.2098	97.8734	1.8664	-3.0857	2.0315	-3.9714	39.0330	-10.4635	30.1880	-18.3182	-19.6757	-7.4945	-18.0500	0.5649	-0.7781
ZYHN	-18.7049	-29.7375	-42.8911	-51.4373	-71.2800	-66.3123	34.5704	197.5027	293.7647	97.3795	57.6811	-44.8411	5.9931	436.5005	13.5321	-32.5692	-62.5976
ZSNY	-2.2991	-55.1223	-25.7693	-21.0226	-45.0571	30.0193	-36.6940	14.4466	115.4454	23.2706	204.2222	61.8487	20.1195	111.0674	13.1673	-45.0190	-40.2370
ZSLC	-19.1339	-49.8224	-51.1799	-41.8846	-75.9579	-60.3453	10.6839	91.7156	75.2483	70.0472	46.0419	73.9816	150.0478	242.4675	54.0307	-90.3231	-63.2501
CHFH	24.1102	15.8745	14.1209	-19.7832	59.5307	187.1645	-38.2748	-48.4496	-46.7875	-63.1098	-16.5771	21.2096	-29.7249	-27.8497	2.8761	-2.5576	103.5119
NBHY	47.5371	47.8533	-2.1426	23.2088	10.7817	56.2986	-5.9799	7.0803	-4.1412	-9.5035	10.1627	-18.7780	-107.5973	-38.0010	49.3851	-10.1478	965.6747
Net Profit	2017 Q1	2017 Q2	2017 Q3	2017 Q4	2018 Q1	2018 Q2	2018 Q3	2018 Q4	2019 Q1	2019 Q2	2019 Q3	2019 Q4	2020 Q1	2020 Q2	2020 Q3	2020 Q4	2021 Q1
ZYHF	143.2474	-15.0154	-79.4422	449.0313	-16.5608	-89.5903	363.5373	69.9385	96.3721	307.7308	-18.9973	-22.1499	-42.6607	66.5140	111.2082	1.4298	141.9900
ZYHK	111.0419	221.5657	164.9744	146.8809	3.4168	-90.6417	16.7613	239.4703	120.3802	293.3736	-0.3145	661.1187	-38.2789	17.5144	164.9431	12.1687	2,539.470
ZYHT	325.0301	1,582.922	206.4451	334.7762	75.9760	-35.1142	-21.7728	-156.0004	56.7836	71.0739	-32.8503	-1.4320	-86.1090	-0.7017	33.4844	81.0000	471.0306
ZYHN	8.4580	-75.8107	9.0663	288.3048	-108.2002	-124.4488	-94.6450	-20.9242	1,096.265	238.7292	728.0490	-124.7485	34.5058	2,128.192	156.9235	-753.4649	-40.3035
ZSNY	-17.6462	-46.3314	-26.9788	-17.2819	-28.6244	58.4435	-86.1535	31.8597	103.2586	34.8219	1,230.531	145.6170	315.5019	157.8500	9.2810	-96.4092	-85.7032
ZSLC	-25.5298	-80.5165	-44.0337	69.5756	-98.8092	-96.5185	-45.1585	1,850.820	146.7579	68.2682	79.7698	21.8667	260.0995	506.2588	123.1235	-234.4403	-68.2561
CHFH	64.8622	179.5012	22.2926	28.4223	241.9070	152.7379	-44.3194	-91.8304	-12.1976	-70.3482	-30.3411	92.2035	-87.1805	-72.1585	3.3751	-112.4456	295.1605
NBHY	1,241.468	328.5594	3.5502	40.6882	2.1898	63.7151	-27.9249	18.9969	-6.2237	35.6945	3.7994	-75.7283	-177.4998	-54.3429	104.3990	108.2060	247.3614
Operate Profit	2017 Q1	2017 Q2	2017 Q3	2017 Q4	2018 Q1	2018 Q2	2018 Q3	2018 Q4	2019 Q1	2019 Q2	2019 Q3	2019 Q4	2020 Q1	2020 Q2	2020 Q3	2020 Q4	2021 Q1
ZYHF	152.9952	2.8634	-41.3588	804.2174	-8.6197	-67.7800	196.8220	16.6079	64.9884	18.8785	-16.8483	-1.5103	-42.9572	77.5766	126.3532	-3.5092	154.9272
ZYHK	110.5314	248.3355	151.9991	3,831.171	25.4857	-89.1128	-31.1773	280.0079	107.1766	267.3878	161.1018	436.4064	-34.2113	12.1283	138.8263	-0.2881	2,150.889
ZYHT	210.8661	25,332.34	226.8471	477.7485	-15.0587	-61.0232	-56.3830	-125.3673	62.7484	99.0650	223.7359	339.8340	-77.4026	-28.4907	-55.3364	-143.9152	180.1701
ZYHN	8.1717	-61.2341	-78.8594	652.4541	-106.0488	-106.0648	-12.8373	124.9536	1,397.939	571.3213	324.1743	-70.9137	41.2777	1,440.910	107.6474	-745.1439	-37.4405

ZSNY	-14.2457	-47.9984	-26.0888	-35.2879	-45.4437	76.9966	-56.1890	24.6534	209.5017	38.0448	531.9814	98.4088	29.4238	153.1523	11.8014	-92.8661	-48.3940
ZSLC	-25.0036	-53.6678	-74.9180	-39.1957	-97.6406	-94.6198	7.0232	680.0707	122.9623	62.3763	64.9256	35.6732	257.2945	475.1629	117.3287	-214.7761	-66.7345
CHFH	55.5333	172.1250	55.4641	-28.8772	345.7170	1,361.657	-44.7318	-102.5403	-11.5539	-77.5022	-16.5980	282.3767	-73.6336	-73.2758	-2.8942	-129.9619	162.6677
NBHY	918.5589	374.6157	-2.3588	44.1388	20.6971	96.0999	-15.4035	19.4589	0.4353	30.4701	6.3310	-63.0643	-144.7424	-57.2495	79.0960	41.6668	353.1542

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