ΠΑΝΕΠΙΣΤΗΜΙΟ ΠΕΙΡΑΙΩΣ

ΤΜΗΜΑ ΝΑΥΤΙΛΙΑΚΩΝ ΣΠΟΥΔΩΝ

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ΣΤΗΝ ΝΑΥΤΙΛΙΑ

«HEDGING IN BUNKER TRADING, THE GREEK CASE ANALYSIS: PIRAEUS AND OTHER GREEK PORTS AS BUNKERING STATIONS»

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ΠΕΡΙΛΗΨΗ

Η εργασία αυτή αποσκοπεί στην πρώτη χαρτογράφηση ενός προσοδοφόρου κλάδου με πολλές προοπτικές για περαιτέρω ανάπτυξη όχι μόνο διεθνώς αλλά και ειδικά στην χώρα μας.

Στην προσπάθεια αυτήν, θεωρήσαμε σκόπιμο να ξεκινήσουμε από μία συνοπτική παρουσίαση της αγοράς του πετρελαίου και των σημαντικότερων μερών/παικτών που την επηρεάζουν δεδομένου ότι η τιμή του πετρελαίου ρυθμίζει σε συντριπτικό ποσοστό τις τιμές των ναυτιλιακών καυσίμων.

Στην συνέχεια προχωρήσαμε στην παρουσίαση του κλάδου των εταιρειών αγοραπωλησιών των ναυτιλιακών καυσίμων που μας ενδιαφέρουν στην συγκεκριμένη περίπτωση. Είναι ένας κλάδος που προέκυψε την περασμένη δεκαετία αλλά η ανάπτυξή υπήρξε τέτοια που η ανοδική πορεία του θα πρέπει να θεωρείται δεδομένη. Γύρω από αυτό το πλαίσιο αναλύουμε τους παράγοντες/παίκτες που επηρεάζουν την αγορά, τους προμηθευτές και τις ναυτιλιακές εταιρείες που προμηθεύονται καύσιμα μέσω των bunker traders.

Το επόμενο βήμα ήταν να δούμε ποια είναι τα χρηματοοικονομικά εργαλεία τα οποία εφαρμόστηκαν σε άλλους κλάδους βρήκαν πεδίο εφαρμογής σε αυτό το κομμάτι της ναυτιλίας και πως αυτά πρακτικά εφαρμόζονται στην καθημερινή πρακτική διαχείριση πλοίων.

Τέλος, θεωρήσαμε σκόπιμο να κάνουμε μια ενδεικτική παρουσίαση των μερών/παικτών όπως παρουσιάζονται στον ελληνικό χώρο, εστιάζοντας κυρίως στις προοπτικές που φαίνονται να προκύπτουν από τις νέες εγκαταστάσεις που έχουν δρομολογηθεί στην Αλεξανδρούπολη για το νέο αγωγό πετρελαίου.

SUMMARY

The aim of this essay is to make an effort to map this lucrative industry, whose potentials are significant not only in a global scale but also for our country in particular.

We began with an introduction of the petroleum industry, particularly insisting in the major players of the market, since petroleum is the underlying product whose price fluctuation severely influences bunker prices.

Our next step was to focus in the bunker trading houses. It is a relatively new industry however the development seen in the past decade gives the strong conviction that is going to further bloom. In addition to the trading houses, we analyze the other market players: the physical suppliers and the purchase departments of the shipping companies actually consuming bunkers.

Advancing in another level, we indicate the most important hedging tools applicable in other industries and which are now used on daily shipping operations to avoid side effects from bunker price fluctuations.

Finally, we give an indication of how the market stands currently in Greece and how it is possible for Alexandroupolis to grow in a major bunkering station in the Mediterranean Sea.

ABSTRACT

The aim of this paper is to fill a substantial void in mapping a market which emerged in the last decade but whose blooming is quite considerable, not even mentioning her potentials for further development. No question that bunkers did exist before the bunker trading houses entered the maritime market, however their position is now very well established and their role as a valuable partner for the maritime operators is further growing. The factor pushing towards this direction is first of all technology and the sophisticated telecommunications systems now applicable from the shipping companies, the vessels and the traders. This development alone proved to be enough to create this new market, shipping derivatives though gave the final touch in creating new techniques in procuring bunkers and new margins to cut cost and even speculate from an activity other than the core business.

It is practically the first attempt to name and analyze the factors influencing the underlying product of the market – bunkers – and during this research we have quite a few difficulties which had mostly to do with the lack of the data and the reluctancy of the market players to disclose such information which is considered confidential. Particularly when analyzing the Greek case, the status under which the vast majority of the Greek shipping companies and trading houses operate (off-shore companies under Resolution N.89/1967, excluding them from following the general accounting and fiscal regulations that apply) sets a barrier hard to overcome. On the other side, the Physical Suppliers and major Greek oil companies, though under regular Greek fiscal regime, they all operate under the same secrecy policy and refuse to give further data and details regarding the volumes, prices and other data of their bunkers trading operations. The final solution to apply to the Greek custom's Authorities for data is really hard to be carried out as the Greek red tape closed that window as well. The effect if this poor outcome in collecting official numerical data is the lack of information regarding the volumes of

bunkers delivered in Greece, regarding the volumes of bunkers traded via Greek traders worldwide, their money equivalent in and revenue that created. A first step would be making an estimation for all the above but even this under the circumstances would be far than accurate and it was considered best to avoid such. Our effort is to make an introduction in bunker trading and hedging in a nutshell, hopefully future researches will have more data to elaborate on.

Considering the above substantial difficulties one might wonder why focusing in a market which is difficult to measure, the answer is simple though : because we have all the indications it is a lucrative blooming market with potentials, especially for our country and our upcoming advanced position in the East Mediterranean energy map, when new investments in the field will be effected.

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Chapter 1
PETROLEUM TRADING

1.1 INTRODUCTION TO PETROLEUM TRADING

What is crude oil? Which are the major characteristics?

Organic material + Pressure + Heat + Time = Crude Oil and Natural Gas

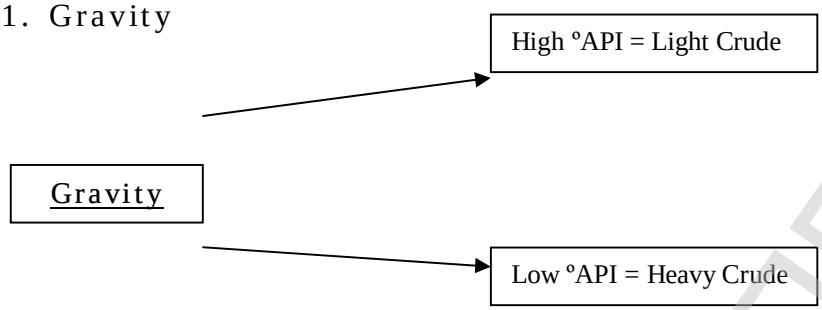
Millions of years ago, remains of aquatic plants and animals living in the ancient years formed what scientists call crude oil. One-celled marine organisms which died sank in the deep seas along with sand and mud. The outcome was an organic-rich layer that eventually turned into sedimentary rock. This original process repeated itself again and again, one layer covering another. Then, over million of years, the seas withdrew. In lakes and inland seas, a similar process took place with deposits formed of non-marine vegetation. In some cases, the deposits that formed sedimentary rock did not contain enough oxygen to completely decompose the organic material. Bacteria broke down the trapped and preserved residue into substances rich in hydrogen and carbon. Increased pressure and heat from the weight of the layers above caused a partial distillation of the organic remainants, transforming them, ever so slowly, into crude oil and natural gas. Petroleum is derived from the Latin words petra (rock) and oleum (oil), it literally means Rock Oil.

1.2 MAIN PETROLEUM CHARACTERISTICS

1. Gravity
2. Sulfur
3. Pour Point
4. Viscosity

All the characteristics described above are critical to crude oil trading because they significantly effect its price. To asses them, physical tests are run and their values give special features to the crude oil. These features separate the different crudes accordingly into groups and consequently into different price and value ranges.

1. Gravity



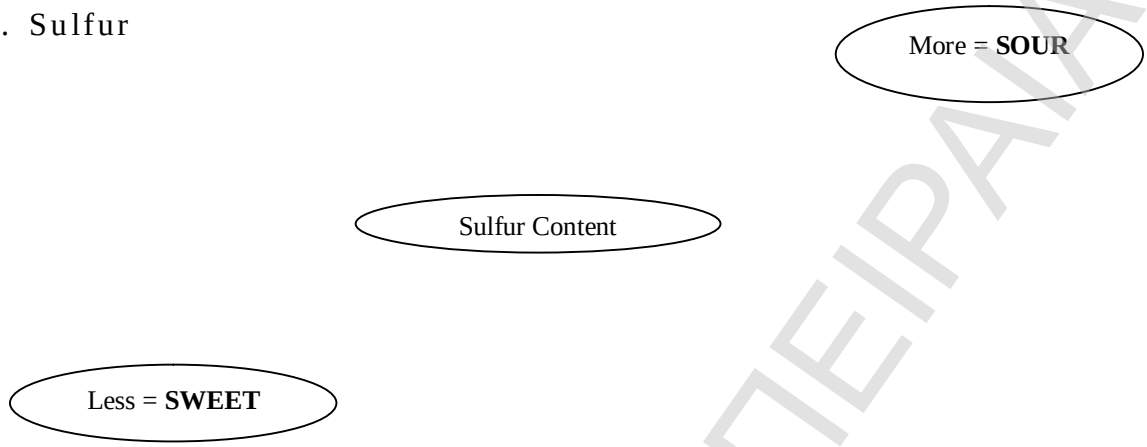
Gravity or density of a crude is generally its most significant physical characteristic. It is a quick and easy way of knowing the proportion of heavy (fuel oil) and lighter (gasoline's, gasoil/heating oil and jet oil) components which occur naturally in the crude. Gravity measures the weight of a compound. Chemists use a measure called " specific gravity" which relates everything to something universally familiar : water. The specific gravity of nay compound divided by the weight of the same volume of water.

In crude oil trading, density is usually expressed in degrees of " API gravity" (º API). The higher the API gravity, the lighter the crude. API (American Petroleum Institute) gravity is an arbitrary scale which is inverse relationship to specific gravity, so that low API gravity oils have a high specific gravity number and vice-versa. The formula for API gravity which is measured in degrees is :

º API = (141.5/specific gravity) – 131.5

Regarding the actual correlation between the API degrees and the price of the crude we should stress the fact that when the crude has high API degrees it becomes more expensive.

2. Sulfur



Crude oils that contain appreciable quantities of sulfur compounds are called “sour”. Those with less sulfur are called “sweet”. Sweet crudes typically have 0.5% sulfur or less, while sour crudes generally have around 2% sulfur or more. The area in between is sometimes called intermediate sweet or intermediate sour, but the distinction is not always clear.

The odor of the crude oil can vary from an almost aromatic bouquet to the distinctly unpleasant smell associated with sulfur derivatives. The sour crude is more valuable because it needs less refining to give its products.

3. Viscosity

Viscosity is a measure of how readily a fluid will flow. It is a important characteristic in the handling and transportation of the crude oil and, to a certain extent how it will refine into finished products. A high viscosity means that an oil will not flow readily; a low viscosity implies good fluidity.

4. Pour Point

The pour point is the lowest temperature at which an oil will pour or flow without interruption when it is chilled. When petroleum products are cooled, a point is reached when some of their constituents begin to solidify. If cooling continues, eventually the oil will not flow. Like viscosity to which it is somewhat related, pour point is an important characteristic in assessing a crude oil's properties, particularly at low temperatures.

1.3 TABLE OF CRUDE OIL CHARACTERISTICS

Common Crudes Traded in the Markets		API Gravity	% Sulfur	Pour Point	Viscosity
Light Sweets	WTI (US)	39	.3	-20	37
	LLS (US)	37	.3	-11	40
	Brent (UK)	38.5	.36	+20	39
	Cusiana (Colombia)	39.5	.17	+32	35
Heavy Sweet	Cabinda (Angola)	32	.2	+65	93.5
Light Sours	WTS (US)	33	1.6	-25	45
	Oriente (Equador)	25	1.3	+25	58
	Dubai (UAE)	30	2.0	-9C	52
	ANS (US)	29.5	1.1	-15	38
	Basrah Light (Iraq)	33	2.0	-27	225
Heavy Sours	Maya (Mexico)	22	3.4	0	334
	Leona 24 (Venezuela)	24	1.8	_24	150

Pour Point – measured in degrees F unless otherwise shown

Viscosity – centistokes at 40°C unless otherwise shown

Sulfur -% by weight

The most important quality of them of them is that crude oil by itself has not value whatsoever : crude derives its value from the products produced during the refining process. As a consequence, crude oil has only one market : the refining industry

1.4 CRUDE OIL PRODUCTS

Products from Crude Oil				
GASES	GASOLINES	MIDDLE DISTILLATES	FUEL OIL	OTHER PRODUCTS
• C: Methane • C2: Ethane • C3: Propane • C4: Butane	• Aviation Fuels • Motor Fuels (gasoline, petrol)	• Kerosene • Jet Fuel • Gas Oil • Diesel Fuel • Home Heating Oil	• Light Fuel Oil • Medium Fuel Oil • Heavy Fuel Oil • Bunker Fuel Oil • Asphalt	• Bitumen • Lubricants /greases • Waxes • Detergents

1.5 REFINERIES

Most refineries evolved rather than being built according to a long-term plan. There has not being a refinery built in the USA since 1976. Environmental concerns have made it almost impossible to build a new refinery. Refinery capacity is increased, therefore, by expansion of existing facilities. This expansion involved the construction of operation facilities that did not exist when the refinery was built decades ago.

Each refiner installs the new equipment according to capital restraints and market requirements. Once a refiner decides on what type of unit to build, there are numerous different technologies and manufacturers from which to choose. All accomplish the same basic

refinery function but will have slightly different characteristics. In other words, all refineries are unique and one cannot build identical installations which give out the exact same products. However the goal of each and every refinery remains the same: optimize the conversion capacity. Therefore, the idea is via chemistry tricks to maximize the production of higher priced transportation fuel output from lower priced heavy crude input.

To this equation described above and once the uniqueness of each refinery is taken for granted, one should not overlook the basic ingredient, the crude and every crude oil is unique as well. Because of the almost infinite variety of hydrocarbon compounds that make up a crude oil, each crude oil is unique. The uniqueness extends to its physical characteristics – gravity, sulfur, pour point etc. – and to the volume and quality of products produced when it is refined.

Chemistry and demand for certain products are the two main coefficients which determine the output of the refinery to meet with the market's requirements. For instance, in colder climates, the refineries have higher requirements for heating oil than those in temperate areas. Seasonal variations, geographic and environmental variations but even simple contractual agreements can modify the output of the process.

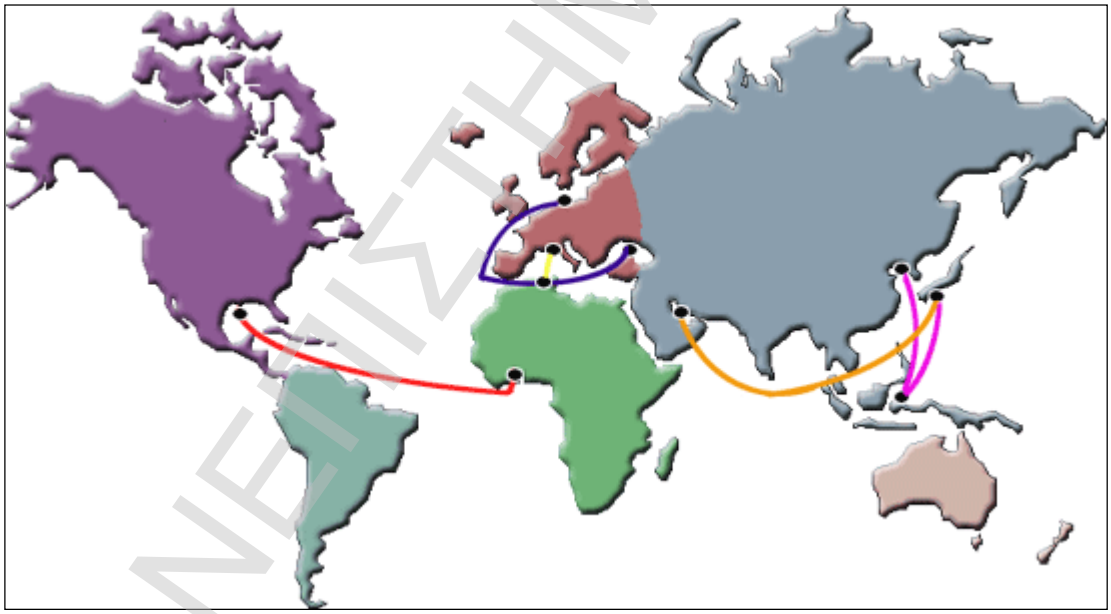
To all the above local or particular characteristics of a refinery projecting the needs of the relevant area our analysis should not put aside the movement of the market in a global level. Markets do not operate independently, even more with crude which can easily be transported in every refinery of the world. The crude will finally be sold to the market with the highest return and the competition will affect the prices. International markets such as the crude oil market are interrelated and the relationships do not exist only within geographic areas. Changes in one area may push changes to other areas, even though there seems to be no direct connection between them If the demand for sweet crude oil increases in Europe, it will

affect the price of sweet crude oil everywhere, causing other markets to react. The sweet/sour crude oil spread in the US is affected, which may change what crudes in the US will process. This “resets” the sweet/sour spread. Each of the areas has a concentration of refineries, which is the market for crude oil. Each is different in requirements, its limitations and its variables.

1.6 CRUDE OIL SUPPLY AND DEMAND CHAIN

1.6.1 Normal Market Supply Markets

- West Africa to the USA
- Former Soviet Union to Northwest Europe
- North Africa to the Mediterranean
- Middle East to Japan
- South Asia to North Asia

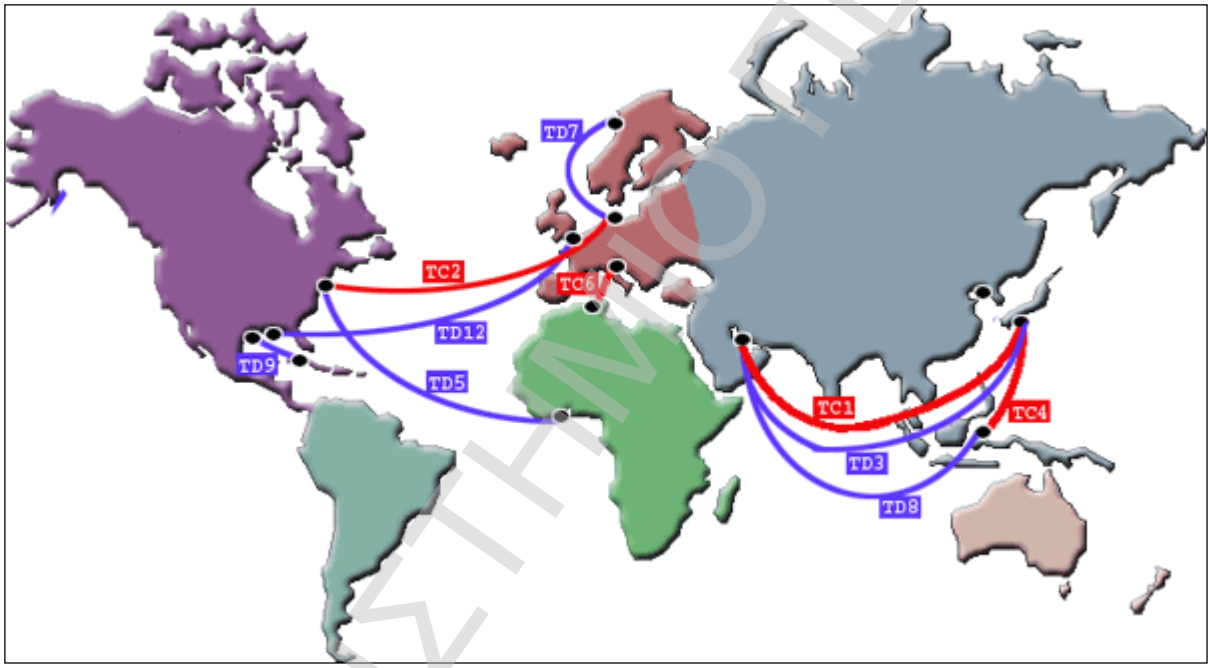


Some supply patterns make economic and logistics sense. The shorter the distance from crude oil production to market, the lower the transportation cost, therefore the higher the net revenue. Other trading patterns are the result of the market requirements. For instance the United States is the largest consumer of motor gasoline in the world. West African crude oil are excellent motor gasoline producers.

In the same sense of economic and logistics sense there are also standard market routes for certain type of vessel to/from certain areas. These distinctions mark a lingua franca between the parties involved in terms of size of vessel, voyage she has perform, type of cargo she is carrying etc. The initial distinction is between Tanker Clean routes (TC) and Tanker Dirty routes (TD). Basis upon this, we can define the size of the vessel her trading areas and finally the type of cargo she carries on board. All the above is information of utter importance as it defines the running cost of the vessel and her average freight for her sector.

Route	Sector	Physical Trade Route	Cargo
TC1	Large Range Panamax Tanker	Arabian Gulf – Japan (Ras Tanura – Chiba)	Clean Products
TC2	Medium Range Product Tanker	Continent – USA Coast (Rotterdam – Philadelphia	Gasoline, naphtha, gas oil, jet fuel
TD3	VLCC	Arabian Gulf – Japan (Ras Tanura – Chiba)	Dirty Product, usually non heat crude
TC4	Medium Range Product Tanker	Singapore – Chiba	Gasoline, naphtha, gas oil, jet fuel
TD5	Suezmax	West Africa – USA Coast (Bonny – Philadelphia)	Crude
TC6	Medium Range Product Tanker	Skikda – Lavera	Clean Products

Route	Sector	Physical Trade Route	Cargo
TD7	Aframax	North Sea – Continent (Sullom Voe – Wihelmshaven)	Dirty Products
TD8	Aframax	Kuwait – Singapore	Dirty Products
TD9	Aframax	Caribs – US Gulf (Puerto la Cruz – Corpus Christi)	Dirty Products
TD12	Panamax	Continent – US Gulf (Antwerp – Houston)	Dirty Products



1.6.2 Crude Oil Market's Major Players

1.6.2.1 The Seven Sisters

The seven major international petroleum companies (the "seven sisters": Exxon, Mobil, Chevron, BP, Shell, Texaco and Gulf) that dominated the industry in the past are gradually loosing some of their influence to OPEC and of course to traders and speculators. Until

1973[1], the seven sisters were the major buyers of transport services of the tanker operating shipping companies, taking advantage of their position as the major player of the market in both the commodity and the demand for ocean transportation. Though nothing was ever officially confirmed, their common practice and policy can lead us to the fairly accurate assumption that there should have been some kind of understanding between them in order to maximize their profits from their position in the market. Via their long-term charter engagements, they have managed to maintain the transportation costs more or less steady and low, however in periods of sudden raise of oil demand, the charter rates can go sky rocket. This development however does not effect their profits as the charter raise is simply a result for the higher demand for oil, whose price is raised as well since demand for ocean transportation is derivative demand to the commodity's raised demand, so the margins are still high. In the past[2], these major oil companies used to also have strong ocean transportation departments operating tankers partly so that they would profit from that lucrative business as well and of course to maintain their logistics supply chain independent (an estimated 33% of the world's tanker capacity was owned by the 7 sisters). In the past decade this tendency has changed due to the augmented carrier's responsibilities in terms of environmental protection measures (new IMO regulations that may also include criminal liability for the crew) but also due to the considerable amounts of money required to invest in tanker fleet building and maintaining. They tend to prefer investing in research and development of their core business and convey such costs and responsibilities to tanker operators. The market is also re-shapped since the first major oil crisis in 1973 and their role is now restricted due to OPEC. The old pattern of "fixed price" transactions where both parties agreed to a price which remained the same regardless the changes in the market condition is long gone. At that time, prices were far less volatile and all parties were willing to accept small price

[1] Ελ. Γεωργαντόπουλος. Γ.Π. Βλάχος. Ναυτιλιακή Οικονομική, Τζέι & Τζέι Ελλάς, Πειραιάς 2003, σελ. 453-454

[2] Κ. Γκιζιάκης. Α. Ι. Παπαδόπουλος. Ε. Η. Πλωμαρίτου. Εισαγωγή στις Ναυλώσεις, Εκδόσεις Σταμούλης, Αθήνα 2002, σελ. 66-69

movements, both favorable and unfavorable, as part of their doing business. These fixed contracts in the end of the day became too risky because they couldn't reflect the rapid changes in the market, the oil producing companies are now well aware of their power of negotiation and OPEC is now the major player since it is the factor moderating the oil production.

1.6.2.2. Organization of the Petroleum Exporting Companies[3] - OPEC

The Organization of the Petroleum Exporting Countries is a permanent, intergovernmental organization created at the Baghdad Conference in 1960 by Iran, Iraq, Kuwait, Saudi Arabia and Venezuela. Over the years other fresh members joined : Qatar (1961), Indonesia (1962), Socialist People's Libyan Arab Jamahiriya (1962), United Arab Emirates (1967), Algeria (1969), Nigeria (1971), Ecuador (1973 – 1992), Gabon (1975 – 1994) and Angola (2007). The scope of this organization is to co-ordinate and unifies petroleum policies among the member countries in order to secure a fair return on capital on those investing in the industry, an efficient, economic and regular supply of the consuming nations and above all secure fair and stable prices for the petroleum producers, their major concern.

After asserting the member countries' legitimate rights as producing countries against the 7 Sisters' multinational corporations policies they took some serious action during the 1970. The first major oil crisis in 1973 was triggered by the Arab Oil embargo and the oil prices from 2,50 USD per barrel closed to an amazing 11,50 USD per barrel in 1974. The second major crisis of 1979 coincided with the Iranian Revolution and oil flew to a remarkable 36,00 USD/barrel. Within the next decades wars and other political events caused several fluctuations in the oil prices simply proving the market's volatility and OPEC's decision to modify production had a lot to do with the

market's movements because it all comes to a monopoly modifying production and therefore setting the new price for the commodity.

For the shipping industry in general, the effects have two dimensions. First of all, considering the demand for tankers is derivative to the demand for oil, the market players were changed, the major player was now the oil producing countries, the oil major companies were now chartering vessels from the major tanker operators who build and maintained their fleet as per the new strict IMO regulations. On the other hand and as a consequence effecting the shipping industry in general, marine fuels' cost can no longer be estimated and that cost represents almost 70% of the vessel's operating cost.

1.7 Crude Oil Pricing

The introduction of Heating Oil, Motor Gasoline and Crude Oil Futures contracts changed the way petroleum was traded forever. The ease of trading energy futures allows more participation by traders, speculators and fund managers. These companies brought trading experience from other commodities, introducing the concept of technical trading to the petroleum industry. OPEC became a more cohesive organization taking a more proactive role in the pricing of their natural resources. For the first time, the Middle Eastern members use crude oil as a political weapon, withholding supplies to influence foreign policy of consuming countries.

The crude oil pricing is based upon the benchmark crude oils. With more than 300 individual crude oil grades being traded on a regular basis, it became increasingly difficult to know the daily price of each of these crude oils. Adding to the difficulty was the fact that some of these crudes did not trade every day.

[3] OPEC, retrieved on August 06 2007 from www.opec.org/aboutus/history/history.htm

Examples of Benchmark Crudes:

- Tapis
- West Texas Intermediate
- Brent
- BFO (Brent/Forties/Oseberg)
- Urals
- Light Luisiana Sweet
- Dubai / Oman
- Bonny Light

Location	Name	Quality
Europe, North Sea	Brent Blend	Light Sweet
Europe, North Sea	BFO	Light Sweet
US, Mid-Continent	WTI	Light Sweet
US, Mid –Continent	WTS	Light Sour
US, Gulf Coast	LLS	Light Sweet
West Africa	Bonny Light	Light Sweet
Arabian Gulf	Dubai/Oman	Light Sour
Far East	Tapis	Light Sweet
Russia	Urals	Heavy Sour

1.7.1 Crude Oil Pricing Techniques

A. Formula price: Crude Oil pricing is usual done via a formula price. A mathematical formula is used to price some of the world's crude oils containing other crudes, refined products, and / or a combination of both.

B. However there are other crudes, mostly the ones which are difficult to market, whose price is the netback price where pricing is based upon the price of the finished products made form the refined crude less the cost.

Crude oil pricing is based either upon terms contracts or at spot contracts

1.7.2 Term Contracts

International crude is dealt for 1 year or more, while US crude only for 3 months or more. The deals keep going until the one of the parties wants to stop with a 90 days notice of course. The actual pricing mechanism can be based on formula that includes a premium or discount to a benchmark crude spot price or on a floating price (posting) plus premium or discount. The term market comprises only approximately 10% of transaction volume, but governs approximately half of the world's physical crude oil.

1.7.3 Spot Contracts

Spot transactions are, obviously, short terms transactions in this particular industry short terms implies a duration of up to only 1 month. It usually involves 1 cargo / batch in the international market, while in the US the volume may concern vary. The price also varies, it can be fixed or floating. The spot market comprises about half of the world's physical movements of crude oil but approximately 90% of its transaction volume.

1.8.The Derivatives Market : at which markets they are traded

1.8.1. Leading Derivatives Market for Oil Derivatives

There are derivatives markets throughout the world which trade oil forward contracts, however the leading ones are the NYMEX at New York and ICE at London, though oil derivatives are also traded at Singapore and at other markets as well.

1.8.2. New York Mercantile Exchange – NYMEX

The New York Mercantile Exchange Inc. is the world's largest physical commodity futures exchange and the pre-eminent trading forum for energy and precious metals. The Exchange has stood for market integrity and price transparency for more than 130 years. Transactions executed on the Exchange avoid the risk of counterparty default because the Exchange clearinghouse acts as the counterparty to every trade. Trading is conducted through two divisions: the NYMEX Division, home to the energy, platinum and palladium markets and the COMEX Division, on which all the other metals trade.

The Exchange pioneered the development of energy futures and options contracts 26 years ago as means of bringing price transparency and risk management to this vital market. The wide array of trading markets provided by the Exchange include futures and options contracts for crude oil, gasoline, heating oil, natural gas, electricity, gold, silver, copper, aluminium and platinum; futures contracts for coal, propane, and palladium and options contracts on the price differentials between crude oil and gasoline, crude oil and heating oil, Brent and West Texas Intermediate crude oil, and various futures contract months (calendar spreads) for light, sweet crude; Brent crude; gasoline; heating oil and natural gas.

1.8.3 Intercontinental Exchange

The Intercontinental exchange operates the global electronic market place for trading both futures and OTC energy contracts. ICE offers a range of contracts based on crude oil and refined products, natural gas, power and emissions. ICE conducts its futures markets through its regulated London subsidiary, ICE Futures, Europe's leading energy exchange. ICE Futures offers liquid markets in the world's leading oil benchmarks: Brent Crude Futures and West Texas Intermediate (WTI), Crude Futures as well as the leading heating oil futures contract by trading volume.

ICE offers energy market participants a range of benefits:

Benchmark contracts
ICE Futures offers liquid markets in the world's leading oil benchmarks: Brent Crude futures and West Texas Intermediate (WTI) Crude futures. And, ICE also operates a liquid and transparent marketplace for trading North America OTC natural gas and power products.

Independence
ICE adheres to best practices in corporate governance in operating its energy marketplace. ICE's Board of Directors is independent ensuring that the Board acts impartially when making decisions that affect operations, markets and shareholders. To further facilitate fair trading practices, neither ICE employees nor its Board participate in energy trading activities, thus avoiding potential conflicts of interest.

Not all trading is done through an exchange. The over the counter market is an important alternative to exchanges and has become larger in terms of the total volume of trading than exchange traded market[4]. Most of the times, it consists of a computer linked network of dealers between two financial institutions or between

financial institutions and their corporate clients. The key issue of the over the counter market is the flexibility of the contracts that can be traded: they are not standardized, they are custom made to the clients needs. On the other hand, there is usually some credit risk.

1.9 PRODUCT TRADING VS CRUDE TRADING

Product trading is actually more complex than simple crude oil trading. The main reason is the large number of products that derive from crude oil distilling. In addition, in product trading quality issues are much more critical than in crude because all differentiations, even the minor ones, are of utter importance. Therefore, product traders must have a broader scope of knowledge and significantly more profound training.

The different quality specifications of each product set a frame of complexity around product trading. To this we must add the extra difficulties of the shipping segregation and the relevant contamination perils. And as if the above wasn't enough regional quality differences along with seasonal demand differences set a puzzle very demanding to solve. A trader in the product trading business initially should be well aware of the differences in the specifications and more than familiar with the ordinary refinery and petrochemical operations. However, probably the most dangerous point is to know the legislative restrictions of every region in order to avoid any kind of problems that will cost large amounts of money and mortification.

The most popular products traded are: motor gasoline (both regular and premium), diesel oil/gas oil, kerosene, jet fuel, residual fuel, asphalt, bitumen. The intermediate stocks traded are: naphtha, cat unit charge stock, motor gasoline blended components, cutter stocks, petrochemical feed stocks.

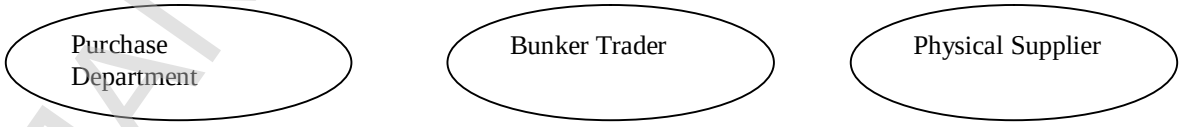
[4] John C . Hull :Options, futures and other derivatives", Prentice Hall International Editions, Toronto 2003: page 2

Chapter 2
BUNKER TRADING EMERGENCE AND DEVELOPMENT

2.1 Introduction to bunker trading

The bunker trading business is a trade that was not here a couple of decades ago under the form and structure we know about it today. It is a trade blooming basis upon the information's technologies which enable the traders putting together a service that could not be offered to the interested parties. Of course the need for provisions was there ever since engines gave moving power to vessel and though before we used to talk about coal, now oil is the material point. The need to supply the vessel with bunkers used to be an agent's business to attend to along with the rest of the provisions and stores the agent monitored on behalf of the owners or operators as per their instructions. During the vessel's cargo operations or just transits for provisions the agent arranged for bunkers supplies as per the Master request even on the spot sometimes as communications with the main office were not easy. The agent applied to the local suppliers, considered the availability and price quotations given and finally made the most convenient arrangement. Technology with all the advanced communications applications made this new trade emerge where there was not space and created a new network of market players in the field.

Nowadays the situation is completely different since there are three parties correlating in the bunkers purchase



2.2 Purchase Department

The Purchase department is the actual gear stick setting the bunker trading business in motion because it creates the demand for bunkers. To get a clear picture of what it consists, we should always bare in mind a few things regarding the position and main interest of the person actually buying the bunkers in every case:

a. The buyer of the bunkers can be either the ship-owner or a charterer, depending on the type of charter under which the vessel is operating as one can see in the table below showing who is paying for the bunkers :

	Ship-owner	**Charterer**
Voyage Charter	Yes	
Time Charter		Yes
Bareboat Charter		Yes

The above table is a simplistic one indicating the general rule, however in the shipping business and practice, there are no limitations as to what the deals can include or not. The above is a general idea and by no means limits what kind of arrangements can be made between the parties interested. Though both of them are mostly interested in the best price they can get, the approach is sometimes different. The ship-owner might want to undertake voyages to certain destination where the bunkers are cheap e.g. Libya so that he can get better profit margins. If a charterer though has obligations to fulfill or contracts to serve he cannot make such choices. On the other hand, a charterer should have more than one vessel to operate and consequently can exercise volume power to his trader while a single vessel owner cannot.

b. The number of the vessels under the same management is always important to consider in order to better understand the position of

each player in the market. For example, the big container carriers like CMA-CGM group have independent departments aiming only to bunkers procurement in world scale. They have strong positions in the market and different tools they can use to ensure quality, quantity and competitive prices. For example, they can have a contract securing quality and quantity for a particular port like e.g. Goia Tauro which they distribute to their different vessels calling that port. A ship-owner operating 4-5 vessels in the general area of South-East Asia has to buy bunkers for every vessel separately in every different port and has a weak negotiating position. Though both of them are mostly interested in the best price they can get, the approach is somehow different.

c. The type of vessels that a company is operating is also an important factor to consider because the frame is set differently for the liner shipping companies while the shipping companies operating tramp vessel are run on a different base. A liner shipping company operating ro-ro vessels or container vessels or even a cruise shipping company may plan far ahead their needs for bunkers and use hedging tools and contracts to secure price and availability. Ferry companies have used contracts for their bunkers procurement for many years now and they negotiate directly with the physical supplier rather via traders because their ports of call are rotated. And again, shipping companies operating tramp vessels all around the world are also poor in hedging tools or negotiating prospects due to the nature of their trade.

2.3 Bunker Traders

A bunker trader is a simple intermediary in between the physical supplier of the bunkers and the client requesting product (shipowner or charterer, the Master does not get involved in placing the order because the his principals can easily monitor the vessel and attend many of the problems arousing, no matter how long the distance). Bunker trading houses make profit in the most simple way one can

imagine; they buy the product from the physical supplier (or sometimes another trader) and they sell to the client by adding a premium to the buying price per metric tone bought. They try to get paid by the clients faster than they pay the suppliers and that is how they make profit. Though simplistic the process may seem the risks are by no means trivial.

The shipping business by default requires significant funds and consequently serious amounts of money are always in steak, the bunkers cost is a fundamental one. In addition, the shipping business has been operating in a global scale since forever even though a global framework does not apply and probably cannot apply. There are thousand of vessels all over the world requesting bunkers, operated by off-shore or holding companies too far away from the trader. In case something goes wrong, too big amounts are left in debt, the debtors are hard to find and the procedure of getting paid can be a hard an costly one. The actual risk derives from the fact that each bunker trading company buys the product for herself and then sells it to her principal, so she is the one in debt towards the physical supplier. In other words the risk of doing business with the wrong people is always there in the bunker trading business, along with the big amounts and the big profits.

A bunker trading house is a one stop shop for the client inquiring for bunkers because he gets what he needs on a global basis through one trader. The bunker trading houses have a wide network of connections with the physical suppliers on a global scale and can check product availability and price indication easily. They have their credit limitation to each physical supplier, personal contact and a solid relationship based upon mutual interest. What bunker traders can boost of is their knowledge over the market. Basis upon the vessel's itinerary they can propose what is the most cost effective solution for bunkers, where the best quality can be found, the exact conditions (barge or ex-pipe, off-roads or within port limits etc). They sell knowledge of the circumstances along with ability to get better prices

like a wholesaler. On the other hand the buyer (ship-owner or charterer) has vessels going around the world, ending up in places they have problems with the communication or the local common practice. They turn to the trader to solve their bunker problems, from whom they also have credit and can easily contact. They do this to make their life easier and have someone they know very well in case something goes wrong and there is a dispute, since most of the traders offer their advise for claims or relative conflicts. The functions mentioned above are my no means few or easy to attend to, so bunker trading is a popular service provided with possibilities to further grow.

2.4. Physical Suppliers

The Physical supplier is the company actually performing the delivery of the bunkers which they distillate in the refinery or which she buys from the refinery and stores in order to sell. In other words, in order to be named as a physical supplier one must have:

a. special license by the local government to distillate or import oil and its products
b. Refinery or storing installations controlled by the local customs
c. Barge, trucks or jetties to physically perform the delivery to the vessel

The bunker trader buys the bunkers from the physical supplier for and on behalf of his principal and in the name of a particular vessel. The physical supplier is always accountable for the quality, quantity, delays and other operational matters closely related to the delivery. His terms and conditions always apply regarding the biding samples and actual bunkering process which are followed during the delivery.

Physical suppliers usually do not sell bunkers directly to the purchase departments of the companies simply because it is risky. The bunker trading houses which they work with have established credit limits and solid business relationships, they are their shield of

protection and via the bunker traders they can sell their local bunkers to companies on worldwide basis. They have the commodity but it is too valuable and risky to sell it to anyone without the necessary precautions. The bunker trading houses provide with such for a share of profit so it is a win win situation.

2.5. Bunker Brokers

Another category similar to the bunker traders are the bunker brokers, slightly differentiated from the bunker traders. The bunker brokers act on behalf of their principals, owners or charterers, and see to make all the necessary arrangements for the bunkering acting on their behalf. Their actual profit is a reward they get for each stem either as a lump sum amount per each stem either as a percentage per each stem. The material point in this case is that for the bunker brokers there is no significant risk as the buyer of the bunkers is their principal(ship owner or charterer), the broker is not indebted. This structure does exist but it is not a common one, both charterers and ship owners prefer conveying the risk to third parties for obvious reasons.

Chapter 3
BUNKER'S RISK AVERSION

3.1 Sources of Risk in the Shipping Industry

Risk management is the process by which various risk exposure are identified, measured and controlled[5]. By definition risk, is the volatility of unexpected outcomes, either business or no business. The origins of these risks come from many sources:

- Human-created risk : business cycles, inflation, government policies, wars
- Natural Phenomena : weather, earthquakes
- Technology

Taking those risks are fundamental to entrepreneurship and are essential to the economy's growth. Particularly in the shipping business where the demand for sea transportation is by default a derivative of the global economic growth and trades in other industries, the risks are high. :

a. Operational Risk (freight and bunkers): Freight and bunkers signify the two opposite ends of the vessel, her income and the major cost for her operating in shipping. Freight fluctuations are usually greater in voyage charters and most of the times ship-owners tend to settle for period Time Charters in order to avoid the volatility. In addition cyclical and seasonal fluctuations also apply along with random political changes or physical phenomena. On the other hand bunker rates are directly correlated to oil prices and oil production. Bunkers put the shipping industry literally in motion while being the biggest fluctuating

[5] P. Jorion: "Value at Risk". McGraw-Hill International, Irvine California 2006 : p. 3

operating cost push the freight fluctuation as well. The bunker trading business is big both at physical supply volume as well as money transactions volume.

b. Ownership Risk (vessel's price value, scrap value, accidents). A ship-owner always puts himself against his two options: what size of vessel to buy and in which market to operate, in the spot market or at time charter basis? There are many things to consider while deciding this as the current value of the vessel and the scrap value, the international operating tonnage in every sector, the market trends and even his guts feeling. Nowadays when considering investing in the shipping business the owners bare great risks also due to the strict environmental legislations worldwide. They spend great amounts of money for pro-active safety measures and suffer huge penalties and fines when held liable for relevant accidents.
c. Exchange Rate Risk: The shipping industry is probably the first sector operating in global scale and probably the first to create a network of supporting business and organizations worldwide to facilitate the operating vessels. However, ship-owners are subject to the exchange rate risk like the rest of the global business, they suffer and profit from rate fluctuations while operating and shipping transportations being a derivative of the international trade.
d. Counterparty Risk: The credit risk originates from the fact that counterparties may be unwilling or unable to fulfill their contractual obligations. It exists in the shipping business like in every other global business; ship-owners have more or less the same means and mechanisms to protect their selves against such situations.

Protection against risk in the shipping industry is crucial because the amounts invested are big and consequently the risk is higher by default. Financial tools are invented for both freight and

bunkers hedging to create a safety net in the sense of risk sharing instruments.

3.2 Derivatives Basics

What is an often definition for the derivative is " a financial instrument whose value derives from something else[6]". First of all, a financial instrument is a standardized contract with rights and responsibilities for each party involved like a mortgage or a stock. The fact that it is standardized facilitates the procedures and assures a sort of unanimous way of interpreting each party's role in the contract. For example, a mortgage divides the amount for buying a house in monthly payments and as long as you fulfill this responsibility you keep your right to the house, at the end you are finally granted the ownership of the asset. When such an instrument is featured as a derivative it means that its value is directly and tightly linked to the value of the underlier and cannot be priced separately. Common underliers are physical commodities such as oil or financial securities such as a stock. The material points in turning any of the above traded as a derivative underlier are ;

a. Ability to be sold on a future date or even before the expiry of the contract
b. When due, to be sold at a certain price given in advance.

In case we are referring to a certain good, this commodity must be a standard one in quality and quantity, like crude oil barrels, and its trade must liquid, there should always be active buyers and sellers at any given time, like the oil market. There are four major categories of underlies; commodities, foreign exchange, interest rates and equities.

When buying a derivative, the player has two things in mind; either to hedge or to speculate. Regarding speculating, the buyer make

estimation that the underlies' market price will have a certain movement and basis upon this estimation makes a contract to profit from it. Hedging is all about avoiding a certain risk, managing prices uncertainty and pro-acting towards the possibility of the prices moving against our interest. Both functions do exist with or without derivatives however derivatives provide the players with another important financial tool; leverage. They can hedge or speculate without actually paying for it, it is sort of borrowed money and the technique will be explained further below while analyzing the four basic derivatives contracts.

One may very well say that traders are in the derivatives business for quiet a while because when a buyer and a seller agree to do a certain transaction with a price guarantee on a given date, then there we have a contract similar to a derivative. These are derivatives, the so called 'over the counter' derivative transactions where no organized official market sets the rules. The two parties are in direct contact and privately settle the particulars of their agreement. The fulfillment of their obligations is totally up to them, there is no other guarantee but mutual trust between them. One cannot doubt that the object between such traders is a derivative transaction, either they realize it or not.

On the other side, there is the derivatives exchange market, the listed market which operates under a different status though trading in the same philosophy. An organized market, with rules and formulas where buyer and seller do not need to find themselves, supply and demand for such agreements meet for the two major players as groups, not as individual companies. In other words, the exchange market provides this liquidity characteristic described above and the rules to trade given derivatives agreements among unknown counterparties. The significant difference is that you are no longer in a position to customize the contract as per your wishes as the options allowed are already given, while you enjoy the privilege of absolute certainty that

[6] M. Durbin : " All about derivatives", McGraw –Hill , New York 2006, p. 3

all obligations will be fulfilled, the clearing procedures of the exchange market provide you with this guarantee. In the listed market, there are four major contracts analyzed as following :

3.2.1 The Forward Contract

It is the simplest of all the derivatives options where one party agrees to buy the underlying at a fixed price by a certain date. It can be contrasted to the spot contract of agreeing to buy or sell an asset today. The buyer is the long party as he takes the long position, equally the seller is the short party. The contract price is the fixed price and the expiration date of the contract is the so called delivery date. The object for both buyer and seller to engage themselves in such a contract is avoiding uncertainty, lock a price though probably at the on the expiry date someone will loose unless spot market price for the underlie equals contract price.

Though as described above it is not a win- win situation, by the contract date the seller must sell and buyer must buy, no matter what the profit or loss, it is their obligation to do so. The forward contract is a typical over the counter tool and credit risk is there (in practice posting collaterals is the only security). Probably one of the most common forward contracts is the one on currency and exchange rates, still there are forward agreements in the energy commodity markets or money itself.

3.2.2. The Futures Contract

The futures contract is very much alike the forward one; the buyer takes a “ long position” and the seller takes a “short position” to carry out the exchange of the underlying commodity at a given price on a specified date. There is a significant difference however since all these transactions are held under the surveillance of a well

constructed market, a derivatives exchange where buyers and sellers meet. By this perspective, the forward from the futures contract has three major differences;

b. Anonymity of the Counterparties: the market herself brings the buyer and the seller together to match each others needs; they do not have to find each other. Moreover, there is constant flow of data and info from both sides, so the liquidity of the market's transactions is continuous.
c. Standard Contracts: since the transactions are held in a regulated market, the contracts are set in advance and the counterparties are not able to make their own rules, they have to choose these predetermined contracts
d. Daily Settlement: the daily settlement is actually a mechanism to avoid risk and cancellations as in the over the counter transactions. At the futures contracts there is a clearing process at the end of every day's transactions and this way we can also review the value of an identical forward contract. In further details, at the end of every day for each futures contract outstanding the clearing process makes an estimation of her value. The party who loses gets a bill, the party gaining money at the end of every day. These movements are not immediately effective as every company has her own credit limitation and only if exceeding a certain threshold do they get a notification for their margin. This credit margin is of course proportional to the collaterals posted or other securities given to the market. Via this process where on each day every transaction is settled and then the contract replaced by an identical one, at the beginning of every trading day every futures position is zero.

The underlying commodities exchanged can be physical or financial goods and there are about 12 or so major exchanges for them like the Chicago Board of Trade or the Hong Kong Futures Exchange. Under the regulations of such market institutions the counterparties aspire mostly to the anonymity among them and to the liquidity of the

contracts exchanged. This calculation is absolutely logical; however it would be a huge mistake to understand that all contracts are equally liquid all times and that you will always find a contract to buy at the price you desire. The possibility to do so is significantly higher within a regulated market, but there is no one who can vouch the result. In such market the supply and demand rules always apply very clearly, therefore there is a liquidity risk that cannot be avoided; it is part of the futures trading process.

3.2.3. The Swap Contract

The swaps contract is all about exchanging futures cash flows basis upon interest payments; one flow is on floating exchange rate, the other one on a fixed rate. For example, we suppose a company has a loan of 10,000.00 euro and 5 years to settle it via monthly payments basis upon an interest rate linked to the Euribor index. The company cannot assess the exact amount of the monthly payments since the Euribor is a floating rate and n order to avoid exposure to interest fluctuations third company comes up like a Securities company. She exchanges the floating Euribor rate with a loan on a fixed rate and our company has secured the amount of her monthly payments.

In the case described above, the Securities Company involved is a swaps dealer buying and selling money, on behalf of two parties needing this service, for a certain fee. This however is not the only scenario; we might as well have two different companies, one with a fixed rate liability and the other with a floating rate liability wanting to exchange. The payer of the fixed rate liability takes the long position; the fixed receiver takes the short position. They do not exchange the loans; the only fulfill each others obligations under a specific contract. Moreover, the payments are not usually effected every month but usually on a quarterly basis and of course they do not actually send each other the amount due, they net the difference between them.

3.2.4 The Option Contract

The option contract gives the holder the right but not the obligation to buy or sell something at a specified price, on or before a certain date[7]. The option contract may or may not end up in a sale, the material point of this contract is the possibility, the option to do the exchange which is not actually valid unless execution. Therefore, it is not the actual underlie in steak, it is the right to a transaction. When you buy a call option you buy the right to buy the underlie, whereas the put option gives you the right to sell the underlie. Once you exercise your option you buy at the exercised price only on the expiry date for the European options, even before for the American options.

The first option coming into mind is of course the commonly known option to but a certain stock, but this is not the only alternative: commodities, units of an index and options to buy forwards, futures and swaps are also underlies in the options contract.

[7] M. Durbin : " All about derivatives", McGraw –Hill , New York 2006, p. 39

Chapter 4
BUNKER HEDGING

4.1. Bunker Hedging in general

The core of risk management is to use financial tools that help us face uncertainty. Derivatives are such tools mostly use in a special area of risk management, at hedging. While hedging we mean that in order to avoid unfortunate results of estimated risks, you take another position with features opposite to the original one. This way you are able to cover both scenarios and actually stay indifferent if the original position losses or gains ; if it loses, your hedging position will cover your loss, thus if it gains you are already covered by default.

As explained in previously, the bunkers cost is probably the only unpredictable amongst a vessel's running costs as the rest of the costs raise inflationary and do not fluctuate a lot. All the rest of the costs the operator can roughly estimate. However the bunkers cost is very high and the price can be really different if you buy them at the Panama Canal or at Curacao. The core of risk management at bunker buying is pro-acting and protecting yourself from really high prices if you can. It is better to secure a price in advance so that you best control the operation and the profit of your vessel: on the one hand you can efficiently control the cost on the other you can accurately make your voyage cost estimation to make up your business decision. Finally, one cannot underestimate the motive for speculation. Either ship owners or charterers they all are in the maritime business to make a profit and if via bunkers hedging they can do so, there is an option that should not be overlooked.

4.2 Factors Affecting the bunker market

Bunkers are a lower crude oil product and their price reflects the price movement of crude oil. Therefore, when monitoring the oil

market in general one can have a very clear idea of how the bunker prices will move. In other words any OPEC decision regarding cutting down production, any political problem in the oil producing countries, any decision by the US Government to alter the oil reserves instantly has direct effect to bunker prices. Analysis over the global oil market equals analysis on the bunker market; however that's not the co-efficient in the equation.

The trends described above apply to the oil market in general while the physical bunkers delivery in each port set their frame of rules and policies which along with every ports singularity complete the puzzle of the local restrictions. Physical suppliers on a local basis play their particular role in bunker's stock, availability and prices. Their day-to-day operations and the local demands sometimes change the Refinery's policy and cause problems in the availability of bunkers because the physical have other priorities or obligations to fulfill. Each port's restrictions regarding the bunkering operations, for example lack of berth dedicated to bunkers supply operations or lack of barges puts obstacles to the bunkers availability in every port. These local problems and restrictions cannot be observed separately from the general area of ports where bunkers are available along a vessel's route : if a vessel is under COA from Mersin to Seville then she has to buy her bunkers at either Mersin or Seville or she has to consider calling for bunkers only the rest of the two major bunkers ports in her itinerary : Malta and Piraeus. All the options mentioned above correlate to the decision but also correlate in between them as intraport competition.

4.3 Over the counter hedging tools options

Bunker risk management is divided into two major categories of contracts, the ones involving physical delivery and the others involving cash settlement. Before actually starting the analysis, we should make a quick reference to risk management companies. They

are consulting houses or traders themselves who monitor the market using financial indexes, sensitivity analysis and other methods to forecast the market movement. Their goal is to have an estimation of how the market will move on global basis, how the prices will be formed in vast areas like the Mediterranean or South-East Asia, and even monitor the prices in specific important ports used as bunkers stations like Gibraltar. In order for the consultants to make such estimation they are in direct contact with the hedging departments of the major financial institutions like banks or other analysts who weigh differently economical and political factors correlated to the oil price. They also gather all info relevant with the underlier from physical suppliers and other local market factors and after elaborating all the data, they issue a bulletin and other graphs with estimations and forecasts for prices for all the major trading areas where the vessels will need bunkers.

The material point of course is to make the correct estimations upon the evolution of oil prices moving for or against and take the right position. As we will see in further analysis below, these bulletins and estimations given are the basis upon which traders make their own calculations, hedge, add their own premium and calculate profit and loss at the end of the day.

One cannot overlook the credit risk in any of the bunker contracts because there are too large amounts in steak. But os it is in every single sell buy bunkers transaction and the credit risk is always there. Such over the counter transactions bare high credit risk and no clearing procedure is carried out, every client has his own credit limitation.

4.3.1. Physical Agreement

The Physical agreements are agreements which end up in physical delivery of bunkers, very similar to forward contracts. There are two main categorizations in appliance; you can either buy an FPA or an MPA Physical Agreement. The idea though in this procedure does not significantly from buying bunkers on the spot market. The only difference is that the delivery and the payment take place sometime in the future and the time span is normally up to a year. When referring to the spot market, we can define it as following: the buyer of the bunkers (either charterer or owner of the vessel) schedules to provide the vessel with bunkers during the loading operation at a port of call e.g. Piraeus. He contacts the local physical suppliers of Piraeus Port via traders usually, because the Oil Companies avoid giving credit to every passing ship-owner / charterer. Whichever company gives the best price, has availability and time to deliver gets the appointment. It is an actual physical market.

4.3.1.1. Fixed Price Agreement

FPA : Fixed Price Agreement on purchasing bunkers for a period of time at specified delivery places. Delivery and payment take place sometime in the future, span up to one year. In other words, there is an agreement between the bunker trader who is actual buyer from the physical supplier and the ship owner / charterer who needs the bunkers for a vessel. Usually basis upon the vessel's itinerary and only if the trading ports are known in advance, they schedule the supplies on a fixed price for a period of time. It is an over the counter transaction and the contract is an agreement between the two parties, there is no listed market you can buy such. Basis that it is a contract finalized basis upon the needs of the ship owner / charterer, he sets the particulars and the details, it is an agreement as per his instructions to best serve his needs.

What is really important in this form of contract is that you cannot ask for delivery at any place you want, you have to have in advance some specific options. In other words, the itinerary of the vessel is essential for such a contract. You also need to have a specific quantity of bunkers to be lifted in a certain period, the hedging period can be from 14 days to 24 consecutive months.

As an example we may revise the following case : a ship owner has fixed his vessel for the next 6 months with a contract of affreightment to carry coal from Murmansk to the Continent. To carry out this particular task, the vessel will be making one round trip per month and the estimated bunkers consumption for this will be 700 mts/month. Throughout this itinerary there are three bunker eligible bunker destinations : Murmansk, Rotterdam and Immingham. Basis on the above, the bunker trader via the help of the risk manager can offer the ship owner a fixed price agreement to deliver bunkers at the relevant ports with prices as following ;

Murmansk: 235,00 USD
Rotterdam: 245,00 USD
Immingham: 257,00 USD

If the ship owners actually take this deal, he will buy his bunkers at the fixed prices, no matter what the fluctuation of the price for the spot market. The bunker trader has bought the fixed price contract from the risk management company and then sold it to the ship owner. If the actual spot market prices move against the trader below the fixed price at which he may have bought the bunkers, the risk management company will have to pay him the difference. If the prices move for him, then he has to pay the risk management company. In any case, the ship owner buys at a fixed steady price. The actual clearing process is calculated basis upon the spot price of the actual delivery date of the bunkers and the difference is settled financially. The spot price is given by the physical supplier who will supply the vessel nominated by the trader. The usual process is that the ship-

owner gives a notice to the trader regarding the vessel's ETA to the port where he wants to lift the bunkers, the trader buys at the best price possible and settles the difference with the risk management company which has given him the original indication at which price to fix the contract.

Advantages: The main advantage of this contract is that you secure a price for your bunkers and of course availability for supply. This kind of agreement is really helpful for liner shipping companies, for cruise vessel companies, for vessels under contract of affreightment etc, since they know their schedule and can plan their deliveries at a fixed price.

Disadvantages: First of all, spot prices may actually have moved against you but you are obliged to lift the bunkers as agreed. In any case you may have lost some profit, you did not loose your money though: you have made your voyage calculations basis upon the given bunker prices and your profit is already secured. If the prices move against you, you have only lost the opportunity to speculate, to get extra profit. There are of course the above mentioned restrictions so if you do not have a schedule for your port of calls, you cannot make such an agreement. In general, you cannot be in a vessel operating in the spot market asking for a fixed price contract since you cannot predict where you will go. Of course there are exemptions to the rule : there might be a shipping company operating several vessels in a certain trading area, therefore she can buy such a contract calculating the needs for all her fleet and securing availability and price but not for a specific vessel. In addition and only if the contract from the bunker traders side is not relied to a single physical supplier to deliver the bunkers, there is some flexibility to reschedule the supply to another port other than the specified in the agreement. In this case, the ship owner will only have to pay the difference.

As a general rule, this fixed price agreement is a very useful tool in special cases of ship management. For instance, cruise vessels

operators do use it to secure not only the price but above all the availability for the exact quality of bunkers they require, usually low sulphur bunkers. Since their cruise plans are set at least one year ahead, the operators can very well negotiate such agreements and convey the headache to secure quantities and profitability to the traders who are in contact with the Physical Supplier on a local basis . Another example where such contracts are used is Greek Coastal Shipping Companies which operate ferry vessels, they also get into such agreements but they do it directly with the Physical Suppliers, there is no trader as an intermediate. Since they are registered Greek public companies, the credit risk for the Physical Supplier is lower than any random ship-owner, so the give them credit. Finally, there is also another possibility to make a fixed price agreement, again via trader: if a shipping company is operating many vessels in a certain trading area she can fix a price agreement to lift a certain amount of bunkers in the general area. For example, a fixed price agreement to lift 2,500 mts of IFO per month to the general South Korea area can be split to a number of vessels and in a number of different ports if the traffic volume of the ship manager and the connections of the trader permit such. These contracts are very popular among their party management companies or major managers which are specialized in certain trading areas and can afford to negotiate a fixed price agreement for the vessels.

4.3.1.2 Maximum Price Agreement

MPA: A Maximum Price Agreement gives you full protection from price fluctuation. Upon payment of an upfront premium you obtain the right, but not the obligation, to buy a certain amount of bunkers at the agreed maximum price. In other words, the ship owner can buy an option contract from his trader; it is more like an insurance policy that he will not pay for his bunkers at a price higher than the given one.

The process which has to be followed in order to give the final amount for the premium depends on the circumstances, the theoretical base upon which you make the calculations is the same when issuing an insurance policy: if your client has a bad record you get him to pay a higher premium. In such contracts however the main things to consider are the following:

a. What is the maximum price for bunkers that the owner wishes to secure, if the price considerably close to the price at the spot market, the premium should be low. In the opposite case, if a price significantly higher than the spot one has to be secured, the premium is definitely high.
b. If the agreement is to be fixed for a period of time when we are expecting important fluctuation on the oil prices, e risk management company has to cover that risk as well
c. The volatility of the market at that period of time has to be taken under consideration.

Such contracts do exist but their application is not really popular. The main reason is that it is extremely complicated to calculate how much this premium should be for the option to buy and thus they are not very popular in the shipping industry. Traders and most importantly risk managers avoid making the calculation because most of the times it is not worth the effort: the margins are low and the eligible buyers for such a contract few. In other words, on top of the restrictions in order to have a fixed price agreement you add the premium calculation. Most of the time, if used, the owners choose such contracts in order to secure quantities and smooth supply for their vessels, especially in the cruise lines companies because they plan at least one year ahead.

4.3.2 Paper hedge

The paper hedge agreements are a pure financial tool where no physical delivery of bunkers is involved. The major advantage of the paper hedge agreement is that the point of reference is Platt's daily report. It is the world's largest energy information provider, provides information and services to companies and individuals active in the fields of electricity, natural gas, oil, marine oil, coal, nuclear energy and petrochemicals. Customers receive Platt's news and market information services in real time and can have easy reference to revise their position. It is a universally recognized financial institution and their reports are considered *lingua franca* in bunker matters, they cannot be questioned.

A Platt's report takes information from oil cargo traders and oil companies and monitors all the relevant cargo movements in different parts of the world. Every afternoon at 1730 GMT the day's transactions are considered closed and all the data has to be processed. On the next morning we get a full report like the one below the Platt's European Market Scan for 31/07/07.

	Size		Area	Low ch	Low	High	Hi ch	Unit	Mean $/mt
3.5% FO FOB Rdam	Barges	FOB	Rdam	5,00	372,25	372,75	5,00	$/MT	372,50
1% FO FOB Rdam	Barges	FOB	Rdam	2,25	359,50	360,50	2,25	$/MT	360,00
Gasoil 0.2	Barges	FOB	Rdam	10,50	652,25	652,75	10,50	$/MT	652,50
3.5% FO FOB NWE	Cargo	FOB	NWE	5,00	351,50	352,50	5,00	$/MT	352,00
3.5% FO CIF NWE	Cargo	CIF	NWE	5,00	368,25	369,25	5,00	$/MT	368,75
1% FO FOB NWE	Cargo	FOB	NWE	4,25	371,00	372,00	4,25	$/MT	371,50
1% FO CIF NWE	Cargo	CIF	NWE	4,25	386,00	387,00	4,25	$/MT	386,50
Gasoil 0.2	Cargo	CIF	NWE	10,75	658,50	659,50	10,75	$/MT	659,00
Gasoil 0.2	Cargo	FOB	NWE	10,75	641,00	642,00	10,75	$/MT	641,50
ULSD	Cargo	CIF	NWE	11,50	698,75	699,75	11,50	$/MT	699,25
ULSD 10 ppm	Cargo	CIF	NWE	12,00	694,50	695,50	12,00	$/MT	695,00
ULSD 50 ppm	Cargo	CIF	NWE	12,25	695,50	696,50	12,25	$/MT	696,00
Jet Kero	Cargo	CIF	NWE	13,00	723,00	724,00	13,00	$/MT	723,50
3.5% Fuel Oil	Cargo	FOB	Med	8,50	374,75	375,75	8,50	$/MT	375,25
3.5% Fuel Oil	Cargo	CIF	Med	8,50	392,00	393,00	8,50	$/MT	392,50
1% FO FOB Med	Cargo	FOB	Med	4,00	382,25	383,25	4,00	$/MT	382,75
Gasoil 0.2	Cargo	FOB	Med	11,50	659,50	660,50	11,50	$/MT	660,00
Gasoil 0.2	Cargo	CIF	Med	11,50	678,50	679,50	11,50	$/MT	679,00
ULSD 50 ppm	Cargo	FOB	Med	12,50	682,75	683,75	12,50	$/MT	683,25
ULSD 50 ppm	Cargo	CIF	Med	12,50	695,50	696,50	12,50	$/MT	696,00
HSFO380 4% S'por	Cargo	FOB	Sing	-3,35	387,97	388,01	-3,35	$/MT	387,99
HSFO180 S'por	Cargo	FOB	Sing	-1,43	393,85	393,89	-1,43	$/MT	393,87
Gasoil 0.5%	Cargo	FOB	Sing	0,19	85,33	85,37	0,19	$/bbl	629,29
3% Fuel Oil	Water	FOB	USG	0,20	58,15	58,25	0,20	$/bbl	369,57
No. 2 Waterborne	WtrBn	FOB	USG	0,0400	2,0780	2,0855	0,0425	$/Gal	640,62
HSFO 180 CST	Cargo	FOB	Arab G	-1,43	379,53	379,57	-1,43	$/MT	379,55
Gasoil 0.25%	Cargo	FOB	Arab G	0,19	83,99	84,03	0,19	$/bbl	625,87
Gasoil	Cargo	FOB	Arab G	0,19	82,19	82,23	0,19	$/bbl	612,46

The first column describes the different qualities and products for oil with special reference to content of sulphur. For example 3,5 % Fuel Oil of the first cell can be distilled as 380 degrees Fuel Oil which main engines use as marine fuel. There are different qualities both dirty and clean but all of them are crude cargoes, not distilled ones ready to be consumed as bunkers by vessels at sea.

The second column defines the size of the cargo exchanged. For example at Rotterdam, where small barges with size at about 3,500 – 5,000 mts DWT are used to enter the canal are used we mean that each lot has approximately that size. When the product is described as cargo, then it may be a lot of 200,000 mts. The water feature only applies for product at Houston, Texas USA where the local quality has to go through a special process in order to get fuel 380 degrees marine Fuel oil out of the refinery.

The third column obviously refers to the selling terms, either CIF or FOB.

When coming to the fourth column, the analysis that will follow applies to the main oil districts of the world where refineries receive and distil oil: Rotterdam, North Western Europe, the Mediterranean, Singapore, the U.S. Golf and of course the Arab Golf.

The next four columns give important numbers: the minimum price difference in U.S. dollars from the previous day, the actual lowest price traded in the previous day and the exact same info for the highest side.

Next in line is the unit of oil traded, and as one may see only at the Arab Golf do we trade in barrels, the rest of the world is trading in US dollars per metric tone.

The only addition in the report is the final column which gives a mean price from the highest and the lowest price traded in the previous day.

The Platt's issues many different reports on a daily basis which can be used as reference in transaction. For example the bunker wire report, which only gives info for the marine fuels(for the distilled oil which a product ready for consumption) is the base upon which agreements are fixed and cannot be questioned. The report explained

above is not direct bunker products however the bunker prices are directly and utterly correlated with the report above because the price fluctuations will follow at the bunkers prices and the availability of products can also be monitored.

The process of the paper hedge mechanism begins with setting a fixed price correlated to the Platt's reports and is not specified for a certain port but a for a certain area, for example the Mediterranean. From that point on, there are three options

a. **Paper Hedge Agreement – Swap**

   This paper hedge agreement enables you to lock a price for your future bunkers consumption without committing yourself into taking physical delivery at any specific destination. When you buy a swap agreement, you fix the price referring to a prior Platt's price depending upon your bunker exposure. Considering that no actual physical delivery takes place, the net result will be that the settlement on the swap transaction counterbalances the changes in your bunker invoices, securing you a fixed price for your bunkers, no matter what happens with the oil prices. In other words, a Swap ensures you a cash settlement where the prior defined Platt's reference settles above fixed prices. On the other hand, the opposite happens when the Platt's reference below the agreed fixed price. This is of course the most common use and a good choice when the vessel or the vessel's a fleet operate in certain trading areas, usually in tramp shipping. For example, if the operator has a mean exposure of 250,00 USD/MT in a certain port, on the other hands he buys a swap for Platt's indication plus 2,00USD. If the Platt's price on the delivery date is 255,00 USD, then he cashes a difference of +2,00 USD per MT. On the other hand, if the prices move against him and the Platt's price is 248,00,

you still secured a price lower than your exposure for 248,00USD/MT. This is only paper settlement to a pure hedging tools and has nothing to do with the actual delivery, availability etc.

b. Paper Hedge Agreement – Cap

A cap paper hedge secures you against bunker prices rising above your budget price, but without the obligation to forfeit the opportunity to increase your profits when bunker prices falling during the hedging period. It is an one way security, where no payment will occur if the agreed price index settles below the cap level. The caps are offered against payment of an upfront premium which depends upon the period and the cap level. There are difficulties to apply such agreements because it is not easy to calculate the premium. As explained above, if you buy a cap to secure you for prices over for Platt's + 2,00USD, you secure your budget if prices move against you over a premium. However, in common practise such contracts are not easily negotiable, owners wishing to take a hedge position prefer to buy a swap and get both protection from opposite price movement along with possibility to speculate.

c. Paper Hedge Agreement – Zero Cost Collar

A zero cost collar strategy is designed you cash compensation where the chosen price index settles above the agreed cap price. To finance the premium on the cap transaction, you simultaneously sell the opportunity to increase your profits where the price index settles below a certain calculated level or "floor price". If the price index settles between the floor and the cap price, no payment will occur. In this case, basis your initial bunker exposure and a Platt's indication you fix a zero cost collar agreement over Platt's – 5,00 USD, for example cap price

250,00 USD, floor price, 245,00USD. The object of this agreement is to cash compensation if the price settles above the cap price on the other hand, if it settles below you have resigned your option to cash the difference.

The thing with paper hedge financial tools is that there is no involvement of physical delivery meaning that it is a matter to be handled not by the operator of the vessel, but by the financial officer in charge. These tools should be monitored by the financial department because it has nothing to do with vessel operating; it has to do with risk aversion. Additionally, all the techniques described above are over the counter hedging tools, therefore in order to make such contracts the trader has to secure credit lines from the client since there is no clearing procedure, each client has to have an established credit line.

4.4 Hedging Tools in the Regulated Market

4.4.1 Imarex Bunker Futures Contracts

All the options described above apply to over the counter transactions, however the IMAREX option cannot be overlooked. Since 5th December 2005 the Imarex launched tradable future contracts through their electronic screen market along with clearing procedures available to all their trading members. The Imarex offers futures contracts on :

- Rotterdam 3.5% Sulphur Barges FOB
- Northwestern Eurpor (NEW) 1.0 Sulphur Barges FOB
- Singapore IFO 180 cst FOB
- Singapore IFO 380 cst FOB
- Fujairah IFO 180 cst FOB
- Houston IFO 180 cst FOB

The duration of these contracts varies from 6 months, 6 quarters and 2 calendar years. These contracts are only available to the trading members who are already in the clearing process through the collaborating bank.

4.4.2 Energy Futures Contracts

One last option to hedge against bunker prices movements is to buy petroleum future contracts in the regular listed market. Since the bunker prices have high direct correlation to the oil prices you can hedge against the commodity price while buying future contract of the underlie product. This solution is based on financial data and is not in direct connection with the aim of bunkers purchasing which is smooth and cheap bunkers supply. However since the transactions take place in the listed market there is no credit risk and oil contracts are always easily tradable. It can be described as hedging in a different market, as you can buy energy future contracts in the major mercantile markets as the NYMEX or at Singapore etc.

Chapter 5

ANALYSIS FOR JULY 2007 IFO MED

5. Analysis for July 2007 IFO FOB Mediterranean

In order to better understand the functions of the hedging tools described above, it was decided to form our own case study example and try to make in indicative application of the techniques analyzed before. In our analysis, we took Platt's data for the general Mediterranean region along with the indications for the ports of Piraeus, Gibraltar and Istanbul for the month of July 2007. We decided to use these three ports in our example because all three of them have their own singularities in terms of traffic, procedures to be followed for bunkering purposes and most of all these three ports are the major bunkering stations in the Mediterranean Sea. To start our analysis, we will make a short presentation of all three ports and have a general idea of their functions. Then, we will show via diagrams and basis upon official Platt's numbers the movements of the oil and bunker prices and then compare them to each other and finall we will present our comments.

5.1.1 Istanbul

Istanbul is the biggest and most important Turkish Port situated in the mouth of Bosporus in the Marmara Sea. It comprises several smaller ports making up to two main sections: Karakoy Piers for passenger and Haydarpasa port for cargo handling. In the Haydarpasa piers, for the year 2006, an estimated of 3,400.000 mts of cargo were handled at the container and cargo berths, while the there are also tanker berths and ro-ro berths. On the other hand, the passenger terminal serving the cruise vessel calling Istanbul is more than vivid. In addition, in the general Marmara Sea area, there are also other terminals, repair zones and shipyards. Above all though, Istanbul is situated in the centre of the Straits, Bosporus and Daranelles, all the

vessel sailing towards and from the Black Sea have to transit Istanbul. Considering this, the volume of passengers or cargo actually handled may look trivial to the number of vessel transiting.

Bunker supply at Istanbul is common practice nowadays not only because of the high quality bunkers of the area but also because in exiting the Black Sea, the vessels can lift their usual bunkers (other than the low sulphur expensive ones required within the Black Sea). There is no option to lift bunkers on a berth, only via barge to the designated anchorage for bunkers lifting.

5.1.2 Piraeus

Piraeus is the Greek port with the highest traffic on a national scale but its traffic is most of the times calculated as the total traffic of the general Piraeus port and Eleusis area which includes ferry terminal, ro-ro terminal, container terminal, passenger terminal, general cargo berths, silos, lay-by berths, petroleum installations and shipyards. Along with infrastructure there is a very strong maritime cluster expanded in all sorts of shipping operations which renders Piraeus as an eligible port to stop for bunkers and sometimes arrange other supplies, repairs, spares etc. At Piraeus you can most of the times lift the bunkers ex-barge either at the Anchorage or ex-barge and ex-truck where the safety conditions permit it since there is no designated anchorage for the bunkers and no designated berth to lift special quality bunkers. Despite these difficulties, Piraeus is still considered a good option regarding bunker lifting because of the fair quality and the relevantly low prices which put aside the fact of the deviation to reach Piraeus.

5.1.3 Gibraltar

Over the year, the Gibraltar Rock has always been a strategic point in the Mediterranean Sea. The same quirk of geography has allowed Gibraltar to evolve as a maritime point of excellence right in the crossroad of the Mediterranean and Atlantic shipping lanes offering various services, among them bunker supplies to the more than 90,000 vessels transiting at Gibraltar on annual basis. Within the last decade, bunkers supplies has become the major activity of the port of Gibraltar and as a result, the relevant Port Authority has worked with all the parties concerned to establish the conditions and rules in order to best serve the industry and of course the clients. Just under 4 millions of tones of bunkers were delivered in 2006 to 5,402 vessels, while in 1989 only a poor 0.84 million tones. Bunkers can be delivered at either berth or at the designated anchorage; the Port Authority has set an easy and flexible frame in regards of pre-arrival requirements and regulations but always respecting the international rules and resolutions.

5.2 Platt's Indications for the Mediterranean in general and for Istanbul, Piraeus and Gibraltar for July 2007

We here below have the official Platt's data for Fuel CST 180 and Marine Diesel Oil, which are the basic marine fuels used in the industry. In the first column, there are the Platt's prices for cargo movements based upon the basic Platt's report similar to the one given previously and in the second column, we have the prices based upon data from the Platt's bunker wire report indicating the prices at which the Physical Supplier sell the product locally on that date. All prices are calculated in U. S. Dollars per metric ton.

5.2.1 Prices for Fuel CST 180

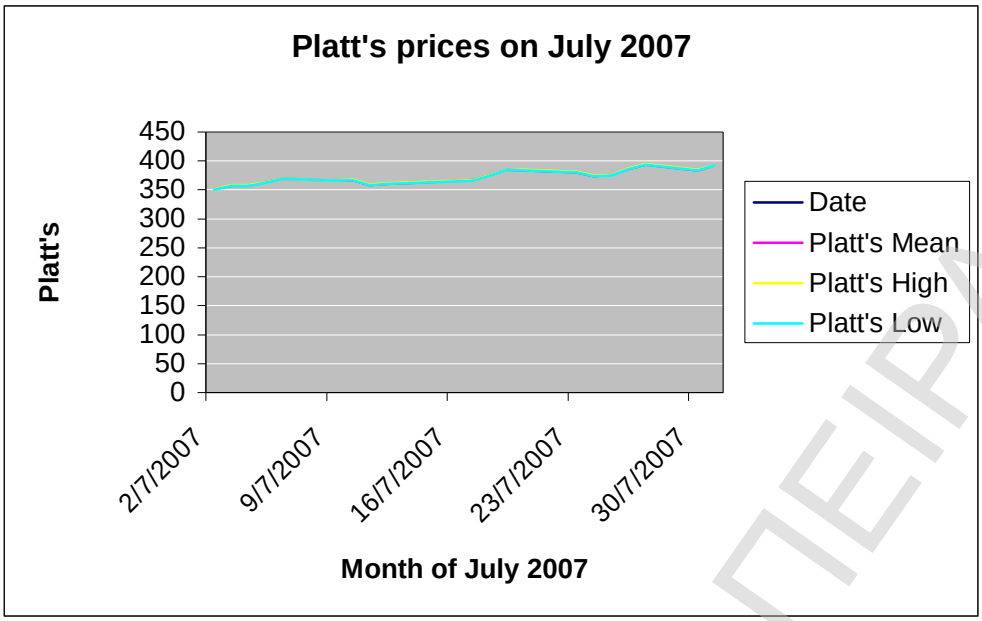
5.2.2 Platt's Report for July 2007

CIF 3,5 % Fuel 180 CST Med			
Date	Platt's July 2007		
	Mean	High	Low
2/07/07	351,25	351,75	350,75
3/7/2007	357,25	357,75	356,75
4/7/2007	357,25	357,75	356,75
5/7/2007	363,5	364	363
6/7/2007	369,25	369,75	368,75
9/7/2007	366	366,5	365,5
10/7/2007	367,25	367,75	366,75
11/7/2007	358,5	359	358
12/7/2007	360,5	361	360
13/7/2007	362	362,5	361,5
17/7/2007	366,75	367,25	366,25
18/7/2007	375,75	376,25	375,25
19/7/2007	384,75	385,25	384,25
20/7/2007	384	384,5	383,5
23/7/2007	380,75	381,25	380,25
24/7/2007	374	374,5	373,5
25/7/2007	375,5	376	375
26/7/2007	386,25	386,75	385,75
27/7/2007	393,75	394,25	393,25
30/7/2007	384	384,5	383,5
31/7/2007	392,5	393	392

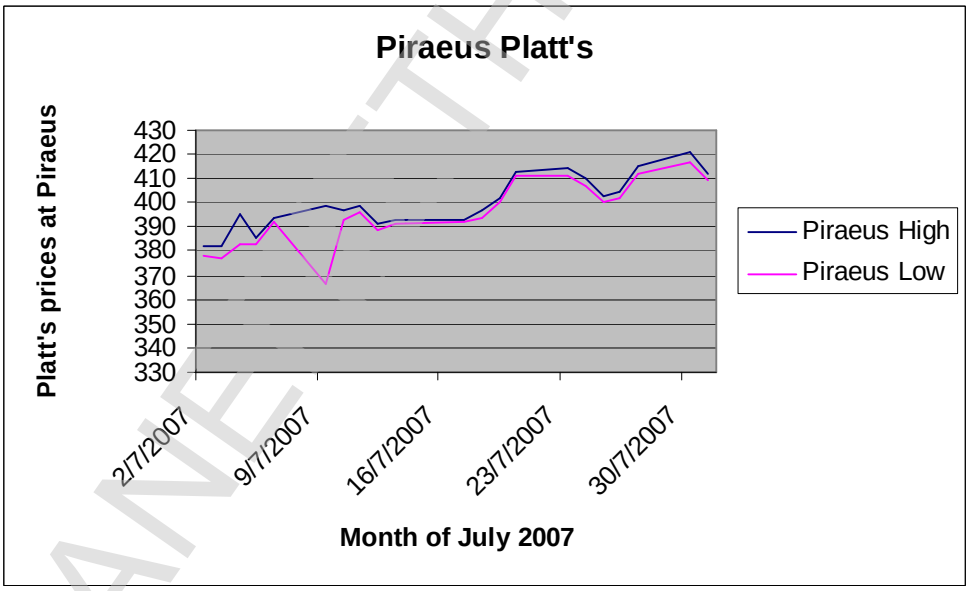
5.2.3 Platt's Bunkerwire Report for July 2007

Date	Piraeus		Istanbul		Gibraltar	
	High	Low	High	Low	High	Low
2/7/2007	382	378	393	389	386	385
3/7/2007	382	377	392	390	391	388
4/7/2007	395	383	398	395	399	397
5/7/2007	385	383	397	395	400	398
6/7/2007	394	392	407	403	402	401
9/7/2007	399	366	411	408	405	403
10/7/2007	397	393	411	409	404	403
11/7/2007	399	396	413	410	406	404
12/7/2007	391	389	408	407	399	398
13/7/2007	393	391	410	408	400	397
17/7/2007	393	392	411	408	402	400
18/7/2007	397	394	414	411	403	400
19/7/2007	402	400	423	422	410	408
20/7/2007	413	411	428	427	421	420
23/7/2007	414	411	428	426	419	417
24/7/2007	410	407	426	424	413	411
25/7/2007	403	400	423	420	409	407
26/7/2007	404	402	425	421	418	415
27/7/2007	415	412	431	430	424	420
30/7/2007	421	417	437	435	430	428
31/7/2007	412	409	431	429	421	420

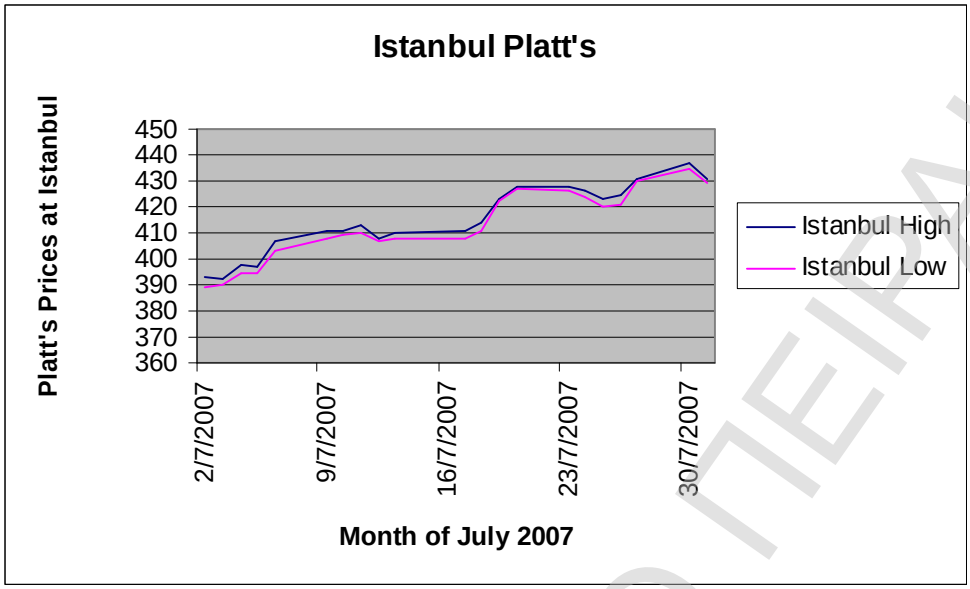
5.3.1 Mediterranean July 2007 Diagram



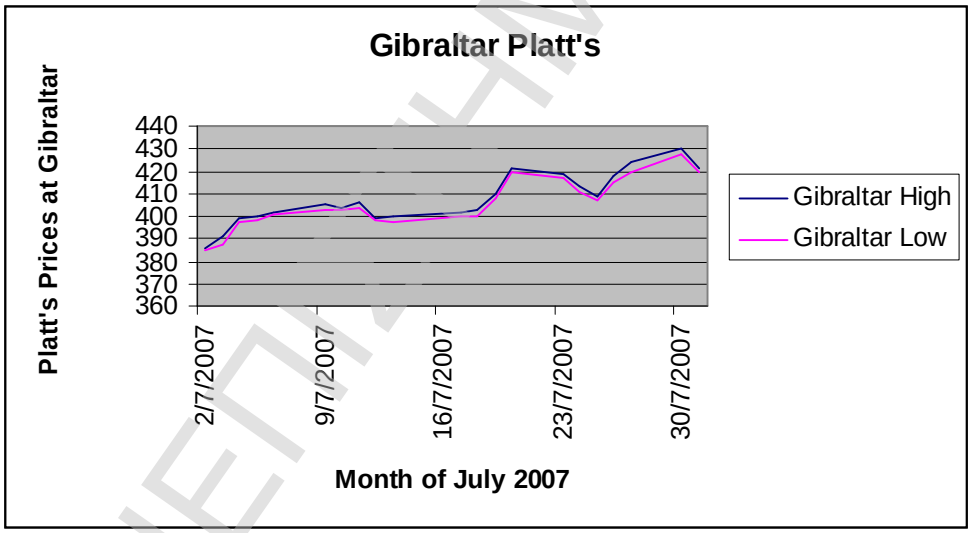
5.3.2 Piraeus July 2007 Diagram



5.3.3 Istanbul July 2007 Diagram



5.3.4 Gibraltar July 2007 Diagram

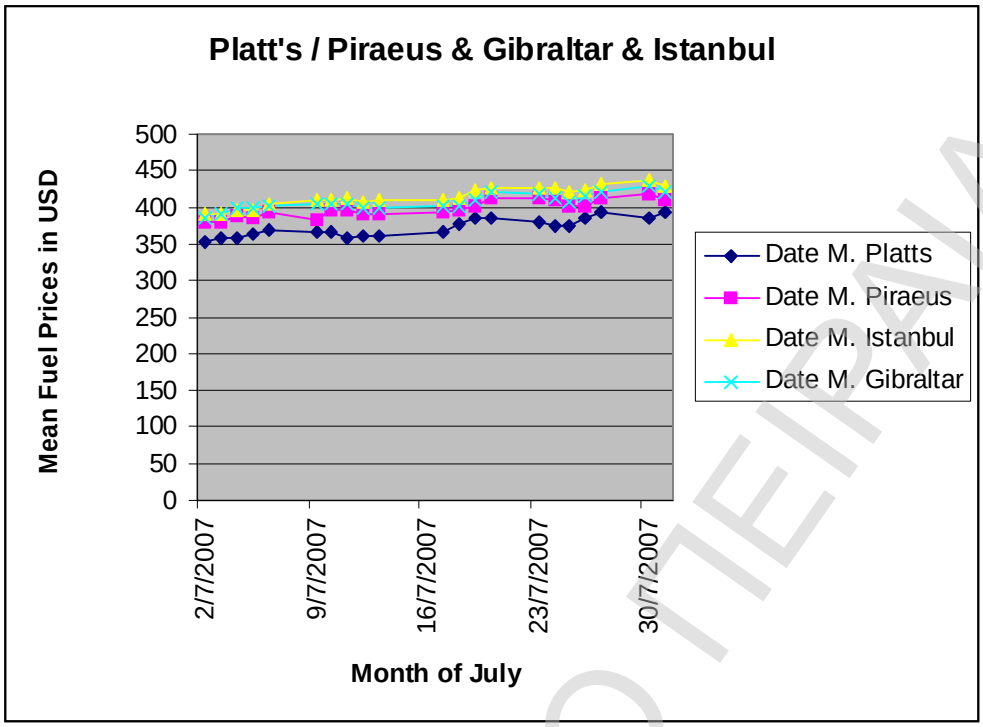


5.4. Correlation in between the three ports

On a first glance of the charts given above we can only see that the starting prices in each and every port are different. Istanbul is significantly more expensive than the rest of the ports and in the Piraeus – Platt's chart, the fuel price in the first ten days has a

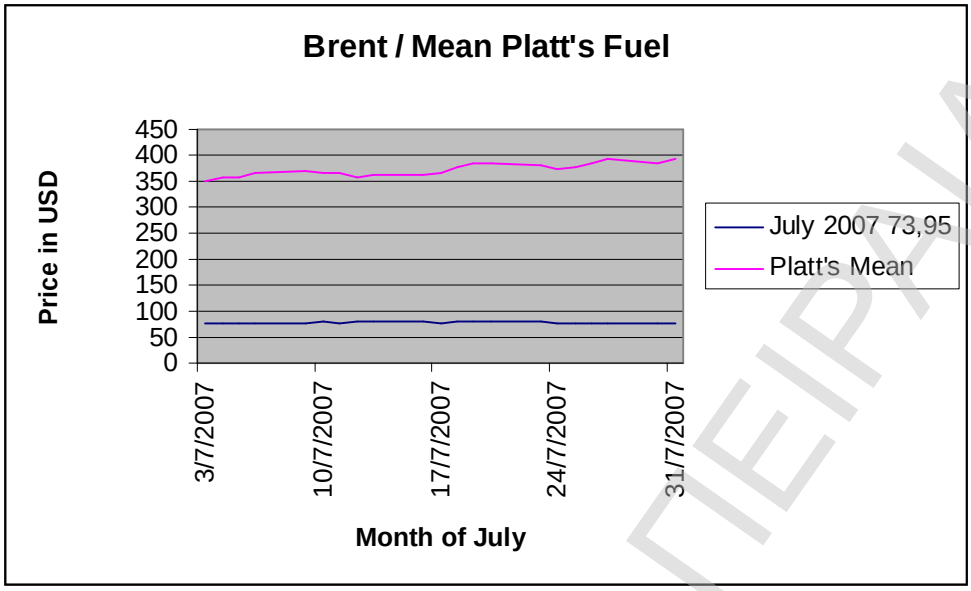
considerate plunge which is not noted either at Istanbul or at Gibraltar in such depth. The differences might seem small in relative terms however in real terms the difference are quite considerable and even a 2 USD difference in the price between Istanbul and Piraeus might be enough to modify the decision. In our case here, Istanbul has all the means to be more expensive because she is the first port in the exit of Black Sea (where special qualities of bunkers should be lifted for environmental protection) and no deviation is required. On the the other hand in Piraeus we note this plunge which cannot be explained via the general movements of the oil prices since the do not observe same in the other ports. Consequently, this should be a local effect, either surplus in the fuel tanks which the physicals wanted to sell in order to receive fresh cargo either low demand for fuel. Actually this situation describes best the fact that on the one hand the bunker prices are closely effected by the oil prices however this is not the only coefficient in the equation, supply and demand locally can play a significant role, sometimes even the local holidays can effect the prices and push them towards the opposite direction than the market in general.

The charts as described above give no indication whatsoever regarding any connection or correlation in between the fuel prices amongst the three ports. In order to best asses such it was decided to furnish another chart indicating the mean prices in all three ports in relation to the mean Platt’s price for the whole Mediterranean.



In revising the chart above, we can see almost a parallel movement of the fuel oil prices, but the plunge pointed out locally at Piraeus. As explained above, this local difference should be deriving by circumstances applying locally. In other words, the general bunker prices more or less have the same movement in the general area but some local differences and the initial price per port which is indicated per port separately relevantly to the particular situation.

5.5. Bunker Prices and Brent Prices correlation



In the final diagram we are about to analyze we would like to see if there is any correlation among the movement of Brent price in relation to the bunker prices in the region. In order to revise such we would like to apply in the same diagram the Brent prices for July 2007 along with the mean Platt's Price for July 2007 and see if there is any proportional movement. As we can see there is almost a parallel movement of the curves giving us the relevant prices for that period, and what we see is fairly normal. A significant percentage of the final bunker price is directly related to the Brent price, however there ae other factors we should not be overlooked: for starters, the most important factor that should be taken under consideration is the availabilities on local basis. Shortages in any bunkering port can shift business to another one and can create extra demand on other ports. On the other hand, if availabilities are tight and a stem is cancelled, the quantity created as a surplus can be sold to a very high price. Such every day transactions are usual and can create the local conditions under which bunkers are traded and their price can fluctuate locally.

Chapter 6

THE GREEK MARKET

6.1 Bunkering at Piraeus

In order to revise the Greek bunkers market the first thing to do is to take a close to Piraeus, the biggest maritime cluster in the area. Piraeus, as a general area including Eleusis and Pachi, is the only port in Greece where you can find all bunker qualities to be delivered on board either via bunker barge or via truck. Depending on the quality and the exact place where the vessel is doing her cargo or other operations, it can be arranged to deliver her bunkers. The common practice is for vessels to arrange short transit calls at the Piraeus anchorage to lift their bunkers via the barges available in the local market. We will now make a short presentation of the parties involved in the deliveries at Piraeus.

6.1.1 Physical Suppliers

As explained in previous chapter, a physical supplier is a company which has her own storage area and logistic means to deliver physically the bunkers. By this calculation, a refinery is by default a physical supplier, however you do not have a to be a refinery to be a physical supplier, a storage installation along with deliver means (trucks and barges) give you the right to be a physical supplier. In the Piraeus area the main Greek petroleum companies are in the market as physical suppliers

- Seka (supply from Motor Oil Refinery at Ag. Theodoroi)
- Aegean Marine Petroleum (supply from Hellenic Petroleum Refinery and has own private storage areas)

- Jet Oil (supply from Hellenic Petroleum Refinery and has own private storage areas)
- Gallon Oil (supply from Hellenic Petroleum Refinery and has own private storage areas)
- Eteka (supply from Hellenic Petroleum Refinery and has own private storage areas)
- Elinoil (supply from Hellenic Petroleum Refinery and has own private storage areas)

They operate both supply barges and trucks to arrange deliveries in the area and they have their own traders which negotiate their product in the market, most of the times towards bunkers traders who represent clients from all around the world.

6.1.2 Trading Houses

Nowadays, all the big bunker trading houses have their own office situated at Piraeus to best serve their Greek clients. Most of them grew in the ’90 and the number is further growing. Basically, it is fairly easy to establish such a trading house here in Greece by taking advantage the favorable regulations of Legal Act n. 89/1967 under which the most of the Greek shipping companies operate. However, though the fiscal status is easy to set, what is most important in this business is reputation and the ability to earn respect and credit by the Physical suppliers since at the end of the day, you market their product. Big amounts of money are in steak and basis it is easy to enter and leave the market easily; the physical suppliers are reluctant to new business relationships. Only the major players have the potentials to really play with the market and offer bunkering solutions, credit, claim handling and risk management tools. A rough calculation of about 50 different trading houses is realistic, however only a minority of them can operate in a global basis, has knowledge of the market and can offer full service.

6.1.3 Port Authorities and Customs

Port Authorities and Custom's Authorities do play their role in the bunkering business since they set the actual frame under which the physical suppliers can actually supply and the traders can trade. Piraeus does not have a designated anchorage for bunkers delivery or a designated berth if a supply requires delivery of a particular quantity via truck or ex-pipe. This regulation along with the safety restrictions which prohibit bunkers delivery while a vessel is having her cargo or other operation at any terminal set a rather unfriendly environment for the market's development. There is only special treatment is handed to the port's regular clients like the cruise vessels; ro-ro's or ferries.

Additionally, Greek customs do not let the physical suppliers clear product through customs during the weekend, but only on weekdays until 1300LT. This basic regulation creates a whole logistics procedure that has to be followed in every delivery and limits the possibilities to supply during weekend. This is a non-profit oriented procedure by the customs which sets a strict frame and poses obstacles for further development.

6.2 Bunkering at Greece in General

Bunkers supplies in all Greek ports are most of the times arranged via the central Piraeus offices and are usually carried out via trucks throughout Greece. In our country, there are several small ports where general cargo vessels of about 2,500 DWT trade within the Mediterranean and there are needs for supplies in several ports or private installations. At the northern part of Greece Thessalonica which handles the biggest cargo volume does not have barges to deliver at roads and only the vessels that perform cargo operations

alongside can be supplied. On the western part o the country, Patras is a major port of entry for the with a vivid ferry terminal, however the no barge is available and supplies are done through trucks or ex-pipe only for the ferries use. Last but not least, in the southern part of the country and especially at Crete island there aren't any barges for bunkers delivery but the ones designated for the military purposes in the port of Souda where the Nato installations are based. In this poor Greek bunkering network there are three other stations which should not be overlooked

6.2.1 Syros Island

Syros island is situated in the centre of the Aegean Sea and its capital, Ermoupolis, is the capital of the Cyclades Prefecture. The well known Neorion Shipyards are based at Syros and just opposite to them the local Seka fuel tanks are installed. In the past year, a supplying barge is stationed at Syros and supplies take place at Syros anchorage. The product is launched in the market through the Seka trading office at Piraeus and it seems like a successful movement since many vessels trading in the area make the minor deviation and lift the bunkers they require without too much delay. However, the tanks are small and supply only the IFO 180 and MGO and of course there is the major problem that Syros' port orientation does not provide a shelter for the vessels. This natural disadvantage and the strong winds of the Aegean Sea sometimes render supplies difficult to carry out.

6.2.2 Kalymnos Island

Kalymnos is an island of the Dodecanese very close to the Turkish coastline. A small bunkering station also operated by Lidmar provides bunkers mostly for the Turkish vessels transiting through Greece with a minor deviation in order to lift cheaper bunkers. The

installations are small and the supplies are only effected ex-pipe to small vessels who can fit the ports draft restrictions, there is no barge available. The position of the island is interesting however the installations are poor and cannot attract many vessels.

6.2.3 Kali Limenes Bunkering Station

Kali Limenes is an old Seka bunkering which has always been in the map as a bunkering point in the East Mediterranean region. This small fishing port is situated in the southern part of the Heraklion Prefecture, about 100 klms from the main port of Heraklion. The tanks are build is a small rocky island and there is the option to either go alongside to lift the bunkers if the vessel is small or remain at the designated anchorage and receive the supply via barge for the bigger vessels. Kali Limenes is an interesting bunkering point, however the main problem there is that this tiny gulf does not have any other facility whatsoever and the vessel cannot get any other service, not even the trivial ones like crew change because Kali Limenes is not an entry point foreigners.

6.3 Alexandroupolis Prospects

Alexandroupolis is the biggest Greek port closer to the Black Sea and the southern exit of the Dardanelles. It is soon to become a bunkering point due to the upcoming completion of the installations of the pipeline Burgas – Alexandroupolis which will be exporting Russian oil to the market while deviating the Turkish straits. This is a major change in the energy map of the area which will also be altering the traditional ocean routes regarding Russian oil export from the Black Sea. The deviation of the Turkish straits will significantly reduce the volume of tankers going towards the Black Sea and will also change the facilities and services that should be offered at Alexandroupolis.

The tanks installations that are due to be build in the aerea will automatically the necessary facilities for bunkers storage while the loading of product or crude cargo vessels will create the necessary traffic for a barge to be stationed there and supply not only the vessels calling Alexandroupolis but also the ones from/towards the Black Sea. This pipeline installation is a major development for the area and the opportunities emerging for business growing are eligible. The installations will be belonging to Hellenic Petroleum but like the Piraeus case other physical suppliers can emerge and profit from the situation.

6.4 Conclusions

One might wonder why choosing this particular subject for analysis since official available data is rather poor while all parties concerned are reluctant in disclosing information. The answer is rather simpler: we have all the indications that this is a profitable business with great opportunities emerging for our country in the near future.

Alexandropoulis consists a major change in the energy map of the whole area provoking many changes in the bunkering stations in relation with the Black Sea. Future bunker tanks and barges at Alexandroupolis may shift vessels from the Istanbul area to Alexandroupolis where to lift bunkers - with no extra specifications applicable in the Black Sea – on their South bound passage of the Turkish Straits. The volume is by no means small and the financial development, working positions and population blooming is going to be significant. It is a major opportunity that Greek State must profit from so that the whole area can benefit.

The role that the government has to play is regulate the condition under which both state offices and private companies should work. On the one hand, there are the Port Authorities and Custom’s

Authorities that can apply different regulations and processes in every prefecture, even though the legislation is the same. This flexibility causes serious problems because the local singularities create a foggy image of uncertainty which is not good because there does not seem to be any transparency. The bureaucracy and singularities are the major enemies of the private companies trying to create business. These problems do exist already creating obstacles in business development in the existing trading areas, it is a pity indeed for the income lost for all parties concerned.

Finally, one should not overlook the upcoming environmental changes; the impact is going to be enormous. It is essential that the government should pose strict rules to assure the maximum environmental protection because without such, all the profits and benefit occurring will come to nothing if pollution destroys the environment.

Appendix

Glossary of terms

Arbitrage
A trading strategy based on simultaneous purchase and sale of the same commodity in two different markets in order to profit from location, product, timings or price discrepancies.

Ask price
The price at which a dealer is willing to sell foreign exchange, securities or commodities. Also called “offer price”.

Barge
Vessel carrying oil with a capacity of up to around 10.000 tones. In the US, barges can be up to, and occasionally over, 15.000 tones in capacity.

Bear market
Market where prices are declining.

Bull market
Market where prices are increasing.

Bid and Ask
Prices offered to buy and sell respectively, on spot market deals. An interested party can sell at the bid and buy at the asked price. Spot prices are not reported as a straight number, but rather, in terms of bid and ask.

BRM
Bunker risk management.

Bunker Hedging

Forward agreement to purchase or sell bunker oil at a predetermined price. The initiation of an opposite futures position to protect a cash market from an adverse price movement.

Call option

A right, but not an obligation, to buy an underlying instrument at a predetermined price.

Cap

Risk management strategy that involves the purchase of a call option, which offers protection against rising fuel prices, but retain the possibility to gain a profit when prices fall. Caps are offered against payment of an upfront premium.

Cash settlement

The settlement of futures or options through payment of a cash difference, rather than taking/ making physical delivery.

Centistokes

Unit of measurement for viscosity.

Collar

A combination of selling a put option and buying a call option (or opposite), where you eliminate an unfavorable direction in prices, but at the same time limit the opportunity to gain a profit when prices develop favorable.

Crack Spread

A spread that traders implement to play the price relationship between crude and refined products.

Crude Oil

Dark oil consisting mainly of hydrocarbons. Crude oil is the mixture of petroleum liquids and gases (together with associated impurities) pumped out of the ground by oil wells.

Forward contracts

An agreement to exchange the currencies, securities or commodities at a specific future date and a predetermined forward rate.

Forward price

The basic forward price of a commodity is determined by the following equation : Forward price = Spot price + Cost of Carry – Convenience Yield.

FPA

Fixed price agreement is a forward agreement to purchase or sell a commodity at a predetermined rate.

Futures

A standardized contract for the future purchase or sale of a commodity on a formalized exchange. In other words, an agreement to make or take delivery of a commodity at a fixed date or strip of dates in the future, at a price agreed upon at the time of dealing.

Gallon

Generally accepted across the oil industry to refer to a US gallon. There are 42 US gallons in a barrel. There are 3.78541 litter in a gallon. There are 1.2 US gallons to the British imperial gallon.

Gas oil

An oil formed through distillation of petroleum of intermediate boiling range and viscosity. An intermediate distillate product used for diesel, fuel, heating fuel and sometimes as feedstock.

Hedge

The purchase of a contract or tangible good that will rise in value and offset a drop in value of another contract or tangible good. Hedges are undertaken to reduce risk by protecting the owner from loss. Buyers and sellers can hedge.

Initial margin

The returnable collateral required to establish a hedge position.

International Petroleum Exchange

The International Petroleum Exchange of London Limited is a recognized Investment Exchange. It is Europe's leading energy futures and options exchange. The IPE provides a highly regulated market place where industry participants use futures and options to minimize their price exposure in the physical energy market.

Margin

A deposit made as a security for financial transactions otherwise financed on credit.

NOPEC

A group of independent crude oil producing nations that are not members of the OPEC, but have collectively restricted productions levels in support of OPEC. Include Malaysia, Mexico, Oman, Egypt, Angola, China and Columbia.

OPEC

Organization of Petroleum Exporting Countries. A cartel of thirteen nations, headquartered in Vienna, Austria, producing 45% of the free world's crude production, acting in collusion to restrict crude protection levels in the interest of higher oil prices. These nations include ; Algeria, Indonesia, Iran, Iraq, Kuwait, Libya, Nigeria, Qatar, Saudi Arabia, United Arab Emirates and Venezuela.

Option

A contract giving the buyer the right, but not the obligation, to buy or sell a given amount of an underlying asset at a fixed price per unit for a specified time period. A European option can only be exercised on the day on which it expires, whereas an American option can be exercised at any time up to, and including, the expiration date.

OTC

Market Over the counter market. Opposite to trading over an exchange, the counterparties individually agree on the terms when trading OTC.

PHA

Paper Hedge Agreement. Financial tools for risk management with cash settlement.

Physical Contract

Contract where buyer and seller agree to settle through physical delivery of the underlying asset following expiration.

Platts

Platts, the world's largest energy information provider, provides information and services to companies and individuals active in the fields of electricity, natural gas, oil, oil shipping, coal, nuclear energy and petrochemicals. Customers receive Platts news and market information services in real time. Platts price information is used as a price of reference in swap agreements.

Put option

A right, but not an obligation, to sell the underlying instrument at the predetermined strike price.

Risk Management

Risk Management means having, in place, a corporate and systematic process for evaluating and addressing the impact of risks in a cost effective way, along with staff, with the appropriate skills to identify and assess the potential risk to arise.

Sensitivity analysis

A tool used to assess the impact of changes in individual risks on key objectives or projects.

Short

The act of selling a futures contract or holding an obligation to deliver a physical product. Traders are said to be “ short” when they have contracted t sell more than they have contracted to buy.

Spot price

The current value of a product

Spread

The difference between the bid(buying) quote and ask (selling) quote, or the simultaneous purchase and sale of two futures contracts to capitalize on the anticipated fluctuations in the price differential between the contracts.

Strike price

The agreed price where the buyer of an option holds the right to buy or sell the underlying product at expiry.

Swap

An arrangement to exchange cash flow between a fixed price and the average of a floating price on a predetermined commodity. The buyer of a swap secures himself against rising prices.

Swap Settlement

The cash settlement of the difference between the agreed fixed price and the average of the floating price for the predetermined commodity and period.

Tonne

The standard Platts abbreviation is mt. A tone, or metric tone, is sometimes tautologically referred to as a metric tone and is defined as the weight of a cubic meter of water. Rough and ready barrel tone conversation factor is 7.33 barrels of crude to one tone, but obviously depends on the specific gravity of the crude.

Value at Risk

A statistical measure of the maximum loss on the company's positions within a given period with a given probability.

Viscosity

Measure of a liquid's resistance to flow. There are a number of viscosity scales in current use.

Zero cost collar

In a zero cost collar the call and put option levels are calculated to result in no premium payment. In other words the premium paid for the bought option is counterbalanced by the premium received on the sold option.

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