8-27-2011

Research on the impact of container freight derivatives on shipping

Zhenle Shen

WORLD MARITIME UNIVERSITY

Shanghai, China

RESEARCH ON THE IMPACT OF CONTAINER FREIGHT DERIVATIVES ON SHIPPING INDUSTRY

By

SHEN ZHENLE

China

MASTER OF SCIENCE

2011

Assessor: Professor Xu Dazhen

International Transportation and Logistics 2011

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.

……

(Shen Zhenle)

……

Supervised by

Professor Xu Dazhen

Shanghai Maritime University

Assessor

World Maritime University

Co-Assessor

Shanghai Maritime University

ACKNOWLEDGEMENT

I am grateful to the World Maritime University and Shanghai Maritime University for giving me this opportunity to study. First of all, I am thankful to my supervisor Professor Xu Dazhen for giving me some indications of the thesis and providing me with useful advice and opinion into this paper. Without his help, I will never be able to finish his paper.

I also want to thank my parents' kindness, they gave me a lot of support in providing a good environment for me to study and write my paper. My classmates also gave me some valuable ideas in my paper and my study.

Abstract

Title of Dissertation: Research on the Impact of Container Freight Derivatives on Shipping Industry

Degree: Master of Science in International Transport and Logistics

Derivatives provide users of both financial and non-financial services with mechanisms to deal with a wider range of business risks. Nowadays, the derivatives industry itself is undergoing a reform after the financial crisis in 2008. While derivatives markets, with the exception of credit default swaps (CDS), were generally not responsible for the financial crisis, they have nevertheless come under intense scrutiny, particularly in the US and EU, from regulators seeking to avoid the possibility of a future crisis. Providers and users of derivatives are worried about the fact that a balance is achieved between, on the one hand, delivery of safe and sound markets and, on the other, the ability of users to manage risks effectively.

Shipping industry is always defined as capital intensive, cyclical, volatile, seasonal and exposed to the international business environment. The parties involved in the market, ship owners, charterers, and shipbrokers, all face significant risks. Therefore, risk management in shipping has been important from long time ago. Freight derivatives contracts are popular and at the same time effective tools for hedging freight rates in the shipping industry.

This paper aims to find out the impact of freight derivatives, especially the container

freight derivatives on shipping industry in various perspectives. It comes as a response to the increasing calls for container freight derivatives. The highly volatile and risky business environment that companies in the industry operate in makes it imperative for them to identify the sources of risk that they face, but also to know how to deal with them effectively. Implementing risk management strategies in the increasingly sophisticated and competitive environment companies operate in our days, can often make the difference between being able to stay in business or not. It can give these companies a comparative advantage over the intense competition that they face in the sector.

This paper is organized as follows. In the first part, some basic ideas and principals about freight derivatives are introduced. Then, the paper explains how exactly SCFI and CFSA works and how they can be used to hedge against vitality in freight rate. And later, the impact of freight derivatives on shipping is analyzed through different perspectives. Also, this is further illustrated by a case study of the link between Composite SCFI vs. AP Moller-Maersk (Share Price). Finally, the paper closes with discussion, practical implication and further research.

KEYWORDS: Container Freight Derivatives, Risk Analysis, Container Shipping Industry

Table of Contents

DECLARATION ..... **i**

ACKNOWLEDGEMENT ..... **ii**

Abstract ..... **iii**

LIST OF TABLES ..... **vi**

Chapter 1 Introduction **1**

1.1 Background of Freight Derivatives 1

1.2 Literature Review 4

1.3 Research Methodology 15

1.4 Excepted Contribution 16

Part I Derivatives and Its Mechanisms **17**

Chapter 2 Introductions to Derivatives Products and Their Users **17**

2.1 Generally on Derivatives 17

2.2 Over the Counter and Forward Contract 17

2.3 Futures Contracts and Options 18

2.4 Derivative Contracts Markets in the Maritime Industry 21

Chapter 3 Characteristics of Container Freight Derivatives **27**

3.1 The Concept of Container Freight Derivatives 27

3.2 The Development of Container Freight Derivatives 27

Chapter 4 SCFI and CFSA **30**

4.1 Basics of SCFI 30

4.3 Basics of CFSA 33

Part II The Impact of Container Freight Derivatives on Shipping Industry 34

Chapter 5 Container Freight Swaps: From a Risk Management Perspective 34

5.1 Risk Management and Shipping 34

5.2 Speculation and Arbitrage Opportunities 38

5.3 Price Discovery and other properties of CFSA 39

5.4 Alternative users and uses of CFSA 41

Chapter 6 Container Freight Swaps: From a Corporate Perspective 43

6.1Case study: Composite SCFI vs. AP Moller-Maersk (Share Price) 43

6.2 Data Collection and Proposed Analysis Method 44

Chapter7 Conclusions 47

LIST OF TABLES

Figure1: Payoffs from Forward Contracts

Figure2: Payoffs and Profits from Option Contracts

Figure3: Yearly Volumes of the BIFFEX Contracts (May 1985-April 2002)

Figure4: Yearly Volumes of Dry-Bulk FFA Contrasts (Jan. 1992- Sept. 2005)

Figure5: Composite SCFI vs. AP Moller-Maersk (Share Price)

Table1: Baltic Panamax Index (BPI) Composition, 2006.

Table2: NYMEX Freight Futures

Table3: AP Moller Maersk's Share Price

Table4: Composite SCFI Index

Chapter 1 Introduction

1.1 Background of Freight Derivatives

Derivatives provide users of both financial and non-financial services with mechanisms to manage a broad spectrum of business risks. While derivatives markets, with the exception of credit default swaps (CDS), were generally not responsible for the financial crisis, they have nevertheless come under extreme scrutiny, mostly in the US and EU, from regulators seeking to avoid the possibility of a crisis that might happen in the future. It is alongside with other parts of the financial services the derivatives industry is undergoing reform following the financial crisis of 2008. Providers and users of derivatives are concerned that a balance is achieved between, on the one hand, delivery of safe and sound markets and, on the other, the ability of users to manage risks effectively.

Shipping industry is usually defined as capital intensive, cyclical, volatile, seasonal and exposed to the international business environment. The parties involved in the market, ship owners, charterers, and shipbrokers, all face significant risks. Therefore, risk management in shipping has been critical for a long time. Freight derivatives contracts are popular and effective tools for hedging freight rates in the shipping industry. The introduction of trading freight derivative contracts can be dated back to 1985 when the Baltic International Freight Futures Exchange (BIFFEX) was introduced.

A fairly large number of the broking houses have been and are still using freight derivatives to hedge or take a position on the future movement of freight rates.

1.2 The Current Development of Container Freight Derivatives

Freight derivatives in containers were developed to provide a means of managing exposure to market risk that could be leveraged by all parties involved in the liner shipping industry in the same way that other freight sectors have been doing successfully for more than 20 years. Container derivatives, also referred as "Box derivatives", officially termed Container Freight Swap Agreements (CFSA), are a financial instrument that allows companies involved in this contract to hedge their exposure to freight rate volatility.

Box derivatives are intended to be used by three main groups of participants: ship owners or operators whose freight income and profit margin is exposed to freight rate volatility; freight forwarders and shippers/consignees whose freight costs are similarly exposed to the shipping environment; and those with no such physical exposure, for example, those people who seek their profit from freight rage change by purely trading the CFSA (e.g. investment bank traders and hedge funds). There is one point to be noted that CFSA do not produce a physical movement of the actual cargo but are a cash-settled agreement between two parties from different sides of the business (i.e. carrier and shipper) that differ in opinion on future box rates.

The parties agree on a price in USD/TEU for a given volume, usually measure in TEU or FEU, on an agreed route and over a specific time period in the future. At the end of the contract period, the parties settle the difference in cash between the pre-agreed contract rate and the resultant market rate.

Clarkson Securities Ltd executed the first Container Freight Swap Agreement (CFSA) in January 2010 allowing counterparties, for the first time, to fix a specified freight rate (USD $ per TEU or FEU) for forward positions without any underlying market risk.

Unlike a physical freight contract, where each party is at risk that the other will perform the contract or not, the derivative has its own pattern that allows for the physical business to be conducted at the spot market rate while the derivative market provides each party with their fixed price. The derivative is actually a process that price risk is transferred to the contract, where shippers, logistics providers and carriers are all be able to focus on their service quality and efficiency.

Settlement is effected against the relevant route assessment of the Shanghai Container Freight Index (SCFI) published by the Shanghai Shipping Exchange. Settlement is calculated on the average of each publication date during the contracted month. Payment is made between counter parties in cash within five days, subject to adjustment in line with the "nearest business day convention," following the settlement date. Commissions shall be agreed between principal and broker.

The broker, acting as intermediary only, is not responsible for the performance of the contract.

1.3 The Research Problem of This Paper

This paper aims to find out the impact of freight derivatives, especially the container

freight derivatives on shipping industry in various perspectives. It comes as a response to the increasing calls for container freight derivatives. The highly volatile and risky business environment that companies in the industry operate in makes it imperative for them to identify the sources of risk that they face, but also to know how to deal with them effectively. Implementing risk management strategies in the increasingly sophisticated and competitive environment companies operate in our days, can often make the difference between being able to stay in business or not. It can give these companies a comparative advantage over the intense competition that they face in the sector.

1.2 Literature Review

There are four main bodies of specific research related to the research problem of this paper. The first area of the related research studies the general introduction of freight derivatives. The second area of the related research studies the risk management perspective of freight derivatives. The third body of this paper mainly focuses at the corporate side of freight derivatives and the practical implementation of container freight derivatives.

1.2.1 Derivatives Products and Their Users

As price risk is managed through using tools like derivative contracts. There are different derivative contracts that can be used for risk management. A derivative is a contract for a transaction whose value depends or derives from the values of other more basic variables. The asset proper can be the financial asset, commodity,

reference rate or index from which a derivative contract derives its value. Generally the terms of a transaction was defined by these instruments that will take place in the future. Examples include forward, futures, swaps, and options. The two major classifications of derivatives are ‘exchange traded’ and ‘over the counter’(OTC) In an exchange-traded market, individuals trade standardized contracts whose terms have been defined by the an exchange.

Traditionally, exchanges have used an ‘open-outcry’ system, where traders meet on the floor of the exchange and use shouting and a complicated set of hand signals to indicate the trades they would like to carry out. In recent years however, they have moved from open-outcry to electronic trading. The latter involves traders entering their trades into a computer system which then automatically matches buyers and sellers in the market. As will be discussed in more detail later, contracts traded at organized exchanges have no credit risk. In an over-the-counter (OTC) market, contracts are bought and sold through a computer- and telephone-linked network of dealers, who do not physically meet in the marketplace. The key feature of this market is that the terms of the contract are not specified by an exchange but are tailored to meet the specific needs of the clients. As such, the participants have the flexibility to negotiate any mutually attractive deal in terms of expiry date, reference price, amount, underlying commodity etc. However, there is usually some credit risk involved in these transactions, usually the risk that counter-party may default on any particular deal.

There are quite a few books that specialize in futures and freight derivatives.
In “Shipping Derivatives and Risk Management” Written by AMIR ALIZADEH and

NIKOS NOMIKOS, clear definitions are given on some of the major shipping derivatives and the authors also discussed shortly about how these derivatives are traded.

Forward contract

A forward contract is an agreement entered into today between two parties, A and B, according to which, Party B has the obligation of delivering at some fixed future date a given quantity of a clearly specified underlying asset, and Party A the obligation of paying at that date a fixed amount that is agreed today (at ‘date 0’), and that is called the forward price at date 0 of the asset at date T, denoted as F(0, T). The underlying asset can be a financial asset (such as interest-rate payments) or a commodity (gold or oil) although in many cases cash settlement is also possible where the amount exchanged is the cash value of the commodity or asset; this is, for instance, so in the case of many financial assets, commodities and freight. Bearing in mind that the buyer of the forward contract can immediately sell the underlying asset at the maturity of the forward contract, the profit and loss (P&L) of Party A (who is the buyer of the forward and is also called ‘long forward’) and Party B (who is the seller, called ‘short forward’).

Futures contracts

Futures contracts are very similar to forward contracts in terms of both their definition and functioning in that they are a contract for the delivery of a specified quantity of an underlying asset at some future date, at a price agreed today. There are, however, some key differences between forwards and futures:

Futures are traded in organized exchanges whereas forwards are traded over-the-counter, usually through a broker. Since futures are exchange-traded contracts, they are guaranteed by a clearing house which effectively acts as a central counter-party for each trade and guarantees the performance of the underlying contracts. Forward contracts, in contrast, are traded on a principal-to-principal basis and, as such, the counter-parties have to assume each other's credit risk, that is, the risk of a loss because of the default of the other party in the contract. It should be noted that it is also possible to have clearing for OTC contracts, where a contract that has been traded outside an exchange can then be cleared through a clearing house.

Traders need to deposit an initial margin with the clearing house and then the P&L from the position is realized on a daily basis through a process known as 'marking to market'. On the other hand, for a forward contract there is, usually, no requirement for margin deposit and the P&L from the position is realized at the contact's maturity.

Futures contracts are standardized in terms of their specifications, such as the underlying asset, contract quantity, maturity etc. Forward contracts, on the other hand, are tailor-made to suit the requirements of each party to the contract.

Finally, because futures contracts are traded in exchanges, most of the positions are terminated prior to the settlement of the contract simply by closing out the position. However, since forward contracts tend to be bespoke contracts between the counter-parties, these positions are usually carried to maturity, although early termination may be negotiated between the counter-parties.

Swaps

A swap is an agreement between two or more parties to exchange a sequence of cash flows over a period of time, at specified intervals. For example, Party

A might agree to pay a fixed rate of interest on a notional principal of US$1 million each year, for five years, to Party B. In return, Party B will pay a floating rate of interest on US$1 million every year for the next five years. This particular swap is called a ‘fixed-for-floating interest-rate swap’. Swaps are mostly negotiated OTC and are very similar to forward contracts. In fact, as we will see in Chapter 11 when we discuss the valuation of interest-rate swaps, a swap contract is equivalent to a portfolio of forward contracts. There are four basic kinds of swaps: ‘interest-rate swaps’, where payments based on two different interest rates on a notional principal are exchanged, similar to the example presented above; ‘currency swaps’, which involve exchange of interest payments denominated in two different currencies; ‘asset swaps’, which involve the exchange of fixed for floating returns based on the returns of an underlying asset that could be a stock, stock index, stock portfolio, or a commodity; and a ‘credit swap’, a contract that is designed to transfer credit risk from one counter-party to another. Swaps can also be classified as ‘plain vanilla’ or ‘flavored’. For instance, the fixed-for floating swap described above is a plain vanilla swap; with flavored swaps, the terms of the contracts can be customized to meet the particular needs of the swap counter-parties.

Options

Options are financial contracts which give their holder flexibility; that is the

right – but not the obligation – to either buy or sell an asset at a specified price, if market conditions are favorable. There are two major classes of options: ‘call

options' and 'put options'. The owner of a call option has the right, but not the obligation, to purchase the underlying good at a specific price and this right lasts until a specific date. The owner of a put option has the right, but not the obligation, to sell the underlying goods at a specific price and this right lasts until a specific date. In other words, the owner of a call option can call the underlying good away from someone else. Likewise, the owner of a put option can put the good to someone else by making the opposite party buy the good. (Kolb and Overdahl, 2007). Obviously this right is very valuable and, hence, to acquire these rights option buyers must pay the price, called a premium, to the option seller.

The users of freight derivatives

Usually there are three categories that can define the majority of the traders that use forwards, futures, option and similar derivatives financial instruments: these are hedgers, speculators and arbitrageurs. All these traders use derivatives for their own specific reasons.

The author gave full details on the major participants of freight derivatives in the paper 'FFA Market set and discovery of Spread Play Opportunities' written by Chatzipanagiotis Vasilis.

Hedgers use forwards, futures contracts and options, for risk management purposes, which derives from market fluctuations and future volatility in market indicator. There is a difference between forwards contracts and options when they are used by investors for risk management reasons. The use of forwards "locks" the hedger at a price. This is the price that the hedger has to pay or receive for the underlying assets

whatever happens in the physical market. On the contrary, the use of options offers the hedger the ability to protect himself against future asset price volatility, while he still holds the right and the opportunity to benefit from favorable price movement.

While hedgers use derivatives products in order to manage the risk they face in a market, a speculator, ,based on his expectations about the future price of the underlying asset, takes a position in the futures, forwards or the options market. If the speculator believes that the price of an underlying asset will rise in the future, then he will take a long future contract. So, he will agree to buy the underlying asset on a certain date in the future at a futures price agreed today.

If the speculators' expectations materialize, and the future spot price is higher than the price agreed in his contract, he will buy the asset at a agreed price, then sell it simultaneously in the physical market, and make himself a profit from the price difference. The opposite will happen if the speculator is bearish about the market, that is, if he believes the market will weaken. Then he will take a short position in the forward or future market, and agree to sell the asset in the future at a specific price. If again his expectation about the asset price materializes, he will buy the asset in the lower spot price at maturity, and sell it on exportation date as his contract commands at the agreed higher price, and thus make a profit. (Chatzipanagiotis Vasilis , 2005)

Speculators can also use options contracts to take a position in the market depending on their expectations. While with the use of futures or forwards, the speculator can have large potential profits or losses, with the use of option contracts, the investor's loss can only be the price he paid for buying the option.

Finally, arbitrageurs are the last group of trades that can use forwards, futures or options. Arbitrage is called the discovery of riskless opportunities to make profit by entering simultaneously in two or more different markets. When the price of an asset in a market is different than the same asset's price in a different market (for example a stock listed in two exchange markets), then an arbitrage opportunity is created. The arbitrager can buy the asset from the market that provides the lower price and simultaneously sell it at a higher price in the other market.

Usually an arbitrage transaction has to be made in high volumes for the profit to offset the usual transaction costs that all positions involve. Theoretically arbitrage opportunities hardly exist, but even if they appear they will last only for a very small time. Demand for the asset at the market where the price is lower will automatically raise the price in this market to bring it to equilibrium with the higher price in the other market.

Finally another reason that all these groups of traders participate in the derivatives markets, either with the use of forwards, futures or options contracts is the gearing that these instruments provide to the investor. Possible large profits that may come from derivatives markets usually demand on behalf of the investor the expenditure of a disproportionate low amount. The possible large profits that may come from a small in terms of money investment represent an important gearing opportunity for the trader. (Chatzipanagiotis Vasilis , 2005)

1.2.2 Container Freight Swaps: From a Risk Management Perspective

In all lines of business, exposure to unanticipated fluctuations, on both the revenue and the cost sides, is not desirable. The shipping industry is no different from other industries in this respect. Extreme fluctuations in freight rates and ship prices throughout the years have been affecting shipping companies' cash flows and, in some cases, forced some of those companies out of business. In markets dominated by uncertainty and risk, it is always prudent to employ methods which reduce or eliminate such uncertainties. The significance of risk management in the freight market has been recognized among the participants in the shipping industry for a long time, as indicated by the development of physical hedging methods, such as period time-charter contracts and Contracts of Affreightment (CoA); the use of these instruments for hedging freight rate risk has been discussed extensively by Gray (1990).

However, it was not until the early 1980s when shipowners, charterers and other parties involved in shipping realized that risk-management techniques which had been applied successfully in commodity and financial markets (such as hedging using futures, forwards, swaps and options) could also be developed and applied for risk management in the shipping industry.

In order to trade derivatives on freight, a necessary condition is the availability of reliable price information on the underlying freight market, based on which derivatives can be priced and settled. This is an important requirement since trading any derivative contract relies on the availability of continuous, measurable and fully transparent price information on the underlying asset. Therefore, the aim of this

chapter is to provide an overview of the freight-market information that is used for the pricing and the settlement of freight derivative contracts. The emphasis is on the indices produced by the Baltic Exchange as this is the leading provider of freight-market information and most of the derivative transactions in the dry and wet markets are settled on the basis of these indices, and also because the structure and composition of these indices gives us insights on how freight derivatives can be used for the purposes of hedging. The different types of freight-market information are discussed in the first part of the chapter.

Chatzipanagiotis Vasilis writes in his paper 'FFA Market set and discovery of Spread Play Opportunities' that:

Just like any other industry that faces fluctuation to some elements of its income or expenditure makes use of derivatives products to hedge its position, so has the shipping industry made use of the forward freight agreement as its main risk management tool the last 5 to six years.

Risk management is all about controlling exposure to volatile markets and locking-in a percentage of profits or equally protecting against losses(Drewry, Shipping Futures and Derivatives ,1977). A shipowner can face many risks because of various markets' volatilities. For sure the most important part for a shipowner's cash flow position is the compensation that he receives for the delivery of his services, the freight rate.

The freight market is a high cyclical market with continuous fluctuations. The volatility in the freight may come by seasonal, cyclical reasons or random shocks

(Kavussanos, 2002). In the container sector for example, freight rates increases in October and November and drop sharply in January.

Also, it has been shown that freight rates as also ship prices seem to show higher volatility, than smaller vessels. So a shipowner can adjust has level of risk by diversifying his portfolio between larger and smaller vessel. (Kavussanos, JTEP & LTR, 1966/7)

Besides the freight rate, a shipowner has also to face possible risks in many other markets. He is exposed to the interest rate market (in case he has been financed by a loan), the exchange rate market(since shipping is one of the most globalized industries), and also the bunker cost(as the price of IFO is also highly volatile). All these risks can be effectively controlled by the shipowner with the use of specialized derivatives products such as interest rate and exchange rate swaps and options, and bunker options.

1.2.3 Container Freight Swaps: From a Corporate Perspective

Container Freight Swap Agreement (CFSA) is a relatively new business in the shipping industry. The first trade of the Container Freight Swap Agreement (CFSA) was made by Clarkson Securities Limited, the derivatives broking arm of Clarkson PLC, between Morgan Stanley, the global investment bank and Delphis, the regional container shipping specialist.

Relevant paper on this issue is also hard to find as the industry is just starting to

accept this new derivatives. This paper will carry out some original study on this aspect and try to offer a new perspective for the industry.

1.3 Research Methodology

1.3.1 Selection of Research Method

There are four main bodies of specific research related to the research problem of this paper. The first area of the related research studies the general introduction of freight derivatives. The second area of the related research studies the legal aspect of the freight derivatives. The third body of this paper mainly focuses on the risk management perspective. The fourth body of related research looks at the corporate side of freight derivatives and the practical implementation of container freight derivatives. A case study that shows the internal relation between the SCFI and AP Moller (Share Price) will be discussed to further support this analysis.

1.3.2 Data Collection and Proposed Analysis Method

Historical data of SCFI and AP Moller Maersk's Share Price from October 16, 2009 to February 25, 2011 was chosen to analyze the correlation of these two series of data. As the composite SCFI Index consist several sub-indexes, these sub-indexes are also taken into consideration.

Excel is used to exam the correlation coefficient between these two series of data.

1.4 Excepted Contribution

This paper aims to bridge the link between the freight market and the real shipping business. It points out some of the most important principles in dealing with freight derivatives and how they can be utilized to be conductive to a corporation.

This paper is organized as follows. In the first part, some basic ideas and principals about freight derivatives are introduced. Then, the paper explains how exactly SCFI and CFSA works and how they can be used to hedge against vitality in freight rate. And later, the impact of freight derivatives on shipping is analyzed through different perspectives. Also, this is further illustrated by a case study of the link between Composite SCFI vs. AP Moller-Maersk (Share Price). Finally, the paper closes with discussion, practical implication and further research.

Part I Derivatives and Its Mechanisms

Chapter 2 Introductions to Derivatives Products and Their Users

2.1 Generally on Derivatives

Shipping financial derivatives are most of times derivatives that are related to shipping indexes. These kinds of derivatives are risk controlling tools that can be used in relating crude oil and iron industry trading industry, so that the freight of these industry products can be controlled. The appearance of future that based on BDI, the first future in maritime industry, marked the maritime freight derivative market has enter into a speedway. BIFFEX, FFA, and freight option are three major tools that can be used to avert freight fluctuation risks and that have inserted great energy into the development and prosperity of the maritime freight derivative market.

In 1985, BIFFEX was introduces by the Baltic Exchange. The index used at that time was the BDI where the participants use a format contract in this freight derivative, and also by using 11 different routes to hedge against their risks. BIFFEX was once very popular among those investors, but there were problems, such as the inefficiency in hedging against risks and lack of liquidity, which lead to its out in 2002.

2.2 Over the Counter and Forward Contract

Forward Contracts

Forward contracts obligate the holder to buy or sell an asset for a predetermined delivery price at a determined future time (Hull, 2006). They are private agreements

between two counter parties and are traded in over-the-counter markets. Therefore, forward contracts are usually tailored to meet the counter parties' unique needs. However, they also expose the counter parties to credit risks because over-the counter markets are ruled by participants themselves, not by any formal organizations where are any rules and regulations. The payoffs from forward contracts are the difference between the spot price (denoted by S_T) at the predetermined time (denoted by T) and the predetermined price (denoted by K). Specifically, the payoff for the buyer (who is said to hold a long position) is (K-S_T); conversely, the seller is said to hold a short position and her payoff is (S_T-K). These are illustrated in Figure 1.

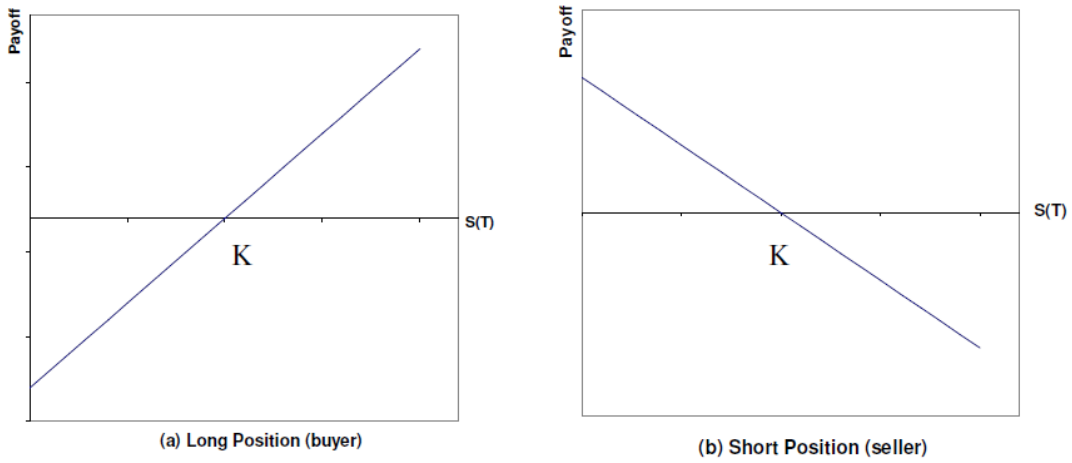

Figure1: Payoffs from Forward Contracts

2.3 Futures Contracts and Options

Futures Contracts

Futures contracts obligate the holder to buy or sell an asset at a predetermined

delivery price at a specified future time. Like Forward contracts, Futures contracts are agreements between two parties (Hull, 2006) where the payoff is the difference between the spot price and the contract price. Contrary to Forward contracts, however, Futures contracts are traded on an exchange, such as the Chicago Mercantile Exchange or the New York Mercantile Exchange, which standardizes the contract features and regulates trading. As a result, contractual risks are eliminated, but these standardized contracts may not provide perfect hedging.

Option Contracts

Option contracts provide the holder with the right to buy or sell an asset at a predetermined delivery price on or before a predetermined date. The predetermined price is referred to as the strike price or the exercise price; the predetermined date is known as the expiration date or the maturity date. There are two basic types of options: call options and put options. A call option gives the right to buy the underlying asset. A put option, by contrast, gives the right to sell it. Basic options can be American or European.

American options can be exercised anytime up to the expiration date whereas European options can be exercised only on the expiration date. Since either type of option gives the right but not the obligation to do something, the payoff is different from either Forward contracts or Futures contracts. Taking a European option as an example, the payoffs (see Figure 2) for the two sides of a call option and a put option are

long call payoff = max $(S_T - K, 0)$;

short call payoff = min $(K - S_T, 0)$;

long put payoff = max $(K - S_T, 0)$;

short put payoff = min $(S_T - K, 0)$.

Option contracts provide the holder with more flexibility. Consequently, the holder has to pay for these options. To get the actual profit or loss, the cost of an option contract must take this into account. Figure2 illustrates this point.

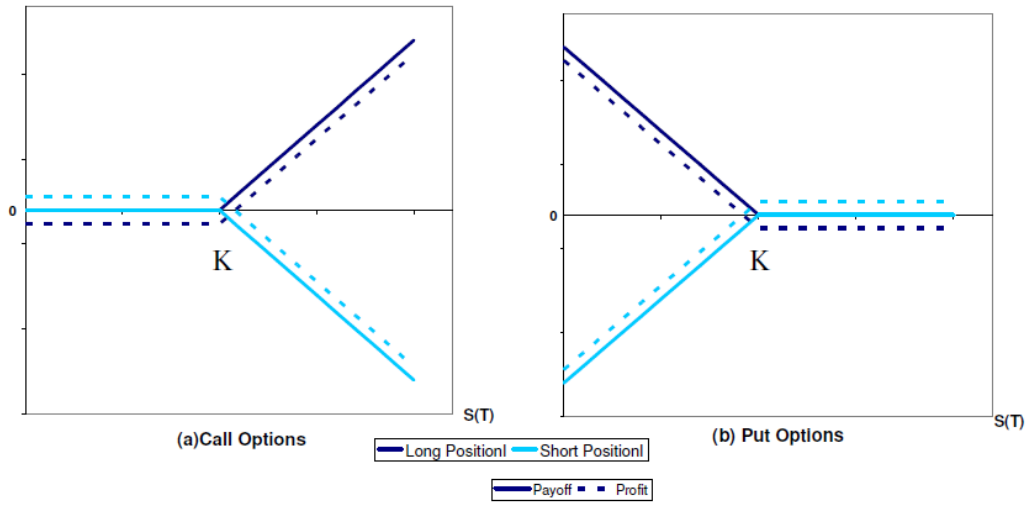

Figure2: Payoffs and Profits from Option Contracts

The options presented above are called "vanilla options" and their payoffs are path independent because they are determined by spot values. By contrast, options whose payoffs are path dependent are called "exotic options." An example of exotic option is an Asian option, i.e., an option whose payoff depends on the average price of the underlying asset over a certain period of time. Asian options are attractive in currency and commodity markets. The price of an Asian option is cheaper than a European option because the volatility of the average value of the underlying asset tends to be lower than the volatility of the asset itself. Another reason is that, in practice, many indexes are given as arithmetic averages of the underlying spot price.

Generally, whenever the underlying asset is thinly traded or there is potential for price manipulation, Asian options are preferred. That is also why derivatives contracts used in the maritime industry are usually of the Asian type. (Amir Alizadeh and Nikos K. Nomikos, 2009)

2.4 Derivative Contracts Markets in the Maritime Industry

Shipping markets can be characterized as capital intensive, cyclical, volatile, seasonal and exposed to the international business environment. The parties involved in the market, ship owners, charterers, and shipbrokers, all face significant risks. Therefore, risk management in shipping has been critical for a long time. Freight derivatives contracts are popular and effective tools for hedging freight rates in the shipping industry. The introduction of trading freight derivative contracts can be traced back to 1985 when the Baltic International Freight Futures Exchange (BIFFEX) was established.

Past Derivatives Markets

The Baltic International Freight Futures Exchange (BIFFEX), a London-based exchange for trading ocean freight futures contracts with settlement based on the Baltic Freight Index (BFI), was the world's first freight futures market. At the beginning, BIFFEX worked well. However, trading volumes began to fall in 1989 (see Figure 3). In 1992, the appearance of new contracts, namely freight options on BFI, over-the counter forward freight agreements (FFAs) etc., led to an increase in BIFFEX trading for a couple of years. Eventually, though market agents switched completely to FFAs and the volume of trading on BIFFEX steadily declined until the contracts ceased to exist in 2002.

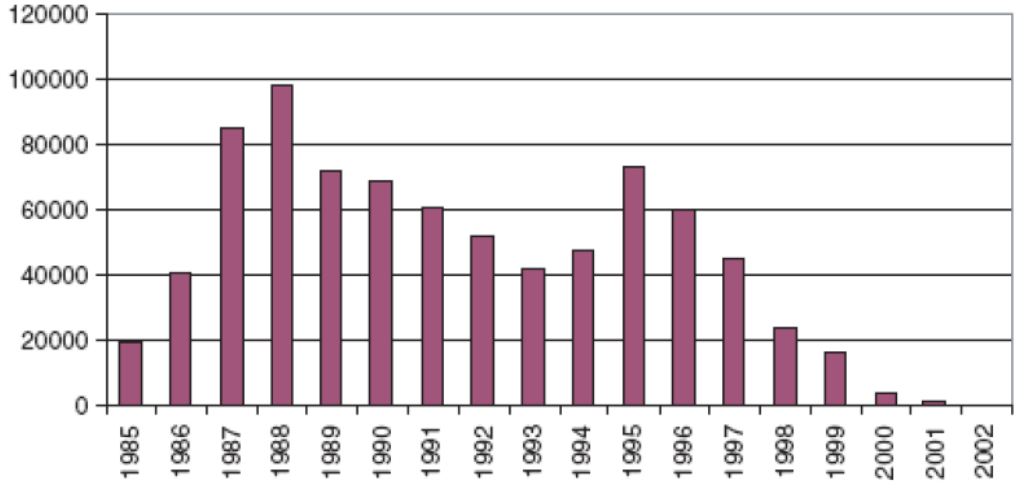

Figure3 Yearly Volumes of the BIFFEX Contracts (May 1985-April 2002)

Source: Kavussanos and Visvikis (2006)

The termination of BIFFEX was mainly due to low liquidity or in another way, the amount of contracts in the market (Koekebakker and Adland, 2004) due to the poor hedging performance of BIFFEX contracts (Kavussanos and Nomikos 2000, Dalheim 2002, Haigh and Holt 2002, Kavussanos and Visvikis 2006). The underlying asset of BIFFEX contracts, the Baltic Freight Index (BFI), a weighted average of the spot prices from 11 shipping routes. Dalheim (2002) argues that the weighting and composition of the index changed over the years. If a market player wants to hedge his particular freight rate risk during the transportation of a specific commodity on a specific route, then a derivative written on a weighted price index of other routes and commodities may not be a good hedging instrument. The two risks may not be strongly correlated. Kavussanos and Nomikos (2000) point out that the routes included in the BFI were diverse in terms of cargoes, vessel sizes etc, which implies cross-hedging. Consequently, BIFFEX contracts did not perform well as

hedging instruments. They were much less effective in eliminating spot market risk (4-19%) than contracts in other commodity and financial futures markets (98%). Most market agents work on specific routes, so they demand contracts tailored to their specific needs. Hedging performance will be improved if contracts are based on an individual route rather than on an underlying index. It is therefore not surprising that FFA contracts which trade on specific routes rather than on the entire index have become popular.

Current Derivatives Markets

Even though BIFFEX ceased to trade in 2002 due to low liquidity, the hedging function of freight derivatives contracts is regarded positively by many in this industry. Different types of contracts have been launched since 1995, and FFAs, Futures, and Options are currently available for trading. The Baltic Exchange, NYMEX, and IMAREX are the three main market places for these contracts. Each has specific products and trading rules, but their common characteristic is increasing trading volumes.

The Baltic Exchange provides daily freight market prices, maritime shipping cost indices, and a market for FFAs. Based on market segmentation, the principal daily indices it publishes are the Baltic Panamax Index (BPI), the Baltic Capesize Index (BCI), the Baltic Supramax Index (BSI), the Baltic Exchange Dirty Tanker Index (BDTI) and the Baltic Exchange Clean Tanker Index (BCTI) (Baltic Exchange, 2007). Each index has a specific composition. For instance, the composition of BPI is shown in Table 1.

TABLE 1: Baltic Panamax Index (BPI) Composition, 2006.

Routes	Vessel size (dwt)	Cargo	Route description	Weights
P1	55,000	Light grain	1–2 safe berths/anchorages US Gulf (Mississippi River not above Baton Rouge) to ARA	10%
P1A	74,000	T/C	Transatlantic (including east coast of South America) round of 45/60 days on the basis of delivery and redelivery Skaw–Gibraltar range	20%
P2	54,000	HSS	1–2 safe berths/anchorages US Gulf (Mississippi River not above Baton Rouge)/1 no combo port to South Japan	12.5%
P2A	74,000	T/C	Basis delivery Skaw–Gibraltar range, for a trip to the Far East, redelivery Taiwan-Japan range, duration 60–65 days	12.5%
P3	54,000	HSS	1 port US North Pacific/1 no combo port to South Japan	10%
P3A	74,000	T/C	Transpacific round of 35/50 days either via Australia or Pacific (but not including short rounds such as Vostochy (Russia)/Japan), delivery and redelivery Japan/South Korea range	20%
P4	74,000	T/C	Delivery Japan/South Korea range for a trip via US West Coast—British Columbia range, redelivery Skaw–Gibraltar range, duration 50/60 days	15%

Source: Kavussanos and Visvikis (2006)

In light of the BIFFEX experience, the underlying asset of an FFA is the market rate of a specific route or an index of a small basket of routes. This is an improvement over the hedging performance of BIFFEX instruments. As a result, trading volumes have steadily increased (see Figure 4).

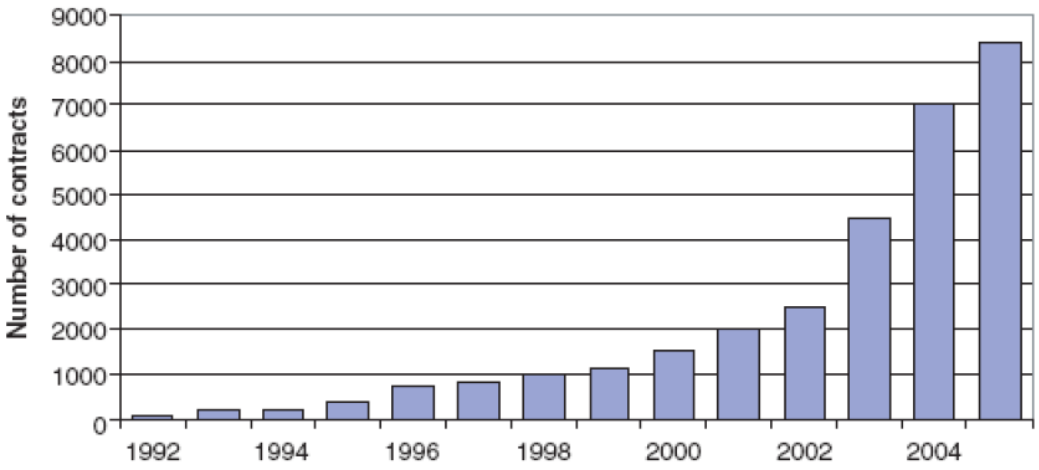

Figure4. Yearly Volumes of Dry-Bulk FFA Contrasts (Jan. 1992- Sept. 2005)

Source: Kavussanos and Visvikis (2006)

New York Mercantile Exchange (NYMEX)

NYMEX provides a flexible, internet-based system of trading and clearing freight Futures. Currently, nine tanker routes are available for trading. Each freight futures contract may be listed for up to 36 consecutive months forward, depending on demand. The trading unit is 1,000 metric tons. Trading ceases on the last business day of the contract month. The price for each contract month equals the arithmetic average of the rates for each business day as published either by the Baltic Exchange or by Platts Oilgram Price Report for the corresponding route. Details are summarized in Table 2.

Table 2. NYMEX Freight Futures

Route Description	Price Index
TC1 Ras Tanura to Yokohama for 75,000 metric tons	Platts
TC2 Rotterdam to USAC for 37,000 metric tons	Baltic
TC4 Singapore to Japan for 30,000 metric tons	Platts
TC5 Ras Tanura to Yokohama for 55,000 metric tons	Platts
TD3 Middle Eastern Gulf to Japan for 250,000 metric tons	Baltic
TD5 West Africa to U.S. Atlantic for 130,000 metric tons	Baltic
TD7 North Sea to Europe for 80,000 metric tons	Baltic
TD9 Caribbean to U.S. Gulf for 70,000 metric tons	Baltic
TD10D Caribbean to U.S. Atlantic Coast for 50,000 metric tons	Baltic

Source: NYMEX (2007)

International Maritime Exchange (IMAREX)

IMAREX is a market offering FFAs, freight futures as well as freight options trading in both the tanker market and the dry bulk market, while NYMEX only offers freight futures trading in the tanker market. The value of dry freight derivatives trading on IMAREX in June grew 376 percent from a year earlier to a record $776 million (Ambrogi, 2007). Each contract can be traded monthly, quarterly, or yearly. The last trading day is the 20th day of a given month, the last day of the first month of a quarter and the last day of the first month of a year for monthly contracts, quarterly contracts, and yearly contracts, respectively. The settlement of each contract is the average of the spot prices over the given period. Table 4 shows the tanker and dry bulk FAAs and freight futures available traded at IMAREX, respectively.

Chapter 3 Characteristics of Container Freight Derivatives

3.1 The Concept of Container Freight Derivatives

Container Freight Swap Agreements (CFSAs) provide a means of hedging exposure to freight market risk through the trading of specified freight rates (USD $ per TEU or FEU) for forward positions. Settlement is effected against the relevant route assessment.

Container Freight Swap Agreements are 'over the counter' products made on a principal-to-principal basis. As such, they are a flexible product and not traded on any Exchange. Contracts traded will normally be based on the terms and conditions of the CFDA standard contracts amended as agreed between the principals. The main terms of an agreement will cover:

(a) The agreed route.

(b) The day, month and year of settlement.

(c) Contract quantity.

(d) The contract rate at which differences will be settled.

Settlement is between counter parties in cash within five days following the settlement date. Commissions will be agreed between principal and broker. The broker, acting as intermediary only, is not responsible for the performance of the contract.

3.2 The Development of Container Freight Derivatives

Derivatives provide users of both financial and non-financial services with

mechanisms to manage a broad spectrum of business risks. In common with other parts of the financial services the derivatives industry is undergoing reform following the financial crisis of 2008. While derivatives markets, with the exception of credit default swaps (CDS), were generally not responsible for the financial crisis, they have nevertheless come under intense scrutiny, particularly in the US and EU, from regulators seeking to avoid the possibility of a future crisis. Providers and users of derivatives are concerned that a balance is achieved between, on the one hand, delivery of safe and sound markets and, on the other, the ability of users to manage risks effectively.

Shipping markets can be characterized as capital intensive, cyclical, volatile, seasonal and exposed to the international business environment. The parties involved in the market, ship owners, charterers, and shipbrokers, all face significant risks. Therefore, risk management in shipping has been critical for a long time. Freight derivatives contracts are popular and effective tools for hedging freight rates in the shipping industry. The introduction of trading freight derivative contracts can be traced back to 1985 when the Baltic International Freight Futures Exchange (BIFFEX) was established.

A number of the large broking houses have been using freight derivatives to hedge or take a position on the future movement of freight rates. According to Baltic Exchange estimates, the notional value of trading in Forward Freight Agreements (FFAs) in the OTC derivatives market suffered a steep decline from $163bn in 2008 to around $40bn in 2009.

This paper aims to find out the impact of freight derivatives, especially the container freight derivatives on shipping industry in various perspectives. It comes as a response to the increasing calls for container freight derivatives. The highly volatile and risky business environment that companies in the industry operate in makes it imperative for them to identify the sources of risk that they face, but also to know how to deal with them effectively. Implementing risk management strategies in the increasingly sophisticated and competitive environment companies operate in our days, can often make the difference between being able to stay in business or not. It can give these companies a comparative advantage over the intense competition that they face in the sector.

Chapter 4 SCFI and CFSA

4.1 Shanghai Containerized Freight Index (SCFI)

For the purpose of meeting the demand of international container freight index derivative and optimizing China's export container freight index system, Shanghai Shipping Exchange renovates and publicizes new Shanghai (Export) Containerized Freight Index (SCFI), which is officially issued on October 16th 2009 to replace the original SCFI issued on December 7th 2005.

The new SCFI reflects the spot rates of Shanghai export container transport market, which includes both freight rates (indices) of 15 individual shipping routes and the comprehensive index.

4.2 The mechanism of SCFI

Freight rates of individual shipping routes

The freight indices show the ocean freight and surcharges of individual shipping routes on the spot market, where:

Shipping routes: the routes cover all major regions of trade flow and export containers from Shanghai, namely Europe, Mediterranean Sea, US west coast, US east coast, Persian Gulf, Australia/New Zealand, West Africa, South Africa, South America, West Japan, East Japan, Southeast Asia, Korea, Taiwan and Hong Kong.

Ports of destination: base ports of the route, e.g.

Mediterranean Sea—Barcelona/Valencia/Genoa/Naples;

Europe—Hamburg/Rotterdam/Antwerp/Felixtowe/Le Havre;

USWC—Los Angeles/Long Beach/Oakland;

USEC—New York/Savannah/Norfolk/ Charleston;

West Japan—Osaka/Kobe; East Japan—Tokyo/Yokohama

Price type: the evaluated price of mainstream (mode) trading price for general shippers on the spot market, which is not influenced by the specialty of ship's type, ship's age, carrier or transport volume.

Surcharges: BAF/FAF, EBS/EBA, CAF/YAS, PSS, WRS, PCS, SCS/SCF/PTF/PCC, etc.,

Another point to be noted, THC, port facility security surcharge, South China origin place surcharge, US automatic customs declaration fee, inland on-carriage surcharge, etc. to be excluded.

Unit: USD/TEU (USD/FEU for US west coast and east coast services)

Trade and transport term: export CIF, CY-CY

Container type/cargo description: general dry cargo container (general cargo for US west coast and east coast services)

Freight Information Collection and Panelists

The freight information for SCFI compilation is reported by CCFI panelists, including liner companies, shippers and freight forwarding agents. All panelists are required to report freight information to SSE prior to 12:00a.m at the Beijing Time on each date of index publication.

All member panelists are world-renowned enterprises or firms with outstanding performances and fame in certain fields. At present, 15 panelists of liner companies and 15 panelists of shippers/freight forwarders provide the freight information. The

detailed name list is as follows:

Panelists of liner companies (in the alphabetic order of English abbreviations) includes: CMA-CGM, COSCO, CSCL, HANJIN, HASCO, HLAG, JINJIANG, K-LINE, MAERSK, MOL, NYK, OOCL, PIL, SINOTRANS and SITC.

Panelists of shippers/ freight forwarders (in the alphabetic order of Chinese Pinyin)includes : Orient International Logistics (Holding) Co., Ltd., UBI Logistics (China) Ltd., JHJ International Transportation Co., Ltd., SIPG Logistics Co., Ltd., Shanghai Orient Express International Logistics Co., Ltd., Shanghai Huaxing International Container Freight Transportation Co., Ltd., Shanghai Jinchang Logistics Co., Ltd., Shanghai Shenda International Transportation Co., Ltd., Shanghai Viewtrans Co., Ltd., Shanghai Richhood International Logistics Co., Ltd., Shanghai Ever-leading International, Shanghai Asian Development Int'l Trans Pu Dong Co., Ltd. , Sunshine-Quick Group, COSCO Logistics (Shanghai) and Sinotrans Eastern Co., Ltd.

Index Publication

The CCFI is publicized by SSE at 15:00 (Beijing Time) on each date of publication. Users may log on to the websites of SSE to get the updated freight index information.

The date of publication is generally each Friday and will be adjusted in legal holidays. The specific dates will be made known to public by SSE. If necessary and reasonable, SSE may postpone or cancel the publication.

4.3 Container Freight Swap Agreements (CFSA)

Container Freight Swap Agreements are a financial futures contract that allow for hedging and speculating against the volatility of seaborne, intermodal container box-rates.

A container freight swap agreement most commonly takes the form of a cash-settled agreement between two parties with an equal and opposite opinion of the future of the market. The parties agree on a price in US$ per container for a given number of containers on an agreed route during a specified period. At the end of the contract period the parties settle the difference in cash between the predetermined contract price and the actual spot market price.

If the market strengthens, and box rates increase, then the buyer of a CFSA (the long position) benefits, since by entering the agreement they have effectively paid less, in advance, for the goods than they would have done trading on the spot market. The buyer of the CFSA has successfully hedged against an increase in cost of the underlying physical market.

Conversely, if the market softens, and box rates decrease, the seller of the CFSA benefits since they have effectively sold the goods, in advance, at a higher rate than they would have done trading on the spot market. In this case the seller of the CFSA has been successful in hedging against an increase in cost of the underlying physical market.

Part II The Impact of Container Freight Derivatives on Shipping Industry

Chapter 5 Container Freight Swaps: From a Risk Management Perspective

5.1 Risk Management and Shipping

It is necessary to explain the reason why CFSA can give full play to its effect in averting risks. Those parties who are engaged in container transportation can not only lock their futures cost of container transport through buying CFSA but also in a very easy and flexible way maintain the basic profit level in the next 23 months (nearly two years). At most of the scenarios, they will make a profit out of it. For example, the two parties agreed to sign CFSA on the route and for the required period for a certain number of container based on their agreed freight rate. If the market goes up, the buyer will gain a profit of the CFSA contract and the reason is obvious. Although the buyer needs to pay a certain amount of money, but compare with the spot price, he is actually paying less for the cargo. In this manner, CFSA can be used to hedge the rise of freight rate in the spot market.

Conversely, if the market is weak, the container trade and transport rates fell, this time of the CFSA benefit the seller because the seller can effectively sell the CFSA contract higher than the spot price. In this case, CFSA seller very successful hedge against the spot market some of the decrease in freight rate. The OTC transaction of CFSA appears to be very active this year. The so-called "OTC", are those transactions outside those Shipping Exchanges. Coordination of buyers and sellers deal through a broker, the broker can be a clearing house for clearing and other financial institutions, any sale of the final settlement through the clearing house, will be objective, fair and secure financial security.

All in all, CFSA can be used by those liner companies to ensure long-term income, and hedging against the drop in spot freight rate.as far as the shipper is concerned, such as large manufacturers, exporters, traders and transport companies, can ensure long-term shipping costs, control the risk of volatility in freight rate. In the value chain other than the potential container transport market participants, including hedge funds, they can also enter into the container shipping market. Fund managers will hedge their portfolio considering the performance of the liners and carriers in the stock market. There are many uncertainties about the reputation of the two parties in OTC transactions. Therefore, market participants want to those financial institutions to assist them in transactions, thereby reducing the potential counterparty credit risk.

CFSA as a market is still in its infancy. Container investors use swaps and forward price of the container index, as a general market indicators and contractual basis for settlement. Index provider, based on data from shipping companies, carriers and transport companies and many market participants rely on the information as an assessment of container freight. The index is calculated based on standard specifications for a particular container shipping lines to provide a reference price. The CFSA is worth the development of great concern people outside the industry. CFSA market so far appears to be the most popular among financial institutions, and for the CFSA actual market operators, such as container shipping company, other shipping companies, freight forwarders and shippers, of course, everyone can participate, but liquidity is the key, and highly qualified experts in international finance specific operations are also needed.

Just like any other industry that faces fluctuation to some elements of its income or expenditure makes use of derivatives products to hedge its position, so has the shipping industry made use of the freight derivatives.

Risk management is all about controlling exposure to volatile markets and locking-in a percentage of profits or equally protecting against losses (Drewry, Shipping Futures and Derivatives, 1977). A shipowner can face many risks because of various markets' volatilities. Of course the most important part for a shipowner's cash flow position is the amount of money that he receives for the delivery of his services, the freight rate.

The freight market is a high cyclical market with continuous fluctuations. The volatility in the freight may come by seasonal, cyclical reasons or random shocks (Kavussanos, 2002). In the container sector for example, freight rates increases in October and November and drop sharply in January.

Also, it has been shown that freight rates as also ship prices seem to show higher volatility, than smaller vessels. So a shipowner can adjust has level of risk by diversifying his portfolio between larger and smaller vessel. (Kavussanos, JTEP & LTR, 1966/7)

Besides the freight rate, a shipowner has also to face possible risks in many other markets. He is exposed to the interest rate market (in case he has been financed by a loan), the exchange rate market(since shipping is one of the most globalized industries), and also the bunker cost(as the price of IFO is also highly volatile). All these risks can be effectively controlled by the shipowner with the use of specialized

derivatives products such as interest rate and exchange rate swaps and options, and bunker options.

The dynamics of the ocean freight market are not unlike those of the better known crude and oil products markets; tanker shipping people have seen the successes of their customers- where futures and derivatives markets enable users to manage extreme volatility. On the liquid side, seaborne movements of crude oil and petroleum products are closely intertwined with the vagaries of the underlying raw materials markets. Rates for VLCCs- crude oil tankers of 300,000 MT deadweight (with a carrying capacity slightly in excess of 2 Million Barrels) were providing a return to owners averaging $95,000/day in 2004 (rates levels rivaling those of the early 1970s- a time when some of the great shipping fortunes were made). In 2005, hires averaging $59,000/day were seen on VLCC voyages from the Persian Gulf to Japan, according to London based Drewry Shipping Consultants. In April 2006, ships owners were netting under $25,000/ day for the same ships on the same voyages- in line with average rates for 2002. By end May 2006, rates on similar vessels had firmed to levels in excess of $40,000/ day; August 2006 saw spot rates approaching $90,000 day for such large tankers, and forward rates approaching $120,000/ day for November/ December 2006 forward slots. With fears of Alaskan oil shortages, Middle Eastern tensions and supply disruptions in both West Africa and the Caribbean, spot tanker rates were at historical highs. As was seen in the Summer of 2006, huge amounts of hedgeable risk in tanker markets are tied to the uncertainty premiums surrounding oil supply, and, in turn, oil and product prices. As oil's vagaries evaporated, tanker rates calmed down. When December 2006 actually came around, spot VLCC's were fetching under $30,000/day. Financial risk management

techniques are now plying their way to the dry cargo side, where China-induced waves of iron ore consumption of iron ore, and bulk raw materials such as metallurgical coal, have brought about quick and usually unpredictable shifts in demand.

5.2 Speculation and Arbitrage Opportunities

Speculators are another important group of traders that have the possibility to use these derivatives. The significant volatility that freight rates present is a big motivation for speculative transactions. A speculator, or investor, can provide in the market liquidity and, most importantly, volume, as it already happens the majority of derivatives markets. (Drewry, 1997).

Of course, there needs to be noted that speculators are a little different with hedgers, they do use the derivatives markets to hedge their positions, but their goal is to achieve profits through the successful expectation of future freight rate changes. But speculators are very important to any derivatives markets whose main role is the transference of risk, because it is usually those people who will take the opposite position that a hedger would put in the market. A speculator usually buys or sells depending on his judgments about the future movement of the market.

Arbitrageurs are another group of people which are somewhat similar to speculators. Arbitrage is taking part in two different markets at the same time, so that they can obtain riskless profits. The arbitrage theory can be found its rout in the freight market with in the form of the spread play theory.

Based on this theory, if the cfsa price between tow shipping routes is relatively large based on the historical freight rate or the number, an arbitrageur can purchase the cheap and sell the relatively expensive in order to take advantage of the anticipated return to normal differential(Kavussanos,2002). So there is something in common between speculators and arbitrageurs in their way of how they use the market. Most of the times they actually don't examine a freight's fundamental reasons of changes, such as those elements that leads to the changes of freight demand and supply, rather they look at the historical data and the future trend which can be used by them to form their future decisions.

A very valuable method tool amongst speculators and arbitrageurs is the so called technical analysis or chart trading. Advanced mathematical models can be used successfully in order to extrapolate predicted movements of trends. Based on historical data and markets, a "higher probability" of the movement of the market can be expressed. A simple example can be that if a market is falling for x consecutives days ,there is a Y probability that its direction will reverse (Drewry,1997).

5.3 Price Discovery and other properties of CFSA

These are price discovery and risk management through hedging (Black, 1976). Freight futures have the very same functions in the shipping markets (Kavussanos and Visvikis, 2006a).

From the way prices of freight futures are formed it is clear that they reveal

information on the expectations of the market participants with regards to future spot rates. The prices of futures may thereby contain more information about future spot rates than the current and past spot prices alone. Freight futures may therefore have price discovery properties. These price discovery properties are desirable in an economic perspective because they enable the futures market to be used to guide physical supply and demand decisions in ways that contribute to a more efficient allocation of economic resources (Kavussanos and Nomikos, 1999), a function best performed if the unbiasedness hypothesis holds. Then, anyone interested in the spot prices of the future can use freight futures prices as unbiased estimates of future spot prices.

The difference between speculation in futures and casino gambling is that futures market speculation provides an important social good, namely liquidity. If it were not for the presence of speculators in the market, farmers, bankers, and business executives would have no easy and economical way to eliminate the risk of volatile prices, interest rates, and exchange rates from their business plans. Speculators, however, provide a ready and liquid market for these risks—at a price. Speculators who are willing to assume risks for a price make it possible for others to reduce their risks. Competition among speculators also makes hedging less expensive and ensures that the effect of all available information is swiftly calculated into the market price. Weather reports, actions of central banks, political developments, and anything else that can affect supply or demand in the future affects futures prices almost immediately. This is how the futures market performs its function of "price discovery."

In general, we support higher transparency, but it is important to avoid unnecessary, administrative burdens on banks and respect industry competition. The purpose of trade transparency is to assist the price discovery process in all financial markets. However, too much transparency is counterproductive. As the price discovery process often is subject to negotiation and even involves, for some transaction types, product adjustment (which is complicated to replicate in an exchange format) makes it impossible to trade the end users (e.g. corporate) demand on an exchange.

5.4 Alternative users and uses of CFSA

More and more shipbrokers have started and are still starting their freight derivatives department. Various shipbrokers find out that some of their clients are not trading derivatives but is a continuous interest in this market as a possible replacement of time charter. Some of them also admit to trade freight derivatives on their own account (Drewry,1997).

Another sector that has taken part in is the banking sector. Banks seem to be very supportive to the concept of risk management and to any efforts of taking some real action. It is by all means a way to increase their range of products to offer to their clients.

Also the cfsa can be used by a market participant for portfolio switching. A market agent reading a particular route where he believes that the short term volatility is going to be low, may sell a cfsa on the existing trade route and buy a matching volume on a different more volatile route. Additionally CFSA can be used for

portfolio management reasons of an existing time charters, where unwanted positions can be closed with the use of CFSAs.

Chapter 6 Container Freight Swaps: From a Corporate Perspective

6.1Case study: Composite SCFI vs. AP Moller-Maersk (Share Price)

In this part, the interrelation between Composite SCFI vs. AP Moller-Maersk (Share Price) is further illustrated by a case study between in order to show that companies can actually benefit from this invest in CFSA. Finally, the paper closes with discussion, practical implication and further research.

Also, if we take a look at Argos' claim against Maersk, which Maersk wants to tear apart their agreement on its own, we can also draw the conclusion that container derivative has its role in averting the risks.

Maersk Line has led the way in calling for more long-term contracting in order to escape the vagaries of the spot market and ensure more predictability for both parties.

Yet it is Maersk that is now in the headlines for allegedly tearing up contracts with Argos when the container trades suddenly rallied, leaving rates agreed with the UK retailer looking extremely cheap. Argos was told there was no space available at such low levels, with a threefold increase unilaterally imposed.

Of course, the volumes that can be traded right now are far too small to provide the big lines with an effective hedging tool, but the Argos action could prove a valuable case study for those who are sceptical about the need for container derivatives. Also it is conductive to avoid such kind of a default of contract.

6.2 Data Collection and Proposed Analysis Method

Historical data of SCFI and AP Moller Maersk's Share Price from October 16, 2009 to February 25, 2011 was chosen to analyse the correlation of these two series of data. As the composite SCFI Index consist several sub-indexes, these sub-indexes are also taken into consideration.

Table 2 AP Moller Maersk's Share Price

Date	2011/3/3	2011/3/2	2011/3/1	2011/2/28	2011/2/25
Price	51750	51800	52700	53650	52650
Date	2011/2/24	2011/2/23	2011/2/22	2011/2/21	2011/2/18
Price	52850	51600	51800	52000	52850
Date	2011/2/17	2011/2/16	2011/2/15	2011/2/14	2011/2/11
Price	53700	53800	54000	53850	53150
Date	2011/2/10	2011/2/9	2011/2/8	2011/2/7	2011/2/4
Price	52950	53950	53800	54050	53150
Date	2011/2/3	2011/2/2	2011/2/1	2011/1/31	2011/1/28
Price	53300	53500	54000	52950	54000
Date	2011/1/27	2011/1/26	2011/1/25	2011/1/24	2011/1/21
Price	54000	53200	53000	52500	52000
Date	2011/1/20	2011/1/19	2011/1/18	2011/1/17	2011/1/14
Price	53100	53500	53250	52630	52730
Date	2011/1/13	2011/1/12	2011/1/11	2011/1/10	2011/1/7
Price	52300	52310	51490	51000	51000
Date	2011/1/6	2011/1/5	2011/1/4	2011/1/3	2010/12/30

Price	51850	51600	52870	52420	50510
Date	2010/12/29	2010/12/28	2010/12/27	2010/12/23	2010/12/22
Price	51420	51120	51090	51450	51090

Table 3 Composite SCFI Index

Date	2011/2/25	2011/2/18	2011/2/11	2011/1/28	2011/1/21
SCFI	1036.51	1060.47	1091.33	1104.64	1107.85
Date	2011/1/15	2011/1/7	2010/12/31	2010/12/24	2010/12/17
SCFI	1111.84	1126.94	1122.68	1082.84	1086.38
Date	2010/12/10	2010/12/3	2010/11/26	2010/11/19	2010/11/12
SCFI	1101.42	1124.98	1157.45	1189.71	1220.7
Date	2010/11/5	2010/10/29	2010/10/22	2010/10/15	2010/9/17
SCFI	1242.87	1259.11	1277.04	1301.31	1375.81
Date	2010/9/10	2010/9/3	2010/8/27	2010/8/20	2010/8/13
SCFI	1583.18	1576.84	1569.04	1543.72	1502.02
Date	2010/8/6	2010/7/30	2010/7/23	2010/7/16	2010/7/9
SCFI	1472.9	1445.13	1417.42	1392.09	1338.15
Date	2010/7/2	2010/6/25	2010/6/18	2010/6/11	2010/6/4
SCFI	1326.51	1326.89	1326.4	1327.93	1341.59
Date	2010/5/28	2010/5/21	2010/5/14	2010/5/7	2010/4/23
SCFI	1378.09	1402.87	1407.55	1396.21	1377.2
Date	2010/4/16	2010/4/9	2010/4/2	2010/3/26	2010/3/19
SCFI	1333.93	1244.81	1179.63	1106.28	1072.58
Date	2010/3/12	2010/3/5	2010/2/26	2010/2/12	2010/2/5

SCFI	1059.19	1039.45	1037.10	1040.96	1051.32
Date	2010/1/29	2010/1/22	2010/1/15	2010/1/8	2009/12/25
SCFI	1052.69	1061.71	1035.74	1009.05	1000.00

6.3 Findings and Implications

Figure 5 Composite SCFI vs. AP Moller-Maersk (Share Price)

The data were further handled. Excel is used to exam the correlation coefficient between these two series of data. The result shows that there is an extraordinarily high correlation (84%) between the composite SCFI index and AP Moller Maersk's Share Price, which really surprises me at the first place. But the result is a great demonstration that CFSA is a great tool for the company like Maersk to lock the freight rate, especially during the time when the freight rate starts to show a wave of fluctuation.

Chapter7 Conclusions

The container sector is the last in the maritime industry to develop its own derivatives, partly because it lacked a global freight index from which it can reflect the freight rate from the big picture and against which to settle the contracts to be traded, until the Shanghai-based index was developed in 2009.

It is obvious that there's willingness from the users of freight — the retailers and the freight forwarders — to embrace the use of freight derivatives not only as a tool to avert risk, but also for price discovery. And shipping lines are taking a bit more time to accept this fairly new product. An increasing number of lines are showing their keen to be involved.

Shippers want to make sure they can crystallize their margins throughout the process. Considering the freight rate fluctuating from $2000 per teu to over $300 teu over the last 24 months from Asia to Europe, there was interest throughout the cargo and transportation chain in adapting this hedging. As far as the current situation is concerned, the most important element is liquidity and that liquidity is going to be achieved in large numbers when the liner companies start trading in the market against the shippers.

We can easily draw a conclusion that once we get shipping lines thinking that it seems to be great to sell the space on their vessels for March for the prices at the moment, and the importers shall buy that space so that they can secure their price level, then it will start rolling, and after that, the market will get is liquidity.

Reference

Ambrogi, S. (2007) Update 1-Dry Freight Futures Trade Hits Record in Q2-Baltic. Reuters News,

London.

ATA. (2006) U.S. Freight Transportation Forecast to 2017. American Trucking Associations,

Alexandria, VA.

Baltic Exchange Homepage. www.balticexchange.com. Accessed July, 2007.

Bureau of Transportation Statistics. (2006) Freight in America. U.S. Department of Transportation.

Center for Transportation and Logistics. (2004) Looking for Options. MIT SUPPLY CHAIN

FRONTIERS (1). Cambridge, MA.

Corsi, T.M. (2005) The Truckload Carrier Industry Segment, in: Trucking in the Age of

Information, pp. 21-42. Burlington, VT: Ashgate Publishing Company.

Dalheim, F. (2002) Freights Derivatives Trading and 'Value-at-Risk' in Tanker and bulk

shipping. Marine Money, June, pp. 23-29.

Ergun, O., Kuyzu, G., and Savelsbergh M. (2007) Reducing Truckload Transportation Costs

Through Collaboration. Working Paper. Georgia Institute of Technology. Atlanta, GA.

Tsai, Regan, and Saphores 18

Haigh, M. S., Holt, M. T. (2002) Hedging Foreign Currency, Freight and Commodity Futures

Portfolios – A Note. The Journal of Futures Markets 22 (12), pp. 1205–1221.

Hull, J.C. (2006) Options, Futures, and Other Derivatives, 6th edition. Upper Saddle River, NJ:

Prentice Hall.

International Maritime Exchange Homepage. www.imarex.com. Accessed July, 2007.

Kavussanos, M. G., Visvikis, I. D. (2006) Shipping Freight Derivatives: A Survey of Recent

Evidence. Maritime Policy & Management 33 (3), pp. 233-255.

Kavussanos, M. G., Nomikos N. K. (2000) Futures Hedging When the Structure of the

Underlying Asset Changes: The Case of the BIFFEX Contract. The Journal of Futures Markets

20 (8), pp. 775-801.

Kirkeby, K. (2007) Transportation: Commercial, Industry Surveys. Standard & Poor's, New

York.

Koekebakker S., Adland, R. O. (2004) Modelling Forward Freight Rate Dynamics – Empirical

Evidence from Time Charter Rates. Maritime Policy and Management 31 (4), pp. 319-335.

New York Mercantile Exchange Homepage. www.nymex.com. Accessed July, 2007.

Vaidyanathan, V., Metcalf, D., Martin, D. (2005) Using Capacity Options to Better Enable Our

Factory Ramps. Intel Technology Journal 9 (3), pp. 185-191.

Wilson, R. (2006) Embracing Security as a Core Business Function. 17th Annual State of

Logistics Report, Council of Supply Chain Management Professionals, Lombard, IL.

Antoniou, A., Holmes, P., (1995) Futures trading, information and spot price volatility: evidence for the FTSE-100

stock index futures contract using GARCH. Journal of Banking and Finance 19, 117–129.

Antoniou, A., Holmes, P., Priestley, R., (1998) The effects of stock index futures trading on stock index volatility: an

analysis of the asymmetric response of volatility to news. Journal of Futures Markets 18 (2), 151–166.

Baldauf, B., Santoni, G.J., (1991) Stock price volatility: some evidence from an ARCH model. Journal of Futures

Markets 11, 191–200.

Batchelor, R., Alizadeh, A., Visvikis, I., (2003) Forecasting performance of spot and forward prices in the freight

forward market. 23rd International Symposium on Forecasting, Merida-Yucatan, Mexico, 15–18 June 2003.

Berndt, E.K., Hall, B.H., Hall, R.E., Hausman, J., (1974) Estimation and inference in nonlinear structural models.

Annals of Economic and Social Management 4, 653–665.

Besembinder, H., Lemmon, M.L., (2002) Equilibrium pricing and optimal hedging in electricity forward markets.

Journal of Finance 57, 1347–1382.

Black, F., (1986) Noise. Journal of Finance 41, 529–543.

Board, J., Sandmann, G., Sutcliffe, C., (1997) The effect of contemporaneous futures market volume on spot market

volatility. LSE Financial Markets Group—Discussion Paper Series, 277, September.

Bollerslev, T., (1987) A conditional heteroskedastic time series model for speculative prices and rates of return. Review

of Economics and Statistics 69, 542–547.

Bollerslev, T., Wooldridge, J.M., (1992) Quasi-maximum likelihood estimation of dynamic models with time-varying

covariances. Econometric Reviews 11, 143–172.

Bollerslev, T., Chou, R.Y., Kroner, K.F., (1992) ARCH modelling in finance: a review of theory and empirical evidence.

Journal of Econometrics 52, 5–59.

Bologna, P., Cavallo, L., (2002) Does the introduction of stock index futures effectively reduce stock market volatility? Is

the "Futures Effect" Immediate? Evidence from the italian stock exchange using GARCH. Applied Financial

Economics 12, 183–192.

Brorsen, B.W., (1991) Futures trading, transactions costs, and stock market volatility. Journal of Futures Markets 11,

153–163.

Chatrath, A., Song, F., 1998. Information and volatility in futures and spot markets: the case of the Japanese Yen.

Journal of Futures Markets 18 (2), 201–223.

Dowd, K. (2002) *An Introduction to Market Risk Measurement* (Chichester: John Wiley &

Sons).
Dueker, M. J. (1997) 'Markov Switching in GARCH Processes and Mean Reverting Stock Market Volatility', *Journal of Business and Economic Statistics*, Vol. 15, No. 1,
pp, 26–34.
Ederington, L. H., (1979) 'The Hedging Performance of the New Futures Markets', *The*
Journal of Finance, Vol. 34, No. 1, pp. 157–70.
Edwards F. and C. Ma (1992) *Futures and Options*, International Edition (Singapore: McGraw-Hill).
Efron, B. (1979) 'Bootstrap Methods: Another Look at the Jackknife', *Annals of Statistics*,
Vol. 7, pp. 1–26.
Embechts, P., C. Kl ̈uppelberg and T. Mickosh (1997) *Modelling Extremal Events for*
Insurance and Finance (Berlin: Springer).
Engle, R. F. (1982) 'Autoregressive Conditional Heteroskedasticity with Estimates of the
Variance of United Kingdom Inflation', *Econometrica*, Vol. 50, No. 4, pp. 987–1008.
Engle, R. F. (1993) 'Statistical Models for Financial Volatility', *Financial Analysts' Journal*,
January–February, pp. 72–8.
Engle, R. F. and G. Gonzales-Rivera (1991) 'Semiparametric ARCH Models', *Journal of*
Business and Economics Statistics, Vol. 9, No. 4, pp. 345–59.
Engle, R. F. and K. F. Kroner (1995), 'Multivariate Simultaneous Generalized ARCH',
Econometric Theory, Vol. 11, pp. 122–50.
Engle, R. F. and S. Manganelli (2004) 'CaViaR: Conditional Autoregressive Value at Risk by Regression Quantiles', *Journal of Business and Economic Statistics*, Vol. 22,
pp. 367–81.
References 485
Engle, R. F., D. M. Lilien and R. P. Robins (1987) 'Estimating Time-varying Risk Premia
in the Term Structure: the ARCH-M Model', *Econometrica*, Vol. 55, No. 2,
pp. 391–407.

Engle, R. F. and V. K. Ng (1993) 'Measuring and Testing the Impact of News on Volatility,' *Journal of Finance*, Vol. 48, pp. 1749–78.
Eydeland, A. and K. Wolyniec (2003) *Energy and Power Risk Management* (New Jersey:
Wiley Finance).
Fama, E. and M. E. Blume (1966) 'Filter Rules and Stock-Market Trading', *The Journal of Business*, Vol. 39, No. 1, Part 2: Supplement on Security Prices, pp. 226–41.
Financial Times (2008) 'Freight Futures Surge as Funds Seek Refuge', 24 February.
Fong, W. M. and K. H. See (2002) 'A Markov Switching Model of the Conditional Volatility of Crude Oil Prices', *Energy Economics*, Vol. 24, No. 1, pp. 71–95.
Geman, H. (2005) *Commodities and Commodity Derivatives* (Chichester: John Wiley &
Sons).
Geman, H. and V. N. Nguyen (2003) 'Analysing Volatility Surfaces for Energy Commodities', ESSEC Working Paper Series.
Geman, H. and M. Yor (1993) 'Bessel Processes, Asian Options and Perpetuities', *Mathematical Finance*, Vol. 3, pp. 349–75.

Amir Alizadeh and Nikos K. Nomikos (2009) 'Shipping Derivatives and Risk Management'

Chatzipanagiotis Vasilis (2005) 'FFA Market set and discovery of Spread Play Opportunities'