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Research on the Greek ship finance and the ship loans from 2003 to 2012

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Research on the Greek Ship Finance and the Shipping Loans from 2003 to 2012

By

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DECLARATION

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

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

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Supervised by

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I hope we keep in touch and contribute to an active World Maritime University-Shanghai Maritime University alumni group.

ABSTRACT

Title of Research Paper: **Research on the Greek Ship Finance and the Ship Loans from 2003 to 2012**

Degree: **MSC in International Transport and Logistics**

Greek Shipping is traditionally in leading position globally. Greek shipowners finance purchases of vessels themselves, but in such a capital intensive industry, such as shipping, finance from third parties, like bank loans, leasing, finance from funds or stock exchange is inevitable. In this paper there will be analysis of shipping loans from the last ten years, the terms of them and whether situation in ship finance is affected by the change in the shipping market, the fluctuation of the interest rates and other factors of the shipping environment. Moreover, there will be an analysis of the bank behavior in relationship with the shipping circles and the fluctuations of the market. There will also be an examination of different finance means with analysis of the characteristics of each different one. In conclusion, the results of the mathematical analysis will be represented and the optimum ship finance solutions according to the author.

Key Words: Ship finance, loan agreement, leasing, securities, margin, mortgage, covenants, balloon installment, correlation coefficient, repayment period, investment, volatility, net present value, internal rate of return

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Chapter 1 Introduction

1.1 Introduction

Ship Finance and loans for acquisition of newbuilding, secondhand vessels or company refinancing is an activity sine qua non shipping industry could not exist as shipping is one of the industries that very big amounts of capital are required. Shipowners depend on banks and other forms of financing to expand or renew their fleet.

During the years, according to the situation of shipping and how good the shipping markets perform, ship finance and bank portfolios also change. That is the reason why we can see big volatility in the ship finance portfolios and the number of banks that are active in the specialized sector of ship finance.

Right now we can see that ship finance through bank loans is getting more and more scarce and loans need a combination of the right bank with the right shipowner in order for them to be provided. Not only this, but we see that due to the industry's lack of profits banks do not see ship finance as a lucrative activity so they are planning to reduce their exposure to shipping, or some of them even plan to exit the shipping market. What shows us the situation in the ship finance banking market is the fact that in 2008, when BDI as a main index was close to 7000, the active shipping banks were almost 300. In contrary, now that BDI is less than 1000, mainly due to overcapacity, active banks are much less. A lot of banks have had losses due to the reason that shipping companies do not have profits right now. In the same time BDI and the other indexes are really low and this reflects also to the value of the vessels. So the "debt to value" ratio is also difficult to be kept in the acceptable levels without the cash contribution of the owners. A lot of them go bankrupt; mortgages and other kind of securities are not enough due to the financial crisis which led to the collapsing of the assets' and collaterals' value. In the same time banks usually prefer to enter the loan

procedure after the third installment (post-financing), when a vessel has legal form and mortgage and other securitization procedures can be activated, even if one of the parties, shipyard or shipowner is not able to honor the expected performance agreement.

Moreover, now we see that the percentage of equity required for a loan is bigger than when shipping markets were better, like in 2008. Nevertheless, banks now require more securities in order to provide a loan, in opposition with older, better times. In the same time new players in the ship finance market, like the Chinese banks, even if they have cash to lend, have not yet reached the level of the traditionally big players, like the European banking institutions due to the limited access to Eurodollars and the relatively short experience. However China Development Bank and China Export Import Bank have started giving loans to foreign shipowners and one of the reason is to support the Chinese shipyards.

In today's shipping market shipowners also try to secure financing with alternative ways. These can be initial public offers (IPOs) for the companies that have gone public. Another way is the high yield bonds. Leasing from banks is also a way for financing shipping activity. Finally, private funds, like pension funds or other kind of funds are willing to invest in shipping but expecting considerably high returns at the upside of the market.

We should say here that the current shipping market where freight rates and values are extremely low, is very interesting for banks activating in ship finance. Moreover we can see that a lot of ship recycling and scrapping is taking place. This can show us that the problem of overcapacity will be solved sooner or later and industry will start again having profits. This fact may represent good opportunities for counter cyclical lending on the understanding that there is a greater potential for upside and hopefully lower levels of risk adopted.

1.2 Literature Review

According to Theodore Syriopoulos (2007) Greek shipping industry has various ways for getting financed. These are forward freight agreements, bank lending, syndication, securitization, high-yield bonds, leasing and international equity initial public offerings. In this research more focus will be given to bank lending and syndication and there will be just a brief reference to the other means of financing. According to Mr. Petropoulos, Head of Petrofin Research, there were some changes in the Greek ship finance market the last

years. First of all, some foreign banks that were not having a Greek share entered the Greek market. Something else is that some of the Greek banks merged or were acquired by foreign banks. We can also see that from 2001 to 2008 bank ship finance portfolios were increasing, while from 2008 until today portfolios are shrinking. This can be explained by the fact that shipping business is not having profits at this time, so not only it is not a lucrative business for banks, but it is also producing loss sometimes, in case some shipowner is unable to pay back a loan and securities are not enough.

According to Petropoulos and Lloyds List (2012) new banks are getting into ship finance more and more recently. There is space for newcomers due to the shrinking of the portfolios of some traditional players in the market of ship finance. Moreover, Greek banks' share of the market is shrinking. Something else I should refer to is that banks are not willing to lend money to small or medium Greek shipowners according to Lloyds List. According to Lloyds Shipping Economist (2011), shipping companies, especially the medium and small ones are squeezed from all sides due to the scarcity of financing. This will clear the shipping market and cure the problem of the overcapacity, as only the strong ones will be left at the end. Eventually shipping will return to profits and banks will start seeing it again as a lucrative business worth investing in.

According to Lloyds Shipping Economist (2011), accessibility to ship finance has fallen and financing is difficult recently due to the poor performance of the shipping markets. However, according to Trevor Law (2012) in the current shipping market, where values and freights are very low, there are some opportunities for counter-cyclical lending. The reason for this is that there is an expected upside of the market. Market is at its bottom right now, meaning that risk is lower for the lending institutions and expected returns are higher. So we see that some banks have already started or are planning to get active in the ship finance market again after the last three years' ship finance shrinking situation. This can also be supported from Lloyd's List article based on Petrofin's bank research where it is shown that lending to Greek shipowners has increased in 2011 from both Greek and foreign banks active in Greek ship finance.

One of the main problems conducting this research is the fact that there is not a lot of academic research that has been done before on Ship Finance Loans and Securities taken for the loans to be provided. There are some papers about Greek shipping industry, like the Greek Paradigm (2007) that also refer to Greek ship finance, but they are far from enough.

There is plenty of material having to do with finance in general, but not so much for the specialized field of ship finance. There are also some papers like the ones of Kavussanos, talking about FFAs and derivatives in the shipping industry, but there are only very few on bank loans. Shipping journals like Lloyds List is the main source of news for the ship finance field and market trends in banking for shipping, but still it is not from a totally academic point of view, but mostly from the market's and the journalist's point of view.

Another problem is the fact that optimization models for finding the optimum level of securities that should be taken do not take into account the extreme volatility of the shipping market. Shipping market can be affected by many variables and situation can change rapidly from one moment to another, like in 2008 with the market collapse. There will be an effort for calculation of the optimum percentage of equity and bank money in a loan applying models, something that banks are doing empirically until now and according to their many years of experience. However some constraints will have to be set, so there is a case that this model will not be suitable for all kinds of situations.
What we should focus on is that research on bank lending for ship finance has still a lot of way to go. There is not abundant information yet on the topic and there is plenty of exploration that still needs to be done. Banks mainly rely on their previous experience to carry on ship finance lending and syndication operations. Although it will be difficult, as it is a path that not many researchers have walked yet, it is a very challenging and interesting topic. If it will be done successfully it will produce results that will worth the effort dedicated.

1.3 Methodology

The purpose of this paper is to examine bank loans for ship acquisitions, newbuildings or second-hand. There will be an examination of the securities and the bank equity percentage for each loan for 10 different years. This examination will be through statistical analysis. Afterwards there will be a comparison of the statistical results with the market indexes and the interest rates through the years. By this comparison the main goal is correlation to be found between market indexes, interest rates and bank behavior – loan policy.

The purpose of this is to form a clear view of how the banks react to market changes. Furthermore there will be a conclusion on which loans produce loss and which ones produce gains for the banks depending on the securities taken and the amount of money released by the bank.

So statistics will be used to reach a conclusion as well as Microsoft Excel.

1.4 Structure

The first chapter is an introduction about the research paper, starting with the background of the research. It continues with the literature review and the academic opinions about ship finance in general. Moreover, there is reference to the methods that will be used and the purpose of the research. The first chapter ends with the structure of the thesis and the restrictions that were faced during the process of creation. Chapter two introduces ship finance through bank lending as well as alternative ways of ship finance. Examples of shipping loans of the last ten years will be listed and analyzed in Chapter 3. Furthermore, in Chapter 4 there will be reference to the methodology used for the loan agreement analysis and a case study with two investments' evaluation during different periods. Mathematical models will be used like correlation coefficient to analyze the relationship between bank behavior, economic and shipping environment changes. There will also be used Net Present Value and Internal Rate of Return for the investments' evaluation. Finally, the fifth chapter will be the conclusion. In the conclusion there will be a discussion about the findings of the research. In the same chapter the author will write about his

personal view and recommendations about ship finance, the banks' policy and the owner's behavior according to the different conditions prevailing in the shipping market.

1.5 Restrictions

The main restriction the author has faced was the fact that there is a lack of data on ship finance and especially on bank ship finance. Usually there is some research done but banks keep it for in-house use and they do not want information to spread. There are also some consultants operating in ship finance. The author has sent some emails to such finance consultants for data provision but there was absolutely no reply. There is the case of confidence and enclosure of data, as this data can reveal vital information regarding the financial condition of both banks and shipowners. That is the reason why the author will not name the banks that provided the loans, the owners that received them and the legal entities (ships) that the loans were provided for. It is a very specific topic. There were some academic points of view on ship finance, but they were either general on ship finance or specific as well, but having to do with a different aspect of ship finance, like derivatives, FFAs and options for example. The author is aware that these difficulties were going to be faced after choosing this topic, but this was an absolute motivation for studying the topic further and producing some conclusions useful for the shipping community. Conclusions which will trigger further studying of the topic in the future.

Chapter 2 Bank Lending in the Shipping Industry and Alternative Ways of Finance

2.1.1 General Information about Bank Lending

There are different ways of financing ship acquisitions or refinancing already existent debts. First of all, the traditional way based on the security of ship mortgage, with or without charter-party assignment. Secondly, finance that has its source in the shipyard. Usually it comes with fixed interest rate and is a result of the cooperation of the shipyard and a bank of the same country, with the support of the state. Finally deals like leasing or sale & purchase that can provide finance up to 100%.

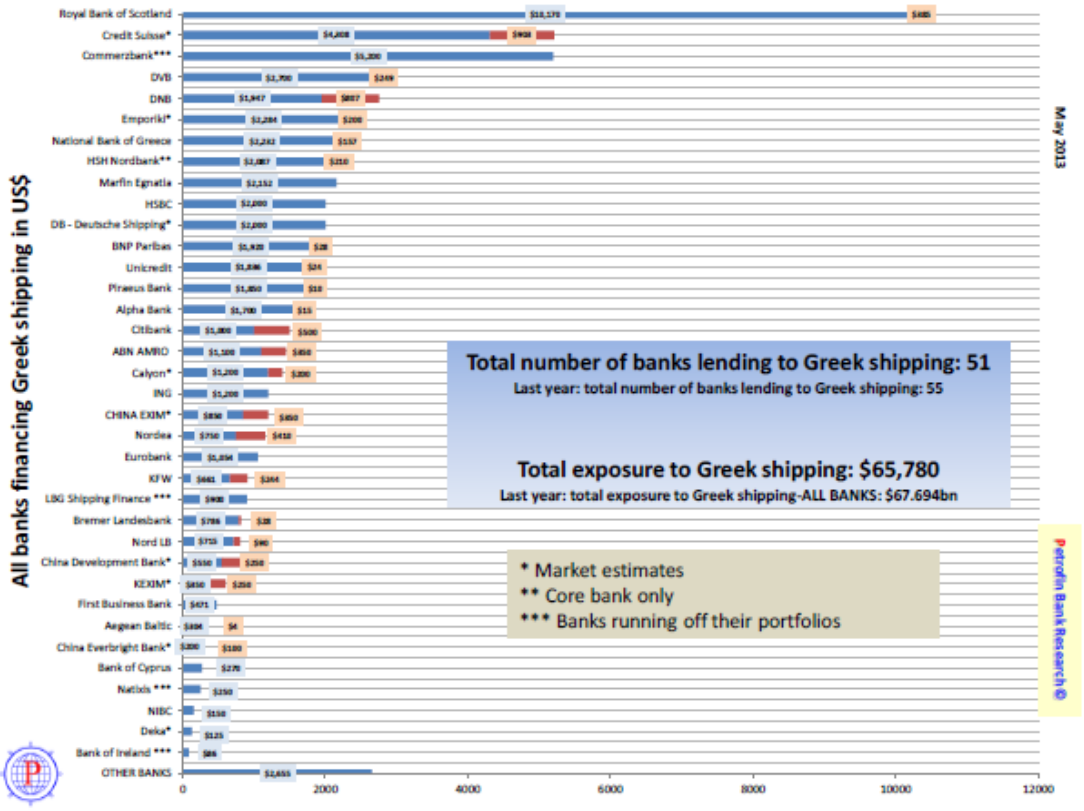

Figure 1: Total Number of Banks financing Greek shipping. Source: Petrofin

The typical ship finance facilities are the term loan, the revolving credit, the line of credit and the overdraft. Term loan is a loan from a bank with a specific amount, a specific repayment period between 1 and 10 years and a floating interest. Term loan can be amortizing or “balloon”. Amortizing is the loan that reduces year by year, while “balloon” term loan is the loan at which a lump sum amount will be paid in the end of the agreement. The revolving credit has to do with the borrowers that draw down money, repay and re-borrow whenever they need it, always according to the constraints of the loan agreements. Of course revolving credit has to do with the asset and the collateral or generally the financial covenants that the borrower provides in order to get the money from the lender. Revolving credit mainly funds working capital and capital expenditure. Passing to the line of credit, we should say that a line of credit is the

maximum amount of credit a borrower is allowed. A line of credit for a borrower may be a combination of various credit products, like a term loan, a revolving credit etc. One of the advantages of the line of credit is the fact that interest is applied on the amount of credit used. Another very important is the fact that the borrower can borrow from the line of credit whenever he needs. However a disadvantage is that any outstanding balance could have to be paid immediately on bank's request, while conditions may be applied to any drawdown. The previously mentioned overdraft is when someone withdraws from his account more than the balance of the account and the account goes below zero. If there was a prior deal on this interest will be charged. In different case some fees will be charged.

Greek shipping depends greatly on bank lending. However due to the crisis that shipping is facing for the last 5 years bank portfolios for Greek shipping are decreasing. According to Petrofin Bank Research 2012, the total bank portfolios for Greek shipping have decreased around 10% during the period 2008-2012. (Figure 2) In the same period the number of banks lending to Greek shipowners has increased from 40 to 51. (Figure 3)

Passing to different lending structures to shipping companies, we should say here that traditionally there are three lending structures, the bilateral lending, the syndicated lending and the "club lending". Bilateral lending is when one single borrower and one single lender are involved in the transaction.

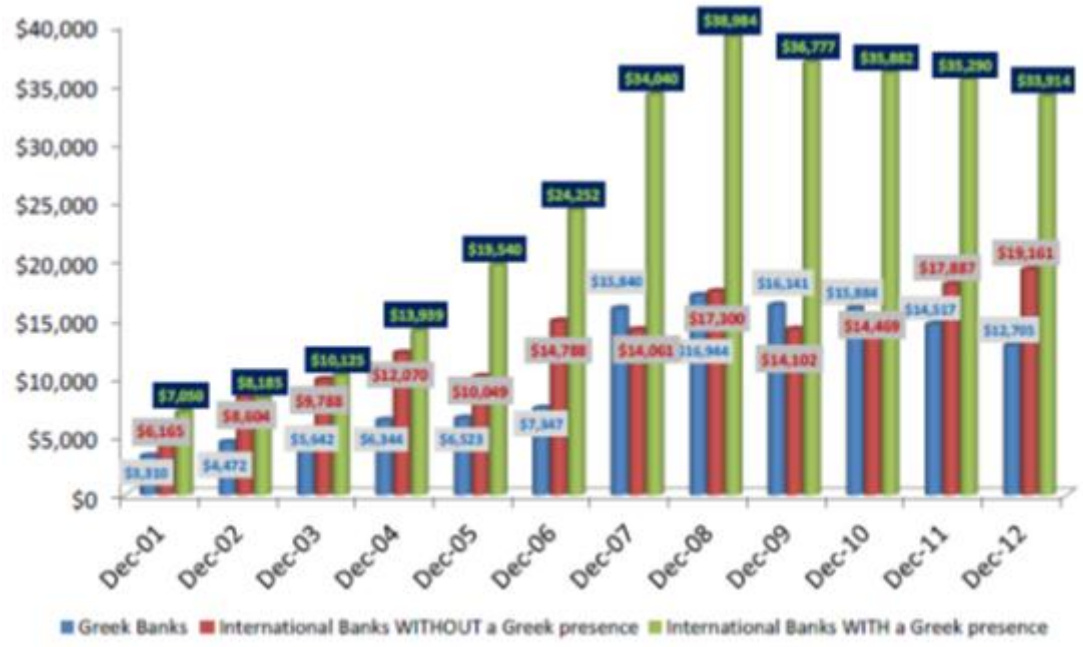

Figure 2: Portfolios of shipping banks years 2001-2012 in $m. Source Petrofin

One very important aspect of bank lending into shipping is syndicated lending. Syndicated loans are provided by a group of banks, while there is one or more of them, commercial or investment bank, which is called the arranger. Usually the arranger is the bank that provided the largest share of the loan. The arranger or agent will fix the interest rates, provide the accounting services and receive the repayments. Usually we see syndicated lending structure because first of all as already mentioned before shipping is a capital intensive industry. So some banks do not have the required capital adequacy or they prefer to share the risk, especially for some big deals, like for example a deal for the acquisition of 10 containerships which would be more than $500 m. Another reason for syndicated lending can be the fact that sometimes it is difficult for a foreign bank to enter a constraint market and needs the help of a local bank.

Table 1: Syndicated lending in $m. Source: Petrofin Bank Research 2013

		2010	2011	2012	
1	Citibank	$2,390.00	$300.00	$2,000.00	566.67%
2	Nordea	$2,100.00	$1,100.00	$2,500.00	127.27%
3	Aegean Baltic	$1,496.83	$1,399.29	$1,345.74	-3.83%
4	Commerzbank-Deutsche Schiffsbank*	$1,300.00	$1,100.00		
5	Credit Suisse*	$60.00	$53.00	$46.00	-13.21%
6	HSH Nordbank*	$469.00	$822.36	$623.03	-24.24%
7	DNB	$1,352.00	$2,085.11	$2,487.00	19.27%
8	Unicredit	$280.80	$245.70	$226.89	-7.66%
9	LBG Shipping Finance**	$847.00	$820.00		
10	Royal Bank of Scotland	$984.00	$353.00	$462.10	30.91%
11	National Bank of Greece	$490.00	$447.00	$427.00	-4.47%
12	ABN AMRO (ex Fortis NL)	$122.61	$278.19		
13	Nord LB	$204.00	$247.20	$226.87	-8.22%
14	Deutsche Bank*	$200.00	$204.00		
15	HSBC	$90.00	$140.00		
16	Alpha Bank	$38.50	$34.50	$30.00	-13.04%
17	BNP Paribas	$255.00	$473.00	$664.82	40.55%
18	First Business Bank	$85.46	$63.06	$59.34	-5.90%
19	KFW	$45.00	n/a	$402.30	
20	Emporiki Bank	$31.00	$27.00		
21	Eurobank	$15.13	$13.28	$11.40	-14.16%
22	Natixis		$70.14		
	Fortis Belgium				
	Commerzbank-ex Dresdner				
		$12,856.33	$10,275.84	$11,512.48	12.03%

We can see in table 1 above that traditional shipping bank like DNB and Nordea had the biggest syndicated shipping portfolio during 2012. In the same table it is shown that syndicated lending has increased 12.03% from 2011 to 2012. There is the case that a deal can be underwritten, where the agent bank guarantees the entire or part of the commitment prior to the syndication. But if there is no subscription by the rest of the

banks, the underwriter will have to absorb the amounts not taken up. Underwriting of loans prior to syndication contains risk but it also provides benefits to the underwriter. These are in fact that the arranger-underwrites can ask for higher fees and can more easily win mandates. Usually for the riskier borrowers we were observing “best-efforts” syndications. This was when the arranging bank was underwriting for an amount less than the whole loan, leaving the rest for the banking system to decide.

Finally, there is also the club lending, where usually the deals are smaller than the syndicated ones, between $25 m. and $150 m, while usually the deal is between similarly risk-oriented banks and the arranger is first among equals.

2.1.2 Characteristics of Bank Loans

The bank loan is the most important source of ship finance. Usually the term of the loan is between 1 and 12 years, but recently it is much lower. Typically the repayment profile is up to 17 years and the bank loans are fully repaid when the ship is 20-23 years. However in general these periods have become shorter. Interest of the bank loans is typically based on LIBOR and it is floating, while the currency the transactions are made most of the times is US dollars.

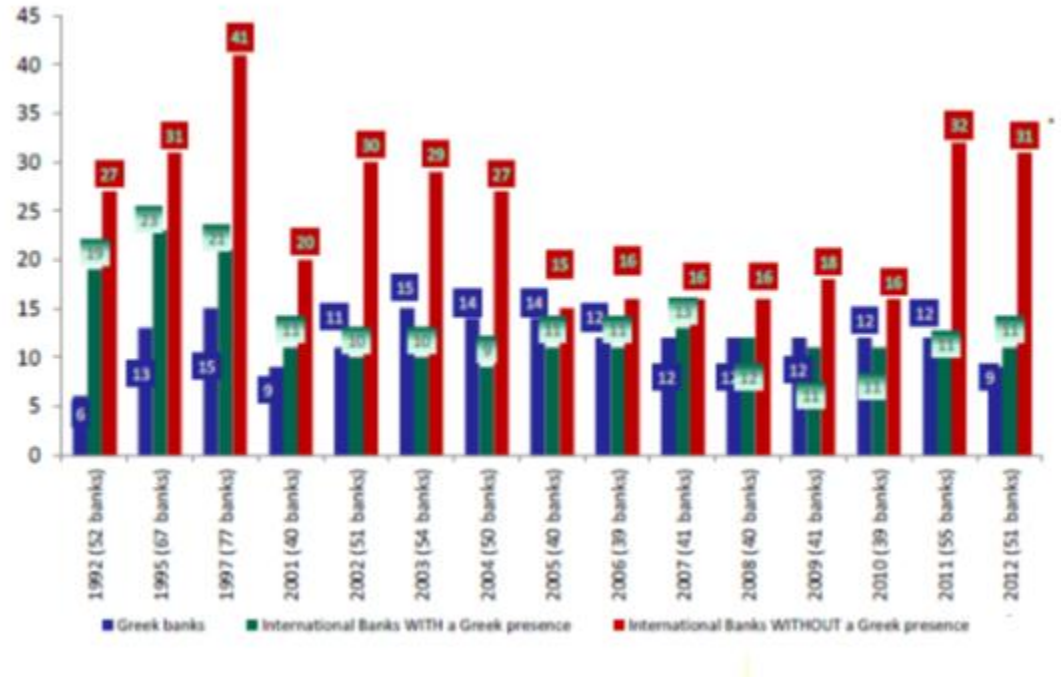

Figure 3: Number of banks financing Greek Shipping 1992-2012 Source: Petrofin

Something that we see very often in the shipping bank loans is the “Balloon” Installment. There is Balloon Installment in a loan when there is a significant amount of the loan paid in the last installment, usually it is between 20% and 40% of the total amount lent.

There are some advantages that balloon installment has. First of all, when a loan contains this type of repayment, it immediately helps improve the cash flow of the company. Shipping company is adding one more ship to its fleet increasing the operating profit and in the same time paying a very reasonable amount of money for each of the repayment installments, which usually are quarterly or semi-annual. Another reason is the fact that when the final maturity date of the loan is close, the company can agree for a new loan facility with a financial institution and refinance the current one, improve its liquidity and repay the above mentioned balloon installment. Balloon installment helps improving the financial situation of the company and the image the shareholders have. So a company can survive in the harsh times of the shipping industry if there is capability and success in the search for financing sources. However

there should always be concern about the financial ratios like assets to liabilities ratio and other gearing ratios. For example a ratio that is important and can immediately get better when balloon installment is used is the Current Ratio=$\frac{Current\ Assets}{Current\ Liabilities}$.

What is a very important aspect in this kind of transactions is the fact that they include financial and value maintenance clauses. In other words, the lender in order to be protected from a collapse of the market, like in 2008 puts some clauses in the contract, for example loan to value ratio, which has to be 80%, in other case the owner should add cash to make the amount owed smaller. However we can see that in the sample of loan agreement the reverse ratio is being used, value to loan ratio, in average around 120%.

Another important fact concerning the bank loans is that the number of advances or tranches can vary. Usually a loan is paid to the borrower in one or two advances, and not so often in three or even four. When we are talking about newbuilding finance, then we can talk about pre-delivery and post-delivery finance by the bank. Pre-delivery finance is when one advance of the loan is withdrawn by the borrower before the delivery of the vessel, while post-delivery finance happens after the delivery of the vessel. Banks in general prefer post-delivery finance, letting the shipowner pay the first 30% or 40% of the market value, depending on the terms of the loan. For example in a newbuilding contract there would be five installments payable to the shipyard. One upon receipt of refund guarantee (10%), one upon steel-cutting (10%), one upon keel-laying (10%), one upon launching (10%). Finally one upon delivery (60%) would complete the payment. Numbers and percentages are indicative. However what should be mentioned is that it is preferable for the financial institution to finance after delivery due to the reason of reduction of exposure. After delivery, even if the shipyard goes bankrupt there will not be need for refund guarantee. Moreover, after delivery ship has already legal entity, it can be mortgaged, traded or even sold in case of shipowner's inability to repay the loan.

As shipping business and volatility are two things that go together, the lenders require securities, not only to be secure that the loan agreement will be honored, but also for the owners to be more careful. Usually the most important security is the first mortgage. Before the shipping crisis of 70s, a banker would usually get securities of around 60%. However after the crisis occurred in the 70s, the policy of the banks changed, as a lot of financial institutions collapsed and others kept on carrying the shipowners' liabilities when the ownership of the mortgaged vessels passed to these banks. After the crisis of the 70s the financial system changed and in most of the cases there is extensive caution showed when a loan is agreed. Usually in every loan agreement there is a set of securities. Some of the common securities contained are the following:

- *Employment of the vessel.* It is easier for a bank to provide a loan and it is also required for the vessel to have long term employment like a Contract of Afreightment or a Time Charter. In this way the banker can easier calculate the earnings of the vessel especially the first years when the installments for the loan are higher. Employment of the vessel is very important for an owner to secure bank finance especially when the market is weak.
- *First Mortgage.* It is a negative security which means that the lender (mortgagee) has priority in claims and can take possession of the asset if the borrower (mortgagor) fails to honor his financial obligations. The mortgagee can either manage the vessel and cover the outstanding payments with the income generated or sell it usually in an auction and cover outstanding loan amount.
- *Second Mortgage.* It is an additional security given to the financial institution. It is not the best security for the lender as sometimes the value of the vessel is not enough to cover two mortgagees, but if there is vessel employment secured, the owner-borrower can increase his negotiating power and his financial strength using the Second Mortgage tool.
- *Cross Collateralization.* It is when a vessel already mortgaged for another loan is further mortgaged or generally used as security for a second loan. By this way a stronger vessel will support a weaker one. In the same time better utilization of the assets of a company is observed.

- *Assignment of Income.* It is a form of a security where it is agreed that a portion of the income generated by the vessel goes directly to the lender. For example if the vessel is time-chartered, there is an amount of money deposited to the lender's account immediately by the charterer
- *Retention Account.* It is another form of security as it is not always easy for the lender to secure the cash-flows from the borrower. That is why the retention accounts are created. For example if a borrower is generating x amount of money, one sixth of it would be frozen in a separate account in order for the bank to be assured that the obligation of the next month or at least part of the obligation will be paid. By this way exposure of the financial institution is decreased.
- *Pledge of shares in the borrower party.* It is another type of security. When this security exists in a loan agreement, the lender can control the shares and as a result the whole company in case of an emergency.
- *Assignment of the Insurance*. This is a type of security. An agreement is made that between others also includes clauses saying that in case of loss or damage the insurance company or the P&I club will cover the amount of money needed. It is more complicated than the other securities as it includes agreements with third parties and premiums that must be paid for the coverage.
- *Personal Guarantee*. Some rich shipowners may have a variety of assets either under their name or under the company's name. So the lender in order to be more assured that the obligations of the shipowner will be honored includes these assets into the securities set. Personal guarantee is not only a security for the financial institution, but it can also motivate the shipowner to be more helpful as it is not only about his assets but also about his reputation. It is also called Recourse Finance.
- *Security Maintenance Clauses.* These are clauses included in the set of securities. These clauses protect the lender in case that the value of the vessel falls under the amount of the outstanding loan (loan to value requirements). Very often they include personal guarantees. They are key covenants

monitoring the risk of a loan facility. Usually they are set for the two first years. Then they are reduced, as it is difficult

Talking about securities and according to Lloyds List, it can be said here that situation especially for smaller owners is much more difficult now than it was in 2008. It is very important to say that in 2008 a shipowner could secure a loan with loan- to-value requirements around 70-80% for a ten-year period with a few covenants. In contrary, now only the big owners can secure loans, but loan-to-value requirements is 55-70% (smaller percentage of bank finance) for a 5-year period with more extensive security covenants. (Wackett, 2013)

When a bank loan is agreed between the two parties, except the securities taken by the lender there are also two kinds of commitments, the guarantees and the letter of credit. The guarantee is the promise to honor the agreement and meet the obligation by the debtor and it has always to be written. Except the principal debtor, there is also the guarantor, who will become liable in case the debtor will not pay. A guarantee should be carefully taken into account by the lending bank, as the value of the guarantee can change rapidly together with the financial condition of the guarantor. That's why a bank or a financial institution regularly checks the financial condition of the guarantor. It is always better for the bank if a guarantee is supported by a cash deposit that has a standard and tangible value. There are also cases where some banks take even personal guarantees, as shipowners sometimes have variety of assets and the bank is protected this way. Sometimes lenders prefer to take personal guarantees as there are many cases of single purpose company with no assets owning the ship is quite often. The lender can also obtain control of future ownership of the company as the personal guarantor is unable to sell his interest as he is tied by his guarantee. It is not unlikely to see situations between guarantors and banks ending up in court to be resolved by litigation. Usually enforcement of the guarantees is an option in the event of a default upon demand from the lender.

The second kind of commitment for a bank loan is the Letter of Credit. For example it can be either cash-secured letter of credit which will be supported by the line of credit

from the designated bank's deposit account. It can help to the provision of short term, seasonal working capital purchasing inventories, managing cash flows and taking advantage of trading discounts. For example a shipowner's bank offers a letter of credit to a shipyard to support his obligations. The shipyard will go to the owner's bank and discount the bills. After that the bank will ask the money from the owner.

The covenants should also be mentioned, as they are some instruments giving the financial organization a way to proactively control things when they start going wrong. For example the financial covenants, like the minimum value adjusted equity ratio, the minimum net operating profit to debt ratio or the minimum loan to value ratio which was mentioned before. In the financial covenants we can also see the valuation and the creditworthiness of the charterer, as the charterparty is always one of the important securities backing up the loan and making lending money to shipowners easier and safer for the bank. Except the financial covenants, there are also the so called "soft" covenants which also are proactive measures to protect the bank from exposure. These covenants may have to do with ownership management and flag of the vessel remaining the same. They can also have to do with the class society of a vessel or with the insurance coverage of the vessel. A financial institution in general is trying to make a shipowner act as transparently as possible in order to reduce possibility of getting exposed to part of unpaid loan or claims.

Something else that should also be mentioned is the warranties. Warranties are not exactly like covenants, but they have similarities as they are both designed to protect the lender. Warranties are mostly about legal aspects, like what happens in case of litigation, the binding effects of the loan agreement, the shipping company and the legal regime that the company operates in etc. They are more general than the financial covenants for example and they are still very important. In a contract when a warranty is not honored the contract is invalid.

Something also important is the insurance requirements of a lender for the vessel that is included in a loan agreement. The insurance requirement is very important, especially when it is about newbuilding vessels which are of higher value. An

Assignment of Insurance is very important for the bank or the financial institution in case of total or partial loss. As it is known when a vessel is mortgaged the bank has rights on it, but also liabilities. In case that the owner-borrower cannot honor the agreement or is unable to pay for the repair of the vessel, the bank will be the one in the end that will pay for the repairing of the vessel, like the bank will be the one to operate it in case the owner goes bankrupt. So it is clear why insurance assignment is of great significance for both parties and especially for the lender.

2.2 Private Equity Funding

Shipping companies except bank lending also turn to private equity funding. A private equity fund is a collective investment scheme used for making investments in various equity (and to a lesser extent debt) securities according to one of the investment strategies associated with private equity. Private equity funds are typically limited partnerships with a fixed term of 10 years (often with annual extensions). Usually a prospectus is made and released when a shipowner is starting cooperation with a fund. At this prospectus information is contained concerning how many and what types of ships will be purchased, strategy, return to the investors and exit scenario in case things not work as expected. At inception, institutional investors make an unfunded commitment to the limited partnership, which is then drawn over the term of the fund. From investors point of view funds can be traditional where all the investors invest with equal terms or asymmetric where different investors have different terms. Usually equity funds are based in tax friendly environments, like Cayman Islands or Bahamas. A private equity fund is raised and managed by investment professionals of a specific private equity firm (the general partner and investment advisor). The shipowner who will be the technical and commercial manager usually enjoys a degree of limited liability. He will receive fees for the management of the vessel. Usually banks or rich tycoons will underwrite portion of the equity capital. Then it will be promoted through market specialists and sold in international capital markets. That is one of the reason funds that are listed in the stock exchange are generally preferred both by shipowners and by

individual investors. Typically, a single private equity firm will manage a series of distinct private equity funds and will attempt to raise a new fund every 3 to 5 years as the previous fund is fully invested. (Wikipedia)

Some well-known private equity funds are the German KG, the Norwegian KS, UK tax leases, US pension funds and US finance organizations. Private equity funding is relatively flexible and in general independent. Private equity funding activating in shipping finance happens especially in occasions like now. The shipping market is low; bank lending is not available for anyone, it is only available to the well-known shipping companies with the strong balance sheets. According to gallops and pole voting, shipping industry people are expecting the market to recover in the next one or two years. This gives the opportunity to independent investors like the private equity funds to invest in shipping companies with high expected returns, higher than if the investment was in any other industry, when the market recovers. However, like in every kind of investment, in private equity fund timing of placement is very important. Investing when the market is at the highest levels, like 2008, most probably is not favorable, as profit margin is limited; market is already high. For example three of the German KG funds created in better market conditions than today, EEH, Embdena and AppenCapital have submitted insolvency due charterers who could not honor long-term time-charters fixed in better market conditions with higher freight and due to other difficulties in today's low shipping market. (Osler, Third KG house casualty, 2013)

2.3 Islamic Finance

Another form of banking and finance is Islamic finance or Islamic banking. Islamic finance is mostly activating trying to help private or semi-private organizations within the Muslim community to develop their business activities. What is very important here is that Islamic finance institutions are operating under the regime of certain Muslim rules, also known as "Shariah". The basic principle of Islamic banking is based on risk-sharing which is a component of trade rather than risk-transfer which is seen in conventional banking (Wikipedia). Islamic rules do not allow making profit out of interest rate ("Riba"), so in Islamic finance, financial institutions operate obeying rules that have been created

to prevent profit making through interest rate ("Fiqh al-Muamalat"). For example instead of leasing and making profit out of interest, in Islamic finance the finance institution is buying the asset and charters it out to the interested party at a little higher price than bought. (Wikipedia, Islamic Finance)

A recent application of Islamic finance on shipping industry is the Shariah-compliant fund set up by ARAB Petroleum Investments Corp and Tufton Oceanic and it is fully underwritten by Apicorp bank. This fund is worth $150 m. and it concentrates mainly in helping Middle Eastern companies to transport petroleum products. This fund is a good example of what was written before. It provides capital for investment to the Middle Easter shipping sector at a time when traditional lenders to shipping companies are shrinking their shipping portfolios. The Islamic fund between ARAB Petroleum Investments Corp and Tufton Oceanic purchased five Medium Range (MR) product tankers.

Although Islamic finance techniques were initially designed to support mainly Muslim business, recently it is becoming widely acceptable and there is some international cooperation, while in the same time the idea of a European shipowner getting financed from an Islamic bank is not something impossible. It is really attractive for foreign shipowners considering the liquidity of Islamic financial institutions and the fact that Islamic finance is developing around 10% year to year. What is really important is that Islamic finance price-wise is highly competitive compared to western traditional lenders like shipping banks. There was already cooperation between western banks as advisors and Islamic banks together with Japanese banks as agents. In the same time there was help provided by western law firms in order for Islamic finance institutions to get know-how and legal advice in operating as ship financiers. (Lloyd's List Asia, 2013)

2.4 Chinese Ship Finance

Another alternative option for shipowners to get financed is the Chinese banks. Chinese ship finance is in the same chapter with Islamic ship finance as it has some similarities with the latter. Fact is that talking about Chinese and Islamic financial institutions we talk about financial institutions with very strong balance-sheets and with very high

liquidity, especially in this particular time that western banks are suffering due to lack of liquidity, toxic bonds, defective government bonds etc. And these are not the only similarities Chinese and Islamic financial institutions have. They are both relatively new players in ship finance compared to the traditional ones (see RBS, Commerzbank, Credit Suisse etc.). Furthermore, both Chinese and Islamic banks' clientele is not as international as it could be. However it could be said for Chinese banks that they are going towards the right direction to become major player of this field. According to Petrofin finance consultants, the shipping portfolio of Australian and Far Eastern banks was $93bn in 2012, while in 2010 $66.4bn. There is no doubt that Chinese ship finance is responsible for the 40% increase of the shipping portfolio these last two years. (Osler, China consolidates as a global financier, 2013)

What is worth mentioning here is that according to Relbanks(2012), the two biggest banks globally in market cap are Chinese, Industrial Commercial Bank of China (ICBC) and China Construction Bank. (Belbas, 2012) If we look at the top ten banks worldwide in market cap, 4 of them are Chinese, the two previously mentioned, Bank of China and Agricultural Bank of China. In the sector of ship finance, the leading Chinese banks are China Export Import Bank (CEXIM), ICBC and Bank of China (see Figure 4). However, considering lending to foreign shipowners, CEXIM and China Development Bank (CDB) are the most active. According to Seafin Ship Finance Consultants, some deals that have been signed already with Greek shipowners are $111m for Maran Gas and Maran Tankers Maritime, $203m for Danaos Shipping and $83m for Diana Shipping from CEXIM. Nevertheless, Cardiff Marine has also signed a deal of $74m with China Development Bank.

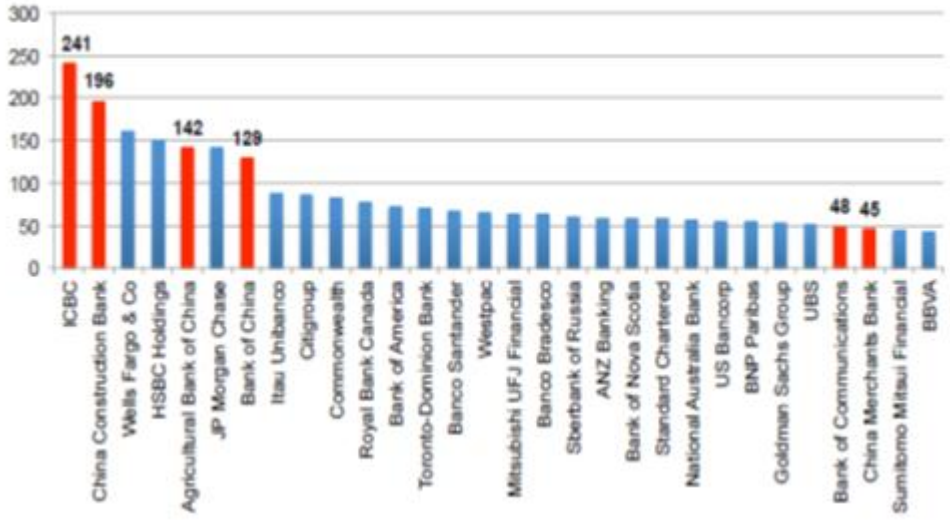

Figure 4: 30 biggest banks in market capitalization Source: Relbanks (January 2012)

It is very important to say that Chinese ship finance is very closely related to the operation and support of the Chinese shipyards. It was recently announced that China Export Import Bank wants to increase lending to shipowners by 40% from 2012 to 2013. CEXIM's goal is Chinese newbuilding to climb higher in the value chain, investing in Research and Development (R&D) and starting to build more offshore equipment, ultra large containerships and eco-friendly ships. In order to achieve this CEXIM is going to increase portfolio of foreign shipowners from $2.1bn in 2012 to $3bn this year, mainly by giving initiative for high-tech newbuildings. (Lin, Cexim stands by $3bn ship finance target for 2013 despite credit risks, 2013)

This comes in the same period with the design of the 12th 5-year plan of China that Chinese Government is doing, where there is a need for supporting Chinese shipyards. It should be said here that while in 2008 the order-book of Chinese shipyards was 3999 vessels with gross tonnage 123,961 million tones, there was a gradual collapse and in 2012 the order-book came out to be 1927 vessels with gross tonnage 63,475 million tones. (Tsimplakis, 2013) Except the financial initiatives and the R&D mentioned above, there will also be tax initiatives to domestic shipowners. China is also planning to merge

some shipyards in order to achieve economies of scale through bigger production units. (Yang, 2013)

Table 2: Shipbuilding in China, Japan and Korea Source: Naftemporiki Newspaper

	2008			2009			2010		
	Nr. of ships	Capacity	Market share	Nr. of ships	Capacity	Market share	Nr. of ships	Capacity	Market share
China	3999	123961	33.7%	3523	111148	37%	2967	103031	39.5%
Japan	1607	63641	17.3%	1286	51966	17.4%	1105	42474	16.3%
S. Korea	2303	137596	37.4%	1675	104252	35%	1357	89595	34.3%
Total	7909	325198	88.4%	6484	267366	89.4%	5429	235100	90.1%

	2011			2012		
	Nr. of ships	Capacity	Market share	Nr. of ships	Capacity	Market share
China	2482	84000	38.7%	1927	63475	39.6%
Japan	933	34270	15.8%	740	25828	16.1%
S. Korea	1078	75872	35%	764	52109	32.5%
Total	4493	194142	89.5%	3431	141682	88.2%

Another very important factor for shipbuilding of China is the operation of Export Credit Agencies (ECAs), that are intermediary institutions between national government and exporters to support export financing. ECAs usually offer credit insurance, financial support or even act themselves as banks. They provide direct lending, assisting the export of the ship. Another role of the ECA can be the role of the financial intermediary. In that case ECA lends to a commercial bank and the bank lends to the shipowner. This scenario is satisfying for everyone as the ECA is happy to pass the risk to the bank, while a bank is happy to do business with the local shipowner and expand its clientele. The third role of an ECA can be as an interest rate equalizer or subsidizer. In that case a bank will provide loans with low interest rates to attract shipowners and generally customers from abroad and the export-import bank or the ECA will subsidize the above mentioned commercial bank with the interest margin.

As it was mentioned above, there has been some noticeable business with China Export Import Bank recently. Usually the ECAs and the Export Import Banks do business together. The big Greek shipping companies managed to secure finance from CEXIM and we can see that ECAs prefer to do business with high profile shipping companies like Maran Tankers, Diana Shipping, Cardiff etc. in Greece. This makes clear that ECAs, like all financial institutions prefer to avoid high risk business with unknown shipowners. Sometimes we can see that ECAs depend on big international banks for making some new transactions, especially in situations like nowadays, when traditional shipping banks have stopped lending so much for the time being. Shipowners are trying to find alternative forms of finance.

However there should be said here that even if China gives financial initiatives to foreign shipowners, there are some restrictions that do not let Chinese ship finance to develop as much as its potentials seem to be. These are for example the capital control through which Chinese Yuan RMB cannot be converted to foreign currency for purely financial purposes. (Osler, China consolidates as a global financier, 2013) Another restriction is the fact that foreign banks cannot lend Yuan yet. So foreign shipowners have to come to China to borrow money, where the process of the approval of a loan is time consuming. (MacAulay, Bradshaw, & Young, 2011) Something else is the fact that there is no central registration for the vessels. As a result it is difficult to observe and follow financed vessels as different ports have different registry. Shipowners and ship-managers can experience not only different registration in different ports but also different rules having to do for example with the arrest a financial institution would require in case of a loan which is not honored. Finally, the mortgage law in China is untested and procedures are time consuming. A bank in order to be safe in case of an owner's default has to place the mortgage long time in advance, as it takes time for a mortgage to come into force.

It should be said here that in general but more specifically for the case of China, financing can be easier if an owner has an agreement with one of the big state-owned corporations, like COSCO, one of the big Chinese chartering companies, like Sinochart

or one of the state-owned steel mills (especially for iron ore carriers). In case of this agreement taking place, except easier financing with fewer securities, as this agreement is the basic security, the vessel turns to be more commercially valuable.

2.5 Leasing – Bareboat Chartering

Leasing and bareboat chartering is an alternative way of ship finance. It can be either operating lease of financial lease. Usually the lease companies agree with owners to buy their vessels. Then leasing companies bareboat the vessels back to the owners for example for 10 or 15 years. This allows the lessor to make use of the vessel without tying up capital for it. During bareboat chartering the charterer bears all the costs of the vessel, like crew management, insurance and maintenance, but in the same time enjoys all the benefits and the profit making. Very often the contract says that the owner should buy back the vessel after certain period at a certain price. So the owner knows the cost of the deal in advance. The return for the lease company is also known in advance and it is usually above 15%. The cost of such a deal is usually higher for an owner than the cost of the traditional bank finance and debt. However a sale & leaseback deal like this offers an owner 100% or close to 100% financing of the vessel's value, something that is extremely rare in bank financing.

One of the main advantages that sale & leaseback deals have is the fact that it is a way of financing 100% off-balance sheet. This means that a shipowner has the opportunity of accomplishing a new project without further burdening the balance sheet with long term liabilities. This can make a shipping company have a better financial image and increase its credibility and creditworthiness. It can be easier for a company that has a less burdened balance sheet to secure a loan from the bank. The bank considers this company as being less risky in comparison with another that has a lot of liabilities. These liabilities can be reflected in Equity / Liabilities Ratio, which improves by acquiring more assets, like ships, and by having fewer liabilities, like loans etc. Speaking about the fact that sale & leaseback is an off-balance sheet transaction, another advantage of it is the fact that the shipowner does not have to face the residual

value risk when there is no repurchase option. When a market is low like today, the prices of a vessel decrease. In that case the shipowner will probably produce loss as the assets on the balance sheet of the company will have lower value. Another very important advantage of sale & leaseback deals is the fact that it gives the opportunity to shipowners to complete new projects. For example, when a shipowner agrees with a lease company to sell his vessel and lease it back, with the money he gets by selling his vessel he can buy a new one and in the same time lease back the old one. Cash is released and can be employed elsewhere. By this way sale & leaseback deals give the opportunity to shipping companies to increase further their fleet. Something else that is very important with the sale & leaseback deals is the fact that the liquidity of the owner improves very much. And in times like now, when a lot of companies go bankrupt, cash is king. Tax benefits provided with this type of leasing deals should also be mentioned, as well as attractive Net Present Values.

Another characteristic of the sale & leaseback deals is the repurchase clause of the deal. According to a sale & leaseback contract, a shipowner usually has the obligation to repurchase the vessel after certain period at certain price. However, there is also the case that a shipowner can have the option of repurchasing the vessel after certain time period.

We should say here that except all the advantages that a sale & leaseback deal has its drawback is the fact that it is more expensive than for example the traditional way of financing through a loan from a bank. As previously mentioned, the return for the leasing company is more than 15%. Return for the bank for a loan would be 5-7% including LIBOR. Another disadvantage is the fact that it is not easy to terminate a leasing deal prior to maturity. It can lead to large termination costs. But yet, if the benefits of an S&L deal outweigh the extra cost, then it is on the judgment of the owner to decide what to do. For example there are companies like Olderndorff Carriers, which do not have a lot of self-owned vessels, they mostly lease them. While operating a 400 ships fleet, Oldendorff owns only 30 of them.

Except the Sale & Leaseback deals there is also the Bareboat Charter, where the charterer and operator does not need to bare the capital costs for the acquisition of the vessel. For that reason he will pay a small but risk free premium to the owner. The charterer will be then responsible for the management (crew, stores, fuels, lubes, repairs & maintenance) and the insurance of the vessel. Some key points in bareboat chartering is the fact that the shipowner should charter out a seaworthy, well-constructed and maintained vessel without defects in order for the charterer to enjoy smooth operation of the vessel. Another key point when we are talking about bareboat chartering is the fact that the charterer, when bareboat chartering term is coming close to maturity, should not stop maintaining the vessel. He should also not stop paying the insurance; he should not avoid passing the vessel through the 5-year planned maintenance and other obligations a ship manager has because the vessel will shortly return to the original owner.

To connect sale & leaseback financing with what was previously mentioned in Chinese ship finance chapter, leasing is a relatively new business for Chinese lease companies, but there are plenty of opportunities into it. A very recent example is the deal made between China International Marine Containers and French line CMA CGM for the leasing of more than 10 9,200 teu boxships. This is indication of the fact that Chinese lease companies and financial institutions can cooperate with European owners, which can give them access to a very big market share in the ship finance field. The Chinese leasing is very similar to the traditional form of bareboat chartering. However, in the traditional bareboat chartering, the vessel is shown in the balance sheet of the owner, he is the one who bears the “burden”. In our case of Chinese lease companies, the vessel is shown in the balance sheet of the lease company, with the risk that is associated to that. (Leander, 2013)

Another aspect of sale & leaseback that should is connected with the previously analyzed chapter of Islamic finance and is interesting to be mentioned, is the way leasing business is taking place in the Islamic finance a little bit different than the traditional leasing process. In the Islamic banking leasing is called “Ijarah thumma al

bai'", which means hire purchase. Because according to the Islamic rules (Shariah), the financial institutions should not make profit by interest, they do two transactions to complete the sale & leaseback agreement. The first contract is the "Ijarah", which has to do with the leasing terms, while the second contract is "Bai", which has to do with the buy-back of the asset when the leasing period is over. So with the first contract, the Ijarah, a customer will lease the vessel from a special-purpose company and after paying the installments he will have the option or the obligation to buy the vessel or vessels activating the Bai contract. The bank who acts as an agent will receive charter fees in order to circumvent the religious rules about interest payment.

A recent example of this kind of transaction according to Shariah rules was when Brunei Gas Carriers were financed with $184m to renew its fleet. The deal would be considered as a leasing deal in western terms. HSBC was the Sharia advisory bank, while the agents were Bank Islam Brunei Darussalam together with two Japanese banks, Bank of Tokyo-Mitsubishi UFJ and Sumitomo Mitsui Bank. The money will be paid to the special-purpose company which will lease the fifth LNG ship and lease it to Brunei Gas Carriers. This was the second deal for this year after a $170m deal last year involving again these two previously mentioned Japanese banks. (Lloyd's List Asia, 2013)

2.6 Derivatives and Risk Hedging

Shipping market experiences high volatility and cyclicality. This fact is a major concern for shipowners, chartering companies and generally investors. (Syriopoulos, 2007) The following is an extreme example, but it is indicating of the extreme volatility of the shipping market. Baltic Dry Index (BDI), the main index used to benchmark dry cargo, like coal, grain, iron ore etc. dipped from 11612 points during the week of June 02 2008 to 663 points during the week of December 01 2008. In other words BDI and the shipping collapsed in a period of 6 months 94.3%. This would be of great concern for a shipowner who deploys his vessels in the spot market. With BDI at the levels of 663 points, a shipowner cannot even cover the operating cost of the vessels.

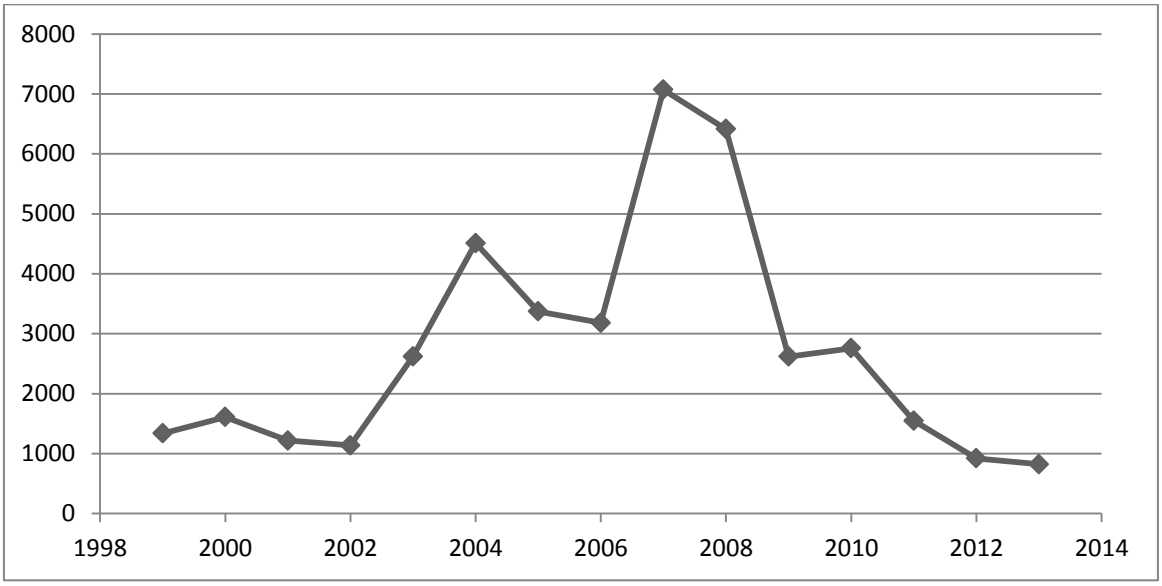

Figure 5: Baltic Dry Index 1999-2013 Source: Clarksons

So in order to hedge the risk of rapidly changing market conditions there are three basic strategies. The first one is to follow a mixed strategy regarding the deployment of the vessels. By saying mixed strategy, the meaning is that part of the fleet is deployed in the spot market and part of the fleet is engaged into time charters. For example a shipowner who chartered out a vessel or some vessels for a Time Charter (TC) or a Contract of Afreightment (COA) in May 07 2008, when BDI was around 10104, for three years. This shipowner later when the market collapsed did not experience the downturn of the market and the following consequences for the three years that the charterparty was valid. Using the same logic, a shipowner who agreed to charter out a vessel or vessels for a three-year TC in 2006, did not experience the booming of the market in 2008 and the following boost in his cash flows and profit making.

Another strategy for hedging the risk for an owner is to diversify the fleet of ships of different sizes and of different cargo specialization. Smaller ships like Panamax (75000 DWT) vessels can experience less volatility in freight than for example Capesize (180000-200000 DWT) vessels. This can be explained as smaller vessels can more easily get employed, as it is easier to find cargo to fill them. Another reason why smaller

vessels show smaller volatility in freight rates is the fact that smaller vessels can approach more ports, so they can be employed in more routes. For example the Panamax vessel has 14 meters draught when loaded, while a Capesize has 19-20 meters draught when loaded.

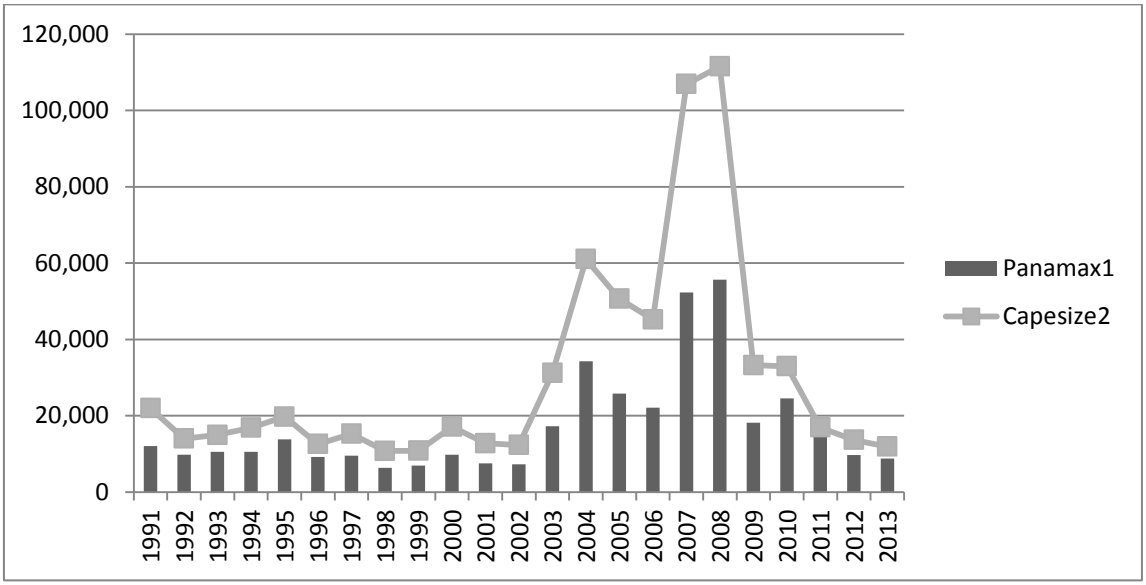

Figure 6: Panamax vs Capesize Freight Rates 1991-2013 Source: Clarksons

Since the various shipping market segments exhibit differing behavior (associated with critical factors such as freight rate fluctuations, vessel size class and operational flexibility), their risk–return profile is also divergent (e.g. Kavussanos, 1997, 2003). Moreover, different asset classes in the same shipping market segment (handymax, panamax, capesize in dry cargo; aframax, suezmax, VLCCs in tanker) show different volatility patterns and the same holds in relation to the contract type (spot vs. time-charters). (Kavoussanos, Business risk measurement and management in the cargo carrying sector of the shipping industry, 2002)

There are plenty of risks involved in the shipping business. For example first of all is the business risk which has to do with the volatility in freight rates and earnings of the shipping companies. Default risk has to do with the ability of a shipping company or its

counterparty to honor its liabilities. Liquidity risk refers to the case that a shipping company will liquidate its asset to gain liquidity. Financial risk has to do with the volatility in interest rates and how burdened is a company's balance sheet with debt. Market risk is related to changes in the market that the company operates or changes in the stock exchange if the company has gone public. Moreover, credit risk is always there as there is always counterparty. Technical and physical risk have to do with vessel deficiencies and company's reputation, while political risk is there as well and has to do with the way political decisions affect shipping business.

A relatively new way to hedge the risks of the extremely volatile shipping market is the use of freight derivatives. Freight derivatives have their origins in 1985, when Baltic Freight Index (BFI) was created and after this BIFFEX (Baltic International Freight Future Exchange). BFI was renamed Baltic Dry Index (BDI) in 1999. As the index (BDI) was developing, except voyage based charters that were introduced in the beginning, there were also time charter rates introduced into the index. BIFFEX was operating and people were trading in it, although it had some deficiencies. In 1992 Clarksons developed the Freight Forward Agreement (FFA), volumes of BIFFEX fell and finally BIFFEX stopped operating in 2002. Some other existing dry cargo indexes are Baltic Handysize Index, (BHI – est. 1996), which became Baltic Handymax Index (BHMI) and Baltic Panamax Index (BPI – est. 1998). There is also the Baltic Capesize Index (BCI – est. 1999), the Baltic Supramax Index (BSI) and the new Baltic Handysize Index (BHSI, introduced in 2006).

However there are not only indexes indicating the freight rates of the Dry Cargo market. There are also indexes about the Tanker and LPG markets. (Kavoussanos & Visvikis, Theory and Practice of Shipping Freight Derivatives, 2011) The Baltic International Tanker Routes (BITR) was introduced in 1998, but eventually it was subdivided into Baltic Dirty Tanker Index and Baltic Clean Tanker Index. Finally, in 2003 the Baltic Liquefied Petroleum Gas assessment (BLPG) was established.

In 2010 60 individual route assessments of Dry Cargo, Wet Cargo and LPG market were produced by independent shipbrokers, specialists in their field every day.

Assessments are made in US$ per mt for the voyage routes, Worldscale for the tanker market and US$ per day for the time charter. Against these daily assessments Freight Forward Agreements (FFA) can be traded.

FFAs are over the counter (OTC) instruments traded on a principal basis. (Kavoussanos & Visvikis, Theory and Practice of Shipping Freight Derivatives, 2011) These contracts are traded according to standard rules and conditions, while there is no physical delivery of cargo or vessel involved; they are cash based. The information included in a contract is the agreed route, the date of settlement, the contract quantity and the contract rate agreed. Specified time charter and voyage rates are usually traded for forward positions. By this way the interested parties can manage reducing exposure to price fluctuations and freight market risks. However, FFAs can be also traded for speculative purposes.

FFAs each day start with no prices (outcry), taking as only guidance for the opening of the market the closing curve of the previous night. The period traded can be as long or as short as possible, as long as two counterparties meet and agree to trade. The same for the price agreed. The broker will be the one to bring the two counterparties together. FFA market is led by sentiment and the main reason of trading is either to hedge a physical deal (shipowner), or to balance a physical trading book (charterer) or to speculate (generally trader). The variables are the ones referred to above and the clearing house.

Except the original FFAs, there are also the FFA options, which appeared as the volumes grew. They are agreements that give the buyer the option to buy or sell the underlying FFA on the settlement day. By purchasing a call option, the buyer has the right to buy the agreed FFA at a specified price at a specified date in the future. Following the same logic, purchasing a put option gives the buyer the right to sell it at an agreed price at the agreed date. Options can only be executed at expiry date. The seller (writer) sells the right to the purchaser to execute his option and the seller receives a premium for that.

One very important characteristic of the FFA markets is that trading passes through clearing houses. Bilateral trading of FFAs is working properly as long as the markets are stable. However, trading through Clearing Houses has its own advantages. In 2001 the International Maritime Exchange (IMAREX) was formed, followed by NYMEX in New York, LCH in London, SGX in Singapore and finally CME in Chicago which absorbed NYMEX. An interested party can either be an individual member of a clearing house or trade through General Clearing Member (GCM). Clearing houses or GCM are going to charge the trading parties for the service of clearing provided. Usually trades are being cleared every day, using daily variation margins which depend on the performance of the market. The only exposure of a customer with a clearing account is to his clearing bank or his clearing house. We should say here that even the interested party suffers some costs for clearing. However these costs are not in vein. In difficult market conditions, like 2008 and 2009, but even in 2013 that we see even traditionally safe counterparties, like KG Funds collapsing one after the other, cleared FFA market suffers no defaults.

It is clear that risk hedging through derivatives and ship finance through a bank or through other means are very closely related. A shipping company or a chartering company can significantly increase credibility and creditworthiness if risks associated with shipping business and shipping environment in general are effectively hedged. Companies and banks are going together, hand to hand in such volatile environments. So a bank will be much more willing to provide finance to a company that is obviously looks to hedge the risks and plan the future more diligently than some other company that is left in the mercy of the gods of shipping.

Chapter 3 Data Collection and Sorting

3.1 Data collection

In this research paper 101 ship finance loan agreements were used. They come mainly from the Greek market. However the borrowers, the banks and the data providers for confidentiality reasons prefer to remain anonymous. The loans were skimmed and put into Excel sheets, one sheet for each year.

3.2 Data sorting

After skimming 101 loan agreements from years 2003 to 2012 and keeping in Excel sheets the most important information like:

- Amount of the loan facility (in US dollars $ million)
- Percentage % of the market value of the vessel that will be covered by the loan facility (if its purpose is the acquisition of vessel or vessels)
- Amount of the balloon installment of the loan
- Margin (Interest) of the loan
- Requirement of the bank concerning the maintenance of the Value of the vessel to Value of the loan $^{V}/_{L}$ Ratio at certain percentage levels
- In how many advances (portions) was the loan facility withdrawn
- Length in years of the repayment process
- Characteristics of the vessels included in the loan agreement
- Interest added to the existing margin in case the borrower fails to pay an installment (default interest). Counting from the time payment of the installment was due until the borrower finally pays it
- Some extra comments about the security documents or other noticeable information. For example existence of a charterparty; use of a collateral; covenant or warranty concerning derivatives trading
- And finally the price of the purchase contract in case that it is given (usually for newbuilding contracts)

Table 3: Example of Loan Agreements 2008

Loan (in m $)	% of the market value	Balloon (in m $)	Margin	Requir./Value to L	Tranches	Length (years)	Vessel	Default Interest	Comments	Contract Price ($m)
50	65%	18	not calculat	125%	1 Advance	10	crude tanker 1	2%	mortgage, general	77.5
4.35	75%	1.95	2%	125%	1 Advance	8	general cargo 1	2%	covenants and 6 securities	
14	60%	-	1.75%	175%	1 Advance	4	bulk 37705 198	2%	collateral: bulk 25694 1985, existing C-P	
13.125	refinance 75%	4.375	0.85%	125%		10	prod tank 13000 2008		derivatives	17.5
30	58%	12.2	0.85%	135%	1 Advance	10	bulk 56557 200	2%	7 securities	51.4
2.1	60%	0.7	2.50%	130%	1 Advance	2	gen. cargo 162	2%	existing bulk 30084 1979, mortgages and	
12.15		1.95	1.25%	115%-130%	1 Advance	3	cont. 37212 1983(new), cont. 455		mortgages and 6 securities	
29.5	refinance existing 13.87	3.5	1.30%	130%	(13.875+16.525)	8	general cargo1	2%	insurance requirements!!, mortgages an	
14.5	65%	5.4	1.70%	125%	1 Advance	8	container 10000 2000(new), reefe		6 securities	
10	working capital requirec	1.6	0.85%	125%	1 Advance	3	bulk 27990 198	2%	6 securities	
	AVG %market value		AVG Margin	AVG V/L Ratio						
	64%		1%	133%						

Chapter 4 Methodology, Findings and Case Study

4.1 Methodology used for Loan Agreements Analysis

After the data was collected and sorted into Excel sheets it was clear that further analysis could be done in the fields that were calculated on the same scale, in percentage %, so the amount of the loan facility would not change the result. Another factor for choosing the object of the analytical comparison was the existence of some relative volatility in the values of the observations during the years 2003 to 2012.

So the ones that were chosen was the market value covered by the loan, the margin and the value to loan ratio. These three values were taken for each year and the average market value covered, average margin and average value to loan ratio requirements were calculated.

For this the formula of average was used as below:

$$AM = \frac{1}{n}\sum_{i=1}^{n} a_i = \frac{1}{n}\left(a_1 + a_2 + \cdots + a_n\right)$$

If n numbers are given, each number denoted by a_i, where $i = 1, \ldots, n$, the arithmetic mean is the [sum] of the a_i's divided by n.

After that in order to find how dependent, correlated or anti-correlated two sets of data, the mathematical formula of correlation coefficient was used:

$$\rho_{X,Y} = \operatorname{corr}(X,Y) = \frac{\operatorname{cov}(X,Y)}{\sigma_X \sigma_Y} = \frac{E[(X-\mu_X)(Y-\mu_Y)]}{\sigma_X \sigma_Y},$$

Where “corr(X,Y)” which stands for correlation, equals cov(X,Y) stands for covariance divided by the product of standard deviation of the two variables or the two sets of data. The constraint here is that standard deviations (σ) should be finite and non-zero.

The correlation coefficient allowed values are between -1 and 1. The closest to 1 the more correlated, meaning that if for example the value of one variable increases the value of the other will decrease. The closest to -1 the value of correlation for two sets of data, the more anti-correlated they are. When we say anti-correlated we mean that for example if one variable’s value increases, the other variable’s value will decrease accordingly. Finally, the closer the value of correlation coefficient is the more independent are the two variables or the two of data.

4.2 Findings of data sorting and analysis

In Figure 7 and Figure 8 we can see that the margin or profit of the bank through interest in the good years of shipping was low, reaching even the very favorable for the

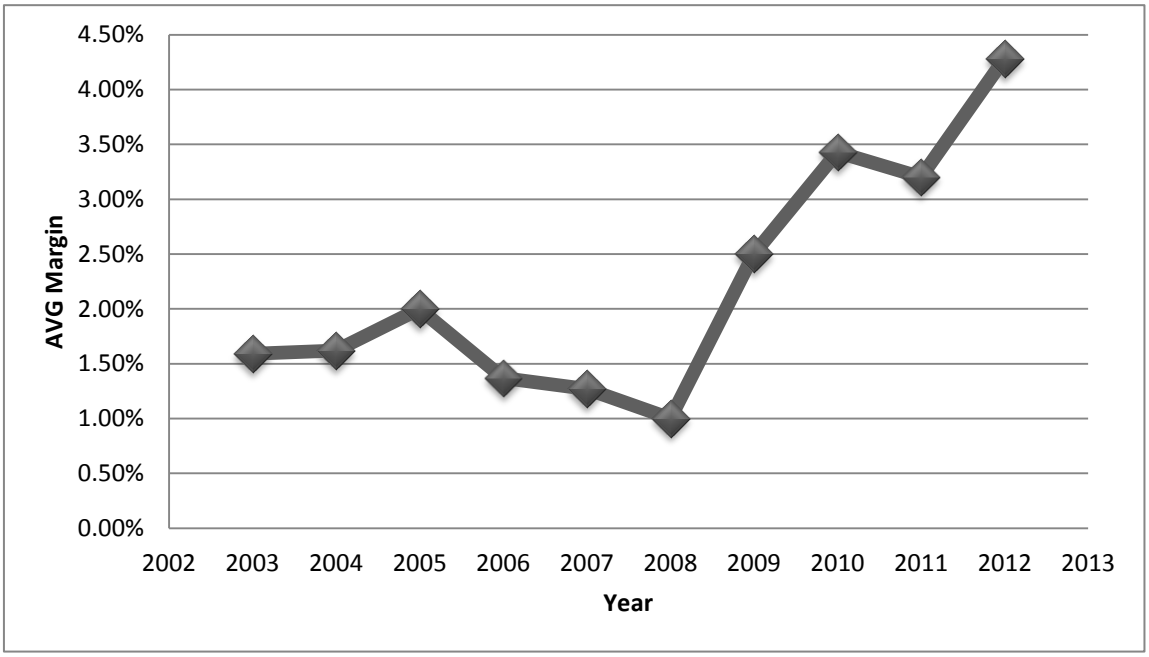

Figure 7: Time vs Average Margin 2003-2012

shipowners value of 1% when shipping market was at its peak and before collapsing in the middle of 2008. Since then, the market is getting worse and constantly more difficult for shipowners to secure finance. The only exception was from 2010 to 2011, when some positive atmosphere prevailed for a while in the shipping world and margin required by the bank decreased but not significantly.

Especially from Figure 8 someone can say that average Baltic Dry Index values and average Margin required by the banks are adversely related. This can be shown from the correlation coefficient, which was found through Excel to be -0.78. So it is proven that bank policy regarding the provision of shipping finance is strongly affected by the performance of the shipping market. It is the perception of exposure to risk that changes for the financial institution. When freight rates collapse and vessel values decrease, the bank perceives more risk in providing finance to shipowners, due to the

fact that earnings generated maybe will not be enough or the value of the vessel will not be able to cover the loan facility. So a bank will increase the margin required and the value to loan ratio maintenance requirements. In the same time, something that can be seen qualitatively and not quantitatively is the fact that a bank or a financial institution will require more securities, more mortgages or even a charterparty in order to provide finance in the scarce times. In case that there is no charterparty there can be bigger need for sooner repayment of a portion of the loan. However if there is a charterparty, an owner can pay less money in installments in the beginning of the loan repayment period and more money in the final balloon installment due to less exposure to risk for the bank.

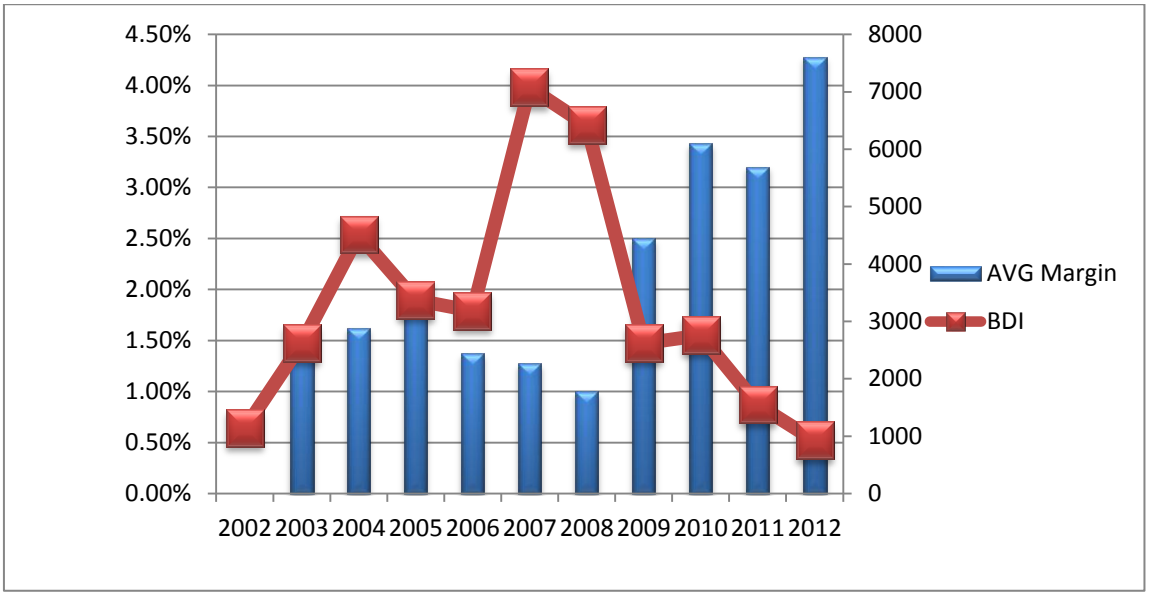

Figure 8: Baltic Dry Index vs Margin 2003-2012

As we know from the law of demand and supply when BDI and Tanker Indexes, like the clean and the dirty index are at low ebb, then the prices of the newbuildings as well as second-hand vessels decrease. This can be explained if we take a look for example at the situation of the market in 2008 before the collapse. People, even individual

investors that had nothing to do with shipping were willing to pay very high prices to buy vessels because they were expecting that if the market stays so high, they will have very good Return On Investment and very good Internal Rate of Return. However with the situation nowadays that is very bad for the market the prices of newbuildings are at the same levels with 2004. The price of second-hand vessels are relatively even lower. In the case of the newbuilding price are relatively higher as there is the expectation that in two years that the ordered vessel will be ready, the market will be in better situation, plus the fact that an owner doesn't have to bear the expenses of maintenance of a vessel for as long as it is in the premises of the shipyard.

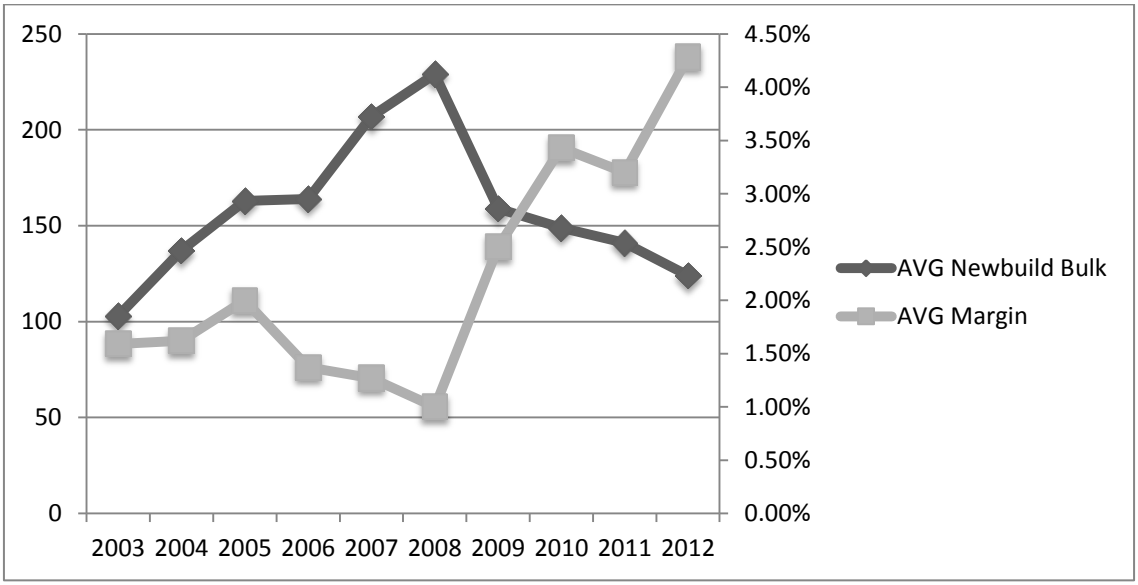

Figure 9: Average Newbuilding Bulk Index 2003-2012 (Source Clarksons) vs Average Margin

We can also see that the Timeseries for AVG Newbuild Bulk and Tanker have almost identical charts with Correlation Coefficient 0.97. This shows us that Bulk and Tanker markets are moving together and they are very much related. In the same time we see that that Margin and Newbuilding Prices are conversely related but correlation coefficient is -0.52 for Bulk carriers and -0.58 for Tankers. With these values we cannot

say that Margin of the banks and Bulk or Tanker Prices are absolutely correlated, however there is some relation between them.

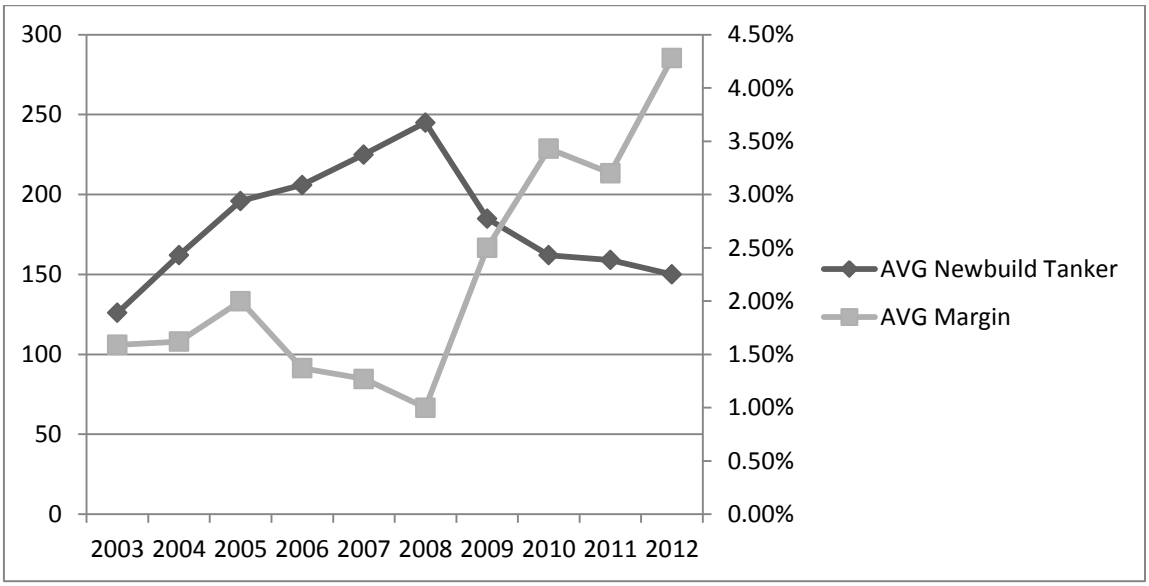

Figure 10: Average Newbuilding Tanker Index (Source Clarksons) vs Average Margin 2003-2012

Another Graph, Figure 11 that has some results is the graph between V/L Ratio and BDI. Correlation coefficient is not worth mentioning here as it is only 0.25. However we can see that for the bank V/L ratio is also a kind of setting factor. For example in 2003, 2006 and 2012 we see that V/L ratio is low and the following years market gets better. So we could say that low V/L ratio is a kind of motivation for the shipowners to get finance. In contrary, in 2011 it is very high as the expectations for recovery and generally the market in 2011 was very bad. Maybe the fact that in 2012 V/L Ratio is relatively low means that shipping recession will be over soon and banks are looking to expand their clientele.

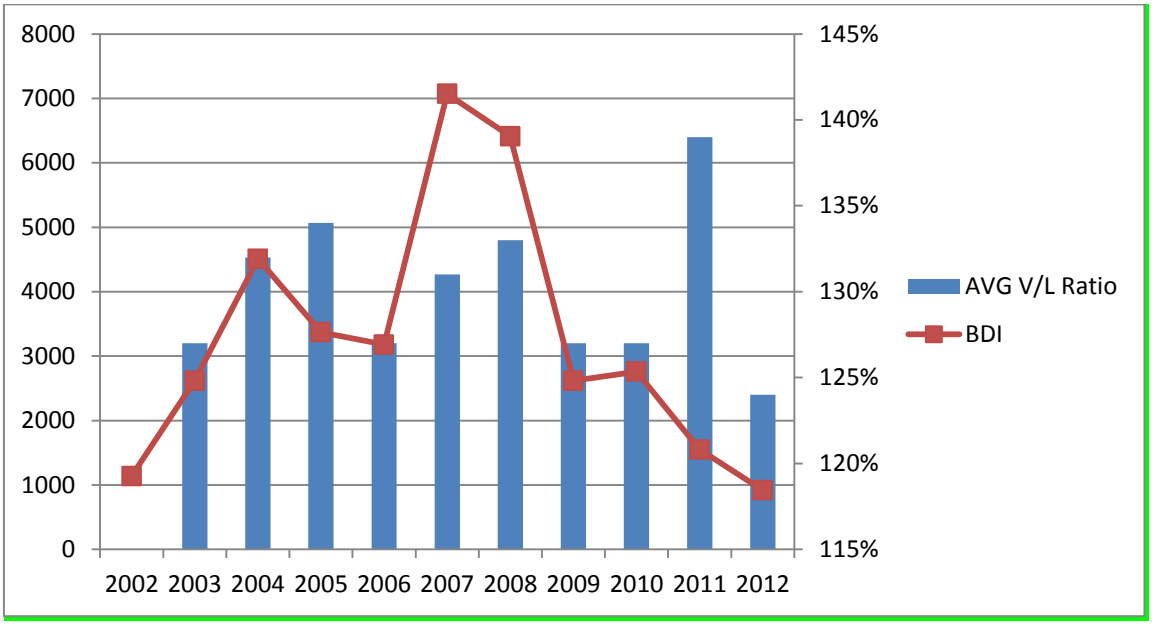

Figure 11: Average V/L Ratio vs BDI 2003-2012

Finally let's take a look at the Figure 12, which combines the 8 year LIBOR interest for 10 years with the Average Margin found before from the data collection. After calculating the correlation coefficient we can say that they are related values as it is -0.71. It can be said here that the combination of these two elements is worth mentioning. LIBOR and Margin are complementary. LIBOR moves opposite than the Margin, so it can be said that it moves together with BDI. This can be explained that LIBOR is a policy making interest. When market is very low and bad and margin is high LIBOR is low in order to be easier for shipowners to get financed and development to come, while when market is high LIBOR is also high in order to avoid overheating.

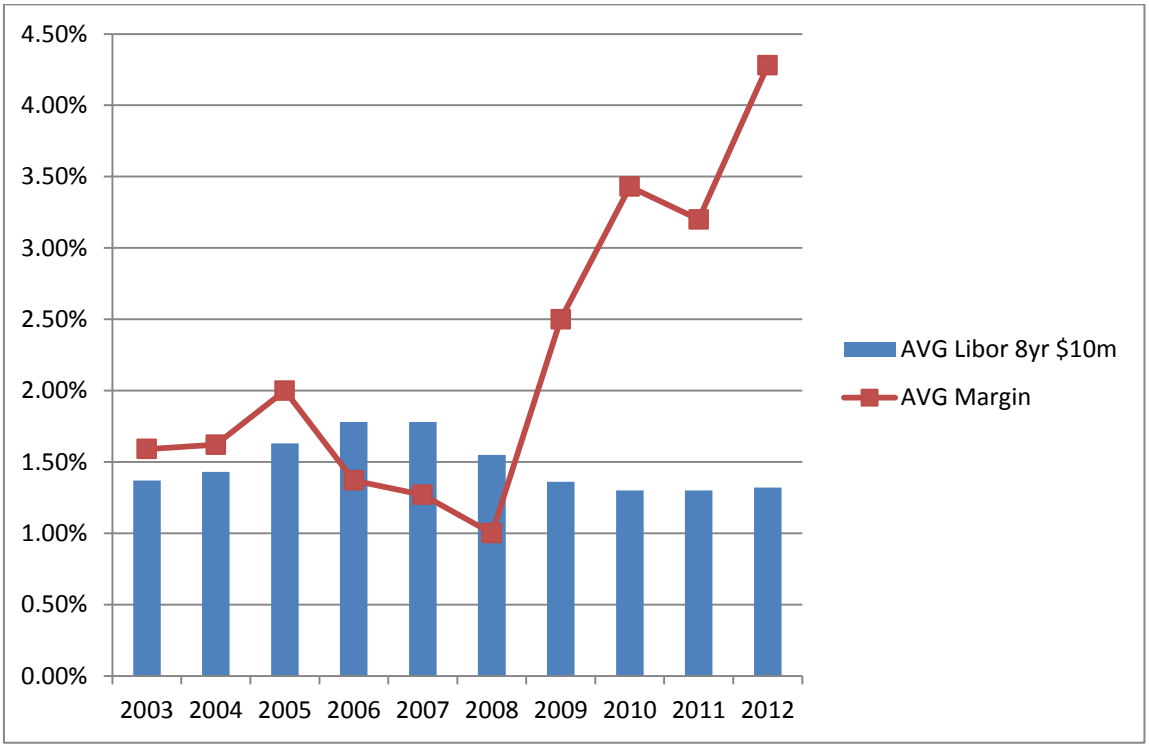

Figure 12: Average Libor 8 years-$10 million vs BDI 2003-2012

4.3 Methodology of Case Study

After sorting and analyzing the 101 loan agreements, it was decided to take two loans and make an investment evaluation. The restriction would be that both the loans have to do with newbuilding finance, as it is easier to find the vessel's value at the time of the agreement, as well as during the next years. The variable of the two loans is the fact that one was agreed during 2003, when shipping market was not good, but the booming followed, while the other loan was agreed during 2008, when the market was at its peak and the collapse followed. The 2003 loan is about financing a newbuilding Handysize bulk carrier of 17000 Deadweight Tonnage, while the 2008 loan has to do with financing a newbuilding Aframax tanker of 115000 DWT. Both loans' details were sorted into Excel sheets. Net Present Value and Internal Rate of Return formulas were used to evaluate the two investments.

To find the NPV of an investment first of all the net cash-flows of the years of the investment should be discounted by the interest an investor would receive if he deposit his money in a bank account.

The first step (1) for finding NPV is to discount a year's cash-flow as below:

$$\frac{R_t}{(1+i)^t}$$

where **t** symbolizes time and in our case year.

i symbolizes the opportunity cost of capital, the return in case an investor invests his money in a bank or in financial markets with similar risk,

and finally **R**t stands for the net cash-flow (cash inflow minus cash outflow) at year **t**

In our case, in both projects the cash-flows every year are different. The reason of this is the volatility that characterizes the freight rates and the operation cost of the vessels. So the above formula (1) is used to calculate the cash-flow of each year separately.

After knowing the combinations of time and cash-flows (t, Rt), the final step (2) for calculating NPV of a project is as follows:

$$\mathrm{NPV}(i,N) = \sum_{t=0}^{N} \frac{R_t}{(1+i)^t}$$

where **Σ** stands for the sum of the discounted cash-flows during the years of the project.

The other tool that was used for evaluating the project was Internal Rate of Return (IRR). For calculating IRR the same formula (2) will be used as above for calculating NPV. However the result of the function must be 0, so NPV=0 (3).

$$\mathrm{NPV} = \sum_{n=0}^{N} \frac{C_n}{(1+r)^n} = 0 \quad (3)$$

This means that the present value of all future cash-flows equals the value of the initial investment. In other words, using IRR someone can find the rate (r) at which the investment will break even. One company should decide to proceed into a project in which IRR is higher than the cost of capital in case of getting a loan. Projects with IRR higher than the interest acquired by depositing the money in the bank is also desirable.

4.4 Case Study

4.4.1 Investment in a Handysize bulk carrier in 2003

The first project that is examined and evaluated is financing the acquisition of a newbulding Handysize bulk carrier of 17000 DWT during 2003. According to Clarksons, buying a 30000 DWT Handysize in 2003 costed $18 million. So in this case, the 17000 DWT is assumed to be slightly cheaper. So it is assumed to cost $15.5 million.

The loan facility was up to 72% of the market value of the vessel or up to $11.2 million. The rest $4.3 million would come from the cash deposits or the retained earnings of the company. The margin (interest) of the loan was 1.25% at the time, while LIBOR was 1.45%. The repayment of the loan would be in 19 consecutive semi-annual installments of $400000. In other words the length of the repayment would be 9.5 years. The balloon installment according to the loan agreement is $3.6 million paid together with the last installment.

Table 4: Data used for Newbuilding Handysize investment evaluation

Year	Time charter rate $/day	Operating cost $/day	LIBOR
2004	17,323	5,450	1.43%
2005	15,918	5,430	1.63%
2006	14,710	5,400	1.78%
2007	28,120	5,300	1.78%
2008	29,486	5,260	1.55%
2009	10,678	5,250	1.36%
2010	15,662	5,200	1.30%
2011	11,587	5,140	1.30%
2012	8,234	5,100	1.32%
2013	7,339	5,139	1.30%

Table 5:10 year Investment in a Handysize bulk carrier

Handy 17K - New vessel											
	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Ship purchase/sale	4,300,000.0										
Time charter rate/day ($ per day)		17,323	15,918	14,710	28,120	29,486	10,678	15,662	11,587	8,234	7,339
Earnings p.a.*		6,149,537.736	5,650,985.577	5,221,913.462	9,982,668.269	10,467,379.808	3,790,649.038	5,559,936.321	4,113,221.154	2,923,083.654	2,605,446.429
Operating costs ($ per day)		5,450	5,430	5,400	5,300	5,260	5,250	5,200	5,140	5,100	5,139
Operating cost p.a.		1,989,250.000	1,981,950.000	1,971,000.000	1,934,500.000	1,919,900.000	1,916,250.000	1,898,000.000	1,876,100.000	1,861,500.000	1,875,735.000
Margin		1.25%	1.25%	1.25%	1.25%	1.25%	1.25%	1.25%	1.25%	1.25%	1.25%
LIBOR		1.43%	1.63%	1.78%	1.78%	1.55%	1.36%	1.30%	1.30%	1.32%	1.30%
Repayment		821,440.000	823,040.000	824,240.000	824,240.000	822,400.000	820,880.000	820,400.000	820,400.000	820,560.000	4,102,000.000
Net Cashflows	-4,300,000.0	3,338,847.736	2,845,995.577	2,426,673.462	7,223,928.269	7,725,079.808	1,053,519.038	2,841,536.321	1,416,721.154	241,023.654	-3,372,288.571
Cumulative cashflows	-4,300,000.0	-961,152.264	1,884,843.313	4,311,516.774	11,535,445.044	19,260,524.851	20,314,043.890	23,155,580.210	24,572,301.364	24,813,325.018	21,441,036.447
Payback	0	1	2	3	4	5	6	7	8	9	10
Discounted cash flows		3,210,430.515	2,631,282.893	2,157,303.871	6,175,044.160	6,349,452.496	832,611.399	2,159,334.067	1,035,184.270	169,340.022	-2,278,197.326
Discounted cumulative cash	22,441,786										
NPV**	18,141,786.368										
IRR	81%										Option to sell around $7500000
* Trading days per year	355										
** Discount rate	4%										
	Repayment	19 semi annual 400000		interest 1.25%							
	Balloon	3600000									

4.4.2 Investment in an Aframax Crude-Oil Tanker in 2008

The second project that is examined and evaluated is financing the acquisition of a newbulding Aframax crude-oil tanker of 116000 DWT during 2008. According to Clarksons, buying a 115000 DWT Aframax tanker in 2008 costed $76.92 million.

The loan facility was up to 65% of the market value of the vessel or up to $50 million. The rest $25 million would come from the cash deposits or the retained earnings of the company. The margin (interest) of the loan was 0.80% at the time, while LIBOR was 1.36%. The repayment of the loan would be in 40 consecutive quarterly installments of $800000 each. In other words the length of the repayment would be 10 years. The balloon installment according to the loan agreement is $18 million paid together with the last installment.

Table 6: Data used for Newbuilding Aframax investment evaluation

Year	Time charter rate $/day	Operating cost $/day	LIBOR
2009	19,375	7,795	1.36%
2010	16,604	7,790	1.30%
2011	14,745	7,780	1.30%
2012	12,995	7,775	1.32%
2013	14,518	7,774	1.33%
2014	14,200	7,780	1.34%
2015	14,900	7,782	1.37%
2016	15,900	7,795	1.42%
2017	17,000	7,800	1.50%
2018	18,000	7,810	1.58%

Table 7:10 year Investment in a Handysize bulk carrier

Aframax 115K - 2008											
	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Ship purchase/sale	26,920,000.0										13460000
Time charter rate/day ($ per day)		19,375	16,604	14,745	12,995	14,518	14,200	14,900	15,900	17,000	18,000
Earnings p.a.*		6,878,125.000	5,894,339.623	5,234,543.269	4,613,293.269	5,153,839.286	5,041,000.000	5,289,500.000	5,644,500.000	6,035,000.000	6,390,000.000
Operating costs ($ per day)		7,795	7,790	7,780	7,775	7,774	7,780	7,782	7,795	7,800	7,810
Operating cost p.a.		2,845,175.000	2,843,350.000	2,839,700.000	2,837,875.000	2,837,510.000	2,839,700.000	2,840,430.000	2,845,175.000	2,847,000.000	2,850,650.000
Margin		0.80%	0.80%	0.80%	0.80%	0.80%	0.80%	0.80%	0.80%	0.80%	0.80%
LIBOR		1.36%	1.30%	1.30%	1.32%	1.33%	1.34%	1.37%	1.42%	1.50%	1.58%
Repayment		3,269,120.000	3,267,200.000	3,267,200.000	3,267,840.000	3,268,160.000	3,268,480.000	3,269,440.000	3,271,040.000	3,273,600.000	21,704,560.000
Net Cashflows	-26,920,000.0	763,830.000	-216,210.377	-872,356.731	-1,492,421.731	-951,830.714	-1,067,180.000	-820,370.000	-471,715.000	-85,600.000	-18,165,210.000
Cumulative cashflows	-26,920,000.0	-26,156,170.000	-26,372,380.377	-27,244,737.108	-28,737,158.839	-29,688,989.553	-30,756,169.553	-31,576,539.553	-32,048,254.553	-32,133,854.553	-50,299,064.553
Payback	0	1	2	3	4	5	6	7	8	9	10
Discounted cash flows		734,451.923	-199,898.648	-775,521.957	-1,275,728.350	-782,335.465	-843,407.856	-623,413.776	-344,677.530	-60,141.425	-12,271,764.995
Discounted cumulative cash f	-16,442,438										
NPV**	-43,362,438.079										
IRR											
* Trading days per year	355										
** Discount rate	4%										
	Repayment	40 quarterly 800000		interest 0.80%							
	Balloon	18000000									

4.4.3 Results of the case study

We can now see from the evaluation of these two investments by using NPV and IRR. The first project, the investment in a Handysize bulk carrier in 2003 turns out to show NPV $18.142m and IRR 81%. In contradiction to that, the investment in a Aframax vessel in 2008 turns out to have negative NPV -$43.362m and IRR could not be calculated due to this negative result.

Comparing these two projects, we can say that the first project in 2003 was successful and financially viable. The acquisition of this vessel produced a lot of profit for the shipowner and according to the NPV and IRR calculations this investment was much more preferable than depositing this money in the bank or other similar capital investment methods. However, the second project in 2008 had the opposite result. The project of 2008 produced loss for the owner and there is a case that it also produced loss for the bank. However this depends on the terms of the loan agreement and in the securities and covenants taken. For example the Value to Loan Ratio in this loan

agreement is 125%. After the collapse of the market in 2008, there was also collapse of the vessel value. The owner would have to prepay to the bank the proper amount in order for the ratio to return to 125%.

Both of these projects' results can be explained by the volatility of the shipping market. Looking at the project of 2003, the owner who decided to build the Handy bulk carrier and get a 10 year period loan was favored by the upside of the market in 2008. It is the ideal situation for an owner the fact that in 2007 and 2008 freight rates were almost doubled while operating and capital costs remained at the same levels. On the other hand, the owner that decided to make the investment in 2008, when market was at the peak made big losses due to the collapse of the market in August of 2008. Freight rate and earnings collapsed. The calculation for the loan was made according to the 2008 levels of earning. In the same time also the vessel was depreciated. But capital and operating costs remain the same. That is the reason why this loan was not proved to be financially viable.

Chapter 5 Conclusion

This research paper was a look at the nowadays shipping finance situation. Bank lending is the traditional way of financing the shipping industry. However bank portfolios for Greek shipping have decreased around 10% during the period 2008 to 2012. At the same period the number of banks lending money to Greek shipowners has increased to 51 from 40 during 2008. Syndicated lending is one very important aspect of bank lending to shipping. By syndicated lending banks can achieve less exposure to risk, as the risk is shared between the cooperating banks, but also service fees for the lending banks are less. In the same time there is more capital adequacy through syndication. In table 1 it is shown that syndicated lending increased 12% from 2011 to 2012. DNB, Nordea and Citibank are the banks with the biggest syndicated shipping portfolios.

Some very important characteristic of the bank loans are the securities taken for the loan, like the mortgage, the retention account or the charter party (employment) assignment. Securities is the element of bank lending that can reduce the risk exposure for a bank, but in the same time can make a loan easier or more difficult to bear for a shipping company during the harsh times that shipping market is low. Except the securities, there are also the covenants and the warranties that have similar effects. It is worth mentioning that financing for owners nowadays is more difficult than it was during 2008 when banks were requiring fewer securities, while larger portion of the market value of a vessel could be financed by a bank than in today's market.

Except traditional bank lending there are also alternative ways of financing shipping. For example private equity funds, like KG funds or like US Pension Funds, can provide financing to shipping companies especially during periods that bank lending is difficult

or is not favorable for shipowners. However the disadvantage of private equity funds is that higher returns are required from shipowners. Another alternative is Islamic banking, with its own rules and principles, especially recently that pricewise it is becoming more and more competitive compared to bank lending.

Chinese ship finance is also an alternative that according to recent data is becoming constantly more popular amongst shipowners, especially if it is taken into account the fact that Chinese ship lending has increased around 40% during the period 2010-2012. Four Chinese banks are included in the list of the banks with the biggest market capitalization. Greek shipping companies, especially the well-known ones have secured Chinese financing of around $1.5-2bn until now. Chinese banks and Chinese shipyards are cooperating under the umbrella of the government in order to bring more foreign owners who want to build new vessels in China. China the last years is globally on top of shipbuilding both in number of vessels and tonnage capacity. Although numbers are already the highest compared to other countries' shipbuilding activity, it should be noted that if some currency policies and some shipping legislation change, Chinese ship finance and shipbuilding can develop even more.

Leasing, Sale and Leaseback or Bareboat chartering is as always an option for a shipowner. Leasing has some advantages like the fact that percentage of finance can be up to 100% and that every transaction is off balance sheet. Its main disadvantage is that for a shipping company it is more costly than getting financed by a bank, while there is no exit scenario, as it is strongly binding and legally very complicated to cancel. Another side of ship finance is risk hedging and derivatives. Options and FFAs can be the solution against the great volatility the performance of shipping markets constantly show. One distinctive characteristic that shipping derivatives have is the fact that when they are traded they pass through clearing houses. This dramatically increases the counterparty risk of bankruptcy mainly during crisis times.

This research paper's main topic was bank lending and the research was done starting with the sorting and analysis of 101 loan agreements on Excel sheet. After that average and correlation coefficient formulas were used. The first finding of this analysis is that

the margin required by the bank to lend money has reached 4.28%, while during 2008 it was just 1.00%. The second finding was that the average margin required by the bank for providing ship loans and the performance of the shipping markets (BDI) are anti-correlated. Correlation between these two sets of data through the years 2003-2012 equals -0.78, which means that the better the performance of shipping market and shipping indexes, the lower the interest a bank applies to the money lent. Something else observed during that research is that there is also anti-correlation relationship between average newbuilding bulk/ tanker vessel prices and average margin. The correlation between average margin and newbuilding price index came out to be -0.52 for bulk carriers and -0.58 for tankers. This means that prices of vessels move together with the BDI and the tanker indexes, however there are also other factors that configure newbuilding prices except the changes of indexes. Another conclusion extracted by the research made was the fact that value to loan ratio doesn't change much during the years, except 2011 that market was in a very bad condition and bank requirements were very high concerning maintenance of V/L ratio (139%). The lowest V/L ratio was observed during 2012 (124%). The correlation of V/L ratio was only 0.25 with BDI, due to the fact that BDI is fluctuating while V/L ratio is in average around 127%. Finally the last finding of this loan agreements analysis is that anti-correlation between 8year $10 m LIBOR and average margin is relatively high. Its value is -0.71. This can be explained that LIBOR is a policy making interest. When market is very low and bad and margin is high LIBOR is low in order to be easier for shipowners to get financed and development to come, while when market is high LIBOR is also high in order to avoid overheating.

After this analysis of the loan agreements there was a case study analysis. Two investments on newbuilding vessels were evaluated. One was for a Handysize bulk carrier in 2003 and one for an Aframax tanker in 2008. For both investments' evaluation NPV and IRR formulas were used. The results showed that the investment done in 2003 was financially viable and successful with NPV $18.142m and IRR 81%. Opposite to the latter, the one done in 2008 was characterized by big losses and it should preferably not be done. NPV came out to be $-43.362 m. The reason for this is that the shipowner who decided to invest on a 10 year term loan in 2003 took advantage of the

upward of the market (2007-2008), as during 2003 market was still relatively low and the calculations for the loan were done according to the 2003 situation with the upward creating profit. In the other hand the 2008 investment failed due to the collapse of the market. The second problem is that vessel's values fell after 2008 together with BDI. So the shipping company would have no exit scenario, like selling without making losses. In the same time cash reserves would vanish through securities like cash retention account and cash injections for maintaining value to loan ratio.

The main finding of this paper is that timing in shipping is one of the most important factors for surviving and even dominating the industry. "Asset play" is equally important to financial health of a company as effective and cost-controlled operations. Greek shipowners are a good example through the years. Growing or renewing the fleet while market is at very low levels and taking advantage of the strong fleet when the market returns to high or even normal levels. Taking advantage by selling vessels at a price that is considerably higher than their acquisition cost. Or otherwise turn the larger and newer fleet into account by securing easier charter for the vessels. Charterers always prefer younger and technologically more advanced vessels as they have lower maintenance and insurance cost. Both the data analysis and the case study came to the result that when BDI, Tanker, Gas and Container Indexes are very low it is the right time to make an investment. It is only matter if there is capital to invest and to bear the maintenance costs until the market recovers. Surviving now is not easy, but the ones that sold their fleet in 2008 making huge profits and at the same time cut costs effectively will get out of the crisis favored by it. Liquidity is king at times like today. Shipbuilding and especially Chinese yards are getting busy again as it is believed that prices of vessels will not get any lower and shipowners with cash reserves are trying to capitalize this fact. Making an investment now is of less risk for both owners and financial institutions. Volatility and high risk are two of the characteristics that make shipping industry so interesting and fortuitous, difficult to survive but with high returns for the winners.

Bibliography

Amir, A. (2013). Trading volume and volatility in the shipping forward freight market. *Transportation Research Part E*, 250-265.

Asia, L. L. (2013, February 1). Islamic finance is not just for Muslims. *Lloyd's List*.

Belbas, D. (2012). Exploring the global ship-financing outlook. *4th Mare Forum Indonesia 2012*, (pp. 1-32).

Berg, E. v. (2012, July 19). Diana containership to raise around $50m on stock market to buy new ships. *Looyds List*.

Berkenkopf, K. (2012, November 2). Can HSH Nordbank hold its nerve? *Lloyds list*.

Erdogan, T. K. (2012). Dynamics of the co-movement between stock and maritime markets. *International Review of Economics and Finance 25*, pp. 282-290.

Grammenos, C., & Arkoulis, A. (2002). Macroeconomic factors and international shipping stock returns. *International Journal of Maritime Economics*, pp. 81-99.

Helen, T. (2007). Maritime Transport: The Greek Paradigm: Chapter 2: A fleet for the 21st century: Moderng Greek Shipping. *Research in Transportation Economics Vol. 21*, pp. 23-61.

Joshi, R. (2012, June 9). Freight markets cast pall on public equity markets. *Lloyds List*.

Kavoussanos. (1997). The dynamics of time-varying volatilities in different size second-hand of the dry-cargo sector. *Maritime Economics and Logistics*.

Kavoussanos. (2002). Business risk measurement and management in the cargo carrying sector of the shipping industry. In Grammenos, *The handbook of maritime economics and business* (pp. 661-692). London: LLP Publications.

Kavoussanos, & Visvikis. (2011). *Theory and Practice of Shipping Freight Derivatives.* London: Risk Books.

Kavoussanos, Juell-Skielse, & Forest. (2003). International comparison of market risks across shipping related industries. *Maritime Policy and Management*, 107-122.

Lagoudis, T. (2007). The Greek Paradigm: Chapter 4: The competitive advantage in the Greek shipping industry. *Research in Transportation Economics Vol.21*, pp. 95-120.

Law, T. G. (2012). *Techniques and Instruments of Ship Finance.* World Maritime University.

Leander, T. (2013, March 26). Chinese leasing companies offer new, longer-term

Lloyd's List.

Lin, M. T. (2012, October 29). Asian players move into ship leasing . *Lloyds List*.

Lin, M. T. (2013, February 25). Cexim stands by $3bn ship finance target for 2013 despite credit risks. *Lloyd's List*.

Lloyds List Group. (2011, 7). Squeezed from all sides. *Lloyds Shipping Economist*, pp. 4-6.

Lloyds List Group. (2011, 12). The search for finance. *Lloyds Shipping Economist*, pp. 5-6.

Lowry, N. (2012, July 5). Banks continue to push up ship finance pricing. *Lloyds List*.

Lowry, N. (2012, October 22). Credit Agricole to keep majority of Greek portfolio despite sale. *Lloyds List*.

Lowry, N. (2012, October 4). Emporiki shipping loans may stay with French parent. *Lloyds list*.

Lowry, N. (2012, May 7). European banks shrink shipping portfolio by 3.5%. *Lloyds List*.

Lowry, N. (2012, February 2). Greek banks provide a quarter of the shipping loan book. *Lloyds List*.

Lowry, N. (2012, April 26). Greek owners suffer fall in financing. *Lloyds List*.

Lowry, N. (2012, May 28). More banks involved despite lending dearth. *Lloyds List*.

Lowry, N. (2012, October 11). Time is running out for some loans. *Lloyds List*.

Lowry, N. (2013, January 22). Petropoulos urges banks to tread carefully with owners. *Lloyds List*.

MacAulay, A. C., Bradshaw, D. R., & Young, D. A. (2011). *Ship finance in China: key developments and challenges.* Shanghai: Mayer Brown.

Masson, P. (2007). The Growing Role of the Euro in Emerging Market Finance. *The World Bank Development Prospects Group*.

McMahon, L. (2012, October 18). Is private equity an answer to funding woes or a wolf in sheep's clothing? *Lloyds List*.

Osler, D. (2012, April 17). Aegean Baltic provides new loans with the strings attached.

Lloyds List.

Osler, D. (2012, June 7). Europe's banking crisis could help shipping, says Ted Petropoulos. *Lloyds List*.

Osler, D. (2013, February 22). Bye-bye bankers? *Lloyds List*.

Osler, D. (2013, February 15). China consolidates as a global financier. *Lloyd's List*.

Osler, D. (2013, February 8). Credit Agricole hangs on to $1.4bn Emporiki shipping loans. *Lloyds List*.

Osler, D. (2013, January 21). DNB retains cautious lending criteria. *Lloyds list*.

Osler, D. (2013, April 4). Third KG house casualty. *Lloyd's List*.

Petrofin S.A. (2003). *Key Developments and Growth in Greek Ship Finance (End of 2002).* Athens, Greece.

Petrofin S.A. (2004). *Key Developments and Growth in Greek Ship Finance (End of 2003).* Athens, Greece.

Petrofin S.A. (2005). *Key Developments and Gowth in Greek Ship Finance (End of 2004).* Athens, Greece.

Petrofin S.A. (2006). *Key Developments and Growth in Greek Ship Finance (End of 2005).* Athens, Greece.

Petrofin S.A. (2007). *Key Developments and Growth in Greek Ship Finance (End of 2006).* Athens, Greece.

Petrofin S.A. (2008). *Key Developments and Growth in Greek Ship Finance (End of 2007).* Athens, Greece.

Petrofin S.A. (2009). *Key Developments and Growth in Greek Ship Finance (End of 2008).* Athens, Greece.

Petrofin S.A. (2010). *Key Developments and Growth in Greek Ship Finance (End of 2009).* Athens, Greece.

Petrofin S.A. (2011). *Key Developments and Growth in Greek Ship Finance (End of 2010).* Athens, Greece.

Petrofin S.A. (2012). *Key Developments and Growth in Greek Ship Finance (End of 2011).* Athens, Greece.

Price, E. (2012, June 13). What the eurozone crisis means for ship finance. *Lloyds List*.

Shackleton, V. (2012, 10). Hedging efficiency in the Greek options market before and after the financial crisis of 2008. *Journal of Multinational Financial Management*.

Stokes, P. (1997). *Ship finance: Credit expansion and the boom-bust cycle.* London: LLP Publications.

Syriopoulos, T. (2007). The Greek Paradigm, Chapter 6, Financing Greek Shipping, Modern Instruments, Methods and Markets. *Research in Transportation Economics, Vol.21*, pp. 171-219.

Theotokas, I. (2007). The Greek Paradigm, Chapter 3, On Top of World Shipping: Greek Shipping Companies' Organization and Management. *Research in Transportation Economics vol.21*, pp. 63-93.

Tsimplakis, A. (2013, April 6). China prepares rebuilding of shipbuilding industry. *Naftemporiki*.

Wackett, M. (2013, April 18). Smaller owners may struggle to secure ship mortgages. *Lloyd's List*.

Wikipedia. (n.d.). *Islamic Finance*.

Wikipedia. (n.d.). *Private equity fund*.

Yang, J. (2013, April 3). Beijing rolls out three-year shipbuilding boost. *Lloyd's List*.