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**Important Factors for Shipping Companies in Raising Funds in the  
Equity and High Yield Bond Public Capital Markets**

by

Angelos George Arkoulis

in partial fulfilment of the requirements

for the Degree of

PhD in Finance

City University Business School  
Department of Shipping, Trade and Finance  
London  
November, 2001

*In Memory of my Father,*  
*Giorgos Arkoulis*

# **TABLE OF CONTENTS**

	Page
LIST OF TABLES	vi
LIST OF FIGURES	ix
LIST OF ABBREVIATIONS	x
LIST OF SYMBOLS	xi
ACKNOWLEDGEMENTS	xiii
DECLARATION	xiv
ABSTRACT	xv
<b><i>Chapter 1: Thesis Overview</i></b>	
1.1 Aim of the Thesis	1
1.2 Thesis Structure	4
1.3 Supply and Demand in the Shipping Markets	7
1.3.1 The Demand for Sea Transport	8
1.3.2 The Supply for Sea Transport	10
1.4 Cyclicity and the Shipping Investment Cycle	12
1.5 Developments in Shipping Finance	16
1.6 Limited Life Shipping Companies (Shipping Funds)	23
1.7 International Regulations in Shipping	25
1.7.1 The Oil Pollution Act (1990)	26
1.7.2 The International Safety Management Code (1998)	29
1.8 The Pecking Order Theory of the Capital Structure	33
1.9 Equity Public Offerings	36
1.10 High Yield Bond Offerings	39
1.11 High Yield Bond Defaults and Restructuring Options	41
1.12 The Role of the Underwriter in Equity Offerings	44
1.13 The Role of the Underwriter in High Yield Bond Offerings	46
1.14 Major Findings of the Thesis	47
1.14.1 Paper 1: The Long Run Performance of Shipping Initial Public Offerings	51
1.14.2 Paper 2: Macroeconomic Factors and International Shipping Stock Returns	56

1.14.3	Paper 3: Determinants of Spreads on New High Yield Bonds in the Shipping Industry	59
1.15	Conclusion and Academic Contribution of the Thesis	64
1.16	Usefulness of the Thesis Findings	67
1.16.1	Usefulness and Implications of the Findings for Shipping Companies	68
1.16.2	Usefulness and Implications of the Findings for Investors and Portfolio Managers	70
1.16.3	Usefulness and Implications of the Findings for Investment Banks	72
1.17	Thesis Limitations and Suggestions for Future Research	73
1.18	References	75

***Chapter 2: Paper 1: “The Long Run Performance of Shipping Initial Public Offerings”***

2.1	Introduction	84
2.2	Data and Methodology	90
2.3	Results and Discussion	98
2.4	Summary and Conclusions	112
2.5	References	116

***Chapter 3: Paper 2: “Macroeconomic Factors and International Shipping Stock Returns”***

3.1	Introduction	133
3.2	Theory/Methodology	137
3.3	Data	146
3.4	Empirical Tests and Results	150
3.5	Conclusions	154
3.6	References	156

***Chapter 4: Paper 3: “Determinants of Spreads on New High Yield Bonds in the Shipping Industry”***

4.1	Introduction	168
4.2	Data and Methodology	172

4.3	Initial Discussion	184
4.4	Regression Analysis	189
4.5	Conclusions	194
4.6	References	197

## **LIST OF TABLES**

### ***Chapter 1:***

Table 1.1A	Major Findings of Paper 1 presented in the Thesis. “The Long Run Performance of Shipping Initial Public Offerings”	48
Table 1.1B	Major Findings of Paper 2 presented in the Thesis. “Macroeconomic Factors and International Shipping Stock Returns”	49
Table 1.1C	Major Findings of Paper 3 presented in the Thesis. “Determinants of Spreads on New High Yield Bonds in the Shipping Industry”	50
Table 1.2	Important Factors in Equity and High Yield Capital Markets for Shipping Companies	66

### ***Chapter 2:***

Table 2.1	Sample Descriptive Statistics	121
Table 2.2	Cumulative Average Adjusted Returns for Shipping Initial Public Offerings, 1987-1995. Excluding Initial Returns	122
Table 2.3	Long Run Performance by Year of Issuance for Shipping Initial Public Offerings, 1987-1995. Excluding Initial Returns	123
Table 2.4	Long Run Performance by First Day Return Categories for Shipping Initial Public Offerings, 1987-1995. Excluding Initial Returns	124
Table 2.5	Long Run Performance by Country for Shipping Initial Public Offerings, 1987-1995. Excluding Initial Returns	125
Table 2.6	Long Run Performance by Proportion of Equity Offered for Shipping Initial Public Offerings, 1987-1995. Excluding Initial Returns	126



Table 2.7	Long Run Performance by Fleet Composition for Shipping Initial Public Offerings, 1987-1995. Excluding Initial Returns	127
Table 2.8	Long Run Performance by Fleet Age for Shipping Initial Public Offerings, 1987-1995. Excluding Initial Returns	128
Table 2.9	Long Run Performance by Initial Gearing Level for Shipping Initial Public Offerings, 1987-1995. Excluding Initial Returns	129
Table 2.10	Regression Results	130
Appendix 2.1	Shipping IPOs by Country and Year of Issuance	131
 <b>Chapter 3:</b>		
Table 3.1	Summary Statistics and First Order Augmented Unit Root Tests	161
Table 3.2	Autocorrelations of the Monthly Macroeconomic Series	162
Table 3.3	'Best' ARMA Models	163
Table 3.4	Correlation Matrix of the World Risk Factors	164
Table 3.5	Regressions of $R_i - R_f = f(WdRET, UdG10FX, UTLP, UdOIL, UdG7IP, LAYUP)$ for the Returns of 38 Shipping Companies, for the Period January 1990 – February 1998	165
Table 3.6	Regressions of $R_i - R_f = f(WdRET, UdG10FX, UTLP, UdOIL, UdG7IP, LAYUP)$ for each Country, for the Period January 1990 – February 1998	166
 <b>Chapter 4:</b>		
Table 4.1	Descriptions of Test Variables	203
Table 4.2	Comparison of Moody's and Standard and Poor's Rating Scales	204
Table 4.3	Characteristics of Shipping High Yield Bond Offerings by Year of Issue (1993-1998)	205
Table 4.4	Shipping High Yield Bond Offerings by Rating Category (Moody's), 1993-1998	206

Table 4.5	Shipping High Yield Bond Offerings categorised by Float, Term, Security, 144A Status and Callability, 1993-1998	207
Table 4.6	Shipping High Yield Bond Offerings categorised by Gearing and Fleet Age, 1993-1998	208
Table 4.7	Univariate Regression Models for New Issue Spread of Shipping High Yield Bonds, 1993-1998	209
Table 4.8	Multivariate Regression Model for New Issue Spread of Shipping High Yield Bonds, 1993-1998	210
Appendix 4.1	Shipping High Yield Bond Issues, 1993-1998	211

# **LIST OF FIGURES**

## ***Chapter 1:***

Figure 1.1	Stages in Fluctuations	14
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## **LIST OF ABBREVIATIONS**

<b>AIC:</b>	<b>Akaike Information Criterion</b>
<b>AMEX:</b>	<b>American Stock Exchange</b>
<b>APT:</b>	<b>Arbitrage Pricing Theory</b>
<b>ARMA:</b>	<b>Autoregressive Moving Average Models</b>
<b>BIS:</b>	<b>Bank for International Settlements</b>
<b>CAPM:</b>	<b>Capital Asset Pricing Model</b>
<b>CAR:</b>	<b>Cumulative Average Adjusted Return</b>
<b>DOC:</b>	<b>Document of Compliance</b>
<b>dwt:</b>	<b>Deadweight Tons</b>
<b>grt:</b>	<b>Gross Registered Tons</b>
<b>IAME:</b>	<b>International Association of Maritime Economists</b>
<b>IMO:</b>	<b>International Management Organisation</b>
<b>IPOs:</b>	<b>Initial Public Offerings</b>
<b>ISM Code:</b>	<b>The International Safety Management Code</b>
<b>MLSQ:</b>	<b>Multivariate Least Squares</b>
<b>MSCI:</b>	<b>Morgan Stanley Capital International</b>
<b>NYSE:</b>	<b>New York Stock Exchange</b>
<b>OECD:</b>	<b>Organisation for Economic Co-operation and Development</b>
<b>OLS:</b>	<b>Ordinary Least Squares</b>
<b>OPA90:</b>	<b>Oil Pollution Act 1990</b>
<b>P&amp;I:</b>	<b>Protection and Indemnity</b>
<b>PORTAL:</b>	<b>Private Offerings Resale and Trading through Automated Linkages</b>
<b>QIB:</b>	<b>Qualified Institutional Buyers</b>
<b>SBIC:</b>	<b>Schwarz Bayes Information Criterion</b>
<b>SEC:</b>	<b>Securities Exchange Commission</b>
<b>SMS:</b>	<b>Safety Management System</b>
<b>SMC:</b>	<b>Safety Management Certificate</b>
<b>SOLAS:</b>	<b>Safety Of Life At Sea</b>
<b>SUR:</b>	<b>Seemingly Unrelated Regression</b>

## **LIST OF SYMBOLS**

<b>%EO:</b>	Percentage of Equity Offered to the Public
<b>ADF:</b>	Augmented Dickey Fuller
<b>AIC:</b>	Akaike Information Criterion
<b><math>ar_{i,1}</math>:</b>	First Month Adjusted Return
<b><math>ar_{i,t}</math>:</b>	Abnormal Return for IPO $i$ , for Month $t$
<b>ARMA:</b>	Autoregressive Moving Average Models
<b><math>AR_t</math>:</b>	Average Adjusted Return
<b>CAR:</b>	Cumulative Average Adjusted Return
<b>cov:</b>	First Order Autocovariance of the $AR_t$ Series
<b>HPR:</b>	Holding Period Return
<b>INRET:</b>	First Day Returns
<b>LAYUP:</b>	Changes in Laid Up Tonnage
<b>MLSQ:</b>	Multivariate Least Squares
<b>OLS:</b>	Ordinary Least Squares
<b>OP:</b>	Offering Price
<b><math>P_1</math>:</b>	Closing Price on the First Trading Day
<b>PI:</b>	World Equity Index Value
<b><math>R_f</math>:</b>	Risk Free Interest Rate
<b><math>r_{i,1}</math>:</b>	Realised Return from the Close of the First Trading Day to the Last Calendar Day of the First Trading Month
<b><math>r_{i,t}</math>:</b>	Raw Return for IPO $i$ , for Month $t$
<b><math>r_{m,1}</math>:</b>	Realised Benchmark Return from the Close of the First Trading Day to the Last Calendar Day of the First Trading Month
<b><math>r_{m,t}</math>:</b>	Benchmark Return for IPO $i$ , for Month $t$
<b>SBIC:</b>	Schwarz Bayes Information Criterion
<b>SUR:</b>	Seemingly Unrelated Regression
<b>UdG10FX:</b>	Unexpected Component of a Global Aggregate Measure of US Dollar Exchange Rates
<b>UdG7IP:</b>	Unexpected Changes in Global Industrial Production
<b>UdOIL:</b>	Unexpected Changes in Oil Prices
<b>USTB<sub>t</sub>:</b>	One Month US Treasury Bill Rate
<b>UTLP:</b>	Unexpected Changes in Global Aggregate Inflation

var: Average Cross Sectional Variance, over 24 Months  
WR: Wealth Relative  
WdRET: Return on the MSCI World Equity Index

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## **DECLARATION**

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## **ABSTRACT**

This thesis attempts to identify factors that are important for shipping companies in tapping the capital markets for finance, either to raise equity or to issue debt in the high yield bond market. The analysis is carried out through the presentation of three research papers.

The first paper presents evidence for the first time on the aftermarket performance of 27 initial public offerings (IPOs) of common stock in the shipping industry worldwide, for the period 1987-1995. The portfolio of shipping IPOs in the sample underperforms the local stock market indices by as much as 36.79% by the end of their second anniversary of trading, but there is no evidence of underperformance in relation to the Morgan Stanley Capital International Shipping Index. Moreover, univariate regression analysis shows that two year holding period returns are positively related to the initial level of gearing and negatively related to the fleet age of the companies at the time of the offering.

The second paper examines for the first time the relationships between a prespecified set of global macroeconomic risk variables and shipping stock returns internationally. The sample consists of 36 companies that are listed in 10 stock exchanges around the world and the analysis concentrates in the period December 1989 - March 1998. The macroeconomic factors included in the analysis are the returns on the world equity market portfolio, and innovations in a prespecified set of global macro variables, namely, industrial production, inflation, oil prices, US dollar exchange rates, and laid up tonnage. Oil prices and laid up tonnage are found to have a negative effect on shipping stocks, whereas the exchange rate variable has a positive effect. In addition, it is found that, in general, the effects of macroeconomic factors exhibit a consistent pattern in the way in which they affect the shipping industry, across countries.

The third paper examines for the first time the primary pricing of shipping high yield bonds. This is performed by testing for the relationships between the following factors and the new issue spread of 30 high yield bond offerings issued by shipping companies in the US market, during the period 1993-1998: rating, callability, term, float, default rate, security status, 144A status, gearing, laid up tonnage and fleet age. Findings of the paper are that shipping high yield bonds carry wider spreads, the lower the rating of their issue, the higher their gearing levels, and the higher the laid up tonnage for the two months preceding the issue. Moreover, there is a statistically significant increase in explanatory power arising from the inclusion of gearing and laid up tonnage in the estimation, suggesting that rating agencies have not fully incorporated the potential effects of these variables, as credit risk factors.

# Chapter 1: Thesis Overview

## 1.1 Aim of the Thesis

The aim of this thesis is to identify factors – based on the general finance literature and the interaction of demand and supply in the shipping markets – that are important for shipping companies when entering the capital markets to raise equity finance or issue debt in the high yield bond market.

Shipping is a dynamic international industry with a major role in economic development. The important link of shipping to the world economy has been highlighted almost 200 years ago. Adam Smith, often regarded as the father of modern economics, viewed shipping as one of the stepping stones to economic growth. In his book *The Wealth of Nations*<sup>1</sup> he argued:

As by means of water carriage a more extensive market is opened to every sort of industry than what land carriage alone can afford it, so it is upon the sea-coast, and along the banks of navigable rivers, that industry of every kind naturally begins to subdivide and improve itself, and it is frequently not until a long time after that those improvements extend themselves to the inland parts of the country..... since such therefore, are the advantages of water carriage, it is natural that the first improvements of art and industry should be made where this

---

<sup>1</sup> Smith [1776] (1983), p.122.

conveniency opens the whole world to a market for the produce of every sort of labour.

Since Smith wrote these words in 1776, shipping has developed into an integral industry and an important component of the world economy through its contribution to international trade. Stopford (1997) regards the story of the shipping industry since the 19<sup>th</sup> century as “one of ingenuity, professionalism, fabulous profits and some disastrous miscalculations”. It involves the creation of superstars like Onassis and Niarchos, but also some miscalculations such as the placed orders for over 100 million deadweight tons of supertankers in 1973, for which demand never materialised (Fearnleys, 1973).

In addition, the industry is to a large extent segmented depending on vessel sizes, vessel types, cargo types, area of operations and distances. In many cases, the conditions that govern operations in one shipping sector may not apply to another and each sector may react differently to supply and demand changes.

The world merchant fleet grew from 59 million gross tons in 1921 to over 553 million gross tons in 2000 (Shipping Statistics and Market Review, 2000). This growth has been followed by increasing vessel sizes and cargo carrying capacity. As a result, the initial capital investment required may not be covered completely by private equity and/or retained earnings. In addition, substantial capital is required for the replacement of the ageing fleet and the expansion of shipping companies worldwide (Peters, 1993); and for the increased concern for safety and the environment as emphasised by the regulatory changes in the industry (Grammenos and Choi, 1999).

Therefore, there is a pressing need for funds from less traditional shipping finance sources such as capital markets (Grammenos and Xilas, 1991).

Despite the significance of the shipping industry as a means of transportation, its prominent economic role in the world economy and the substantial amounts of finance required, academics have generally shied away from studying (1) the capital markets as a source of finance in the shipping sector; and (2) the industry and/or company related characteristics that can be crucial in the decision of shipping companies to raise capital either in the equity markets worldwide or in the high yield debt market in the US.

Such an analysis, however, would be of particular benefit to shipowners, investors (private and institutional), and investment bankers, as the uncovering of factors that may influence the raising of shipping finance in the equity and high yield capital markets can contribute towards sounder financing and investment decisions.

## **1.2 Thesis Structure**

Chapter 1 sets the scene before the presentation of the papers and enables the reader to comprehend the motivation behind the research of this thesis. The sole purpose of the chapter is to provide a theoretical background that constitutes the framework in the three research papers presented in the thesis. Thus, several aspects of the shipping markets are briefly examined. These are based on existing literature and include a number of features of the shipping industry that were omitted from the three papers, as they were not essential in their structure. In addition, the findings and usefulness of the research conducted in the papers are discussed.

The remainder of Chapter 1 provides an overview of several characteristics of the shipping markets (sections 1.3-1.4), a synopsis of the developments in shipping finance (sections 1.5-1.6) and an outline of the important regulatory changes in the shipping industry in the 1990s (section 1.7). Sections 1.8 to 1.13 deal with several aspects of the equity and high yield debt capital markets. More specifically, section 1.8 discusses briefly the pecking order theory of the capital structure, sections 1.9 and 1.10 outline the pros and cons of issuing equity and high yield debt, respectively, section 1.11 summarises the restructuring options for companies with defaulted high yield bonds, whereas sections 1.12 and 1.13 outline briefly the role of the underwriter for equity and high yield bond offerings, respectively. Having set the background, sections 1.14 to 1.17 focus on the research findings of the three papers presented in this thesis and their usefulness. In section 1.14 the research findings are presented and discussed. Section 1.15 offers some concluding remarks, highlighting the academic contribution of the thesis, while section 1.16 considers the usefulness of the thesis

findings for shipping companies, investors and portfolio managers, and investment banks. Finally, section 1.17 discusses the limitations of the thesis and provides some suggestions for further research.

The second chapter comprises of the first paper, entitled “The Long Run Performance of Shipping Initial Public Offerings”. The purpose of this study is to present evidence for the first time on the aftermarket performance of 27 initial public offerings (IPOs) of common stock in the shipping industry worldwide for the first two trading years, during the period 1987-1995. The companies are listed in seven stock exchanges internationally. Performance is measured against the local stock market indices and against the Morgan Stanley Capital International index for shipping equities. Three alternative performance measures are adopted. In addition, the paper examines the relationships of various factors with the aftermarket performance of new shipping equity offerings. These factors are gearing, fleet age, first day returns, the proportion of offered equity and fleet composition. Finally, performance in the aftermarket is also examined by year and country of issuance.

Chapter 3 consists of the second paper, entitled “Macroeconomic Factors and International Shipping Stock Returns”. The objective of this paper is to examine the relationships between a prespecified set of global macroeconomic risk variables and shipping stock returns internationally for the first time. The sample consists of 36 companies that are listed in ten stock exchanges around the world and the analysis concentrates in the period December 1989 - March 1998. The macroeconomic factors included in the analysis are the returns on the world equity market portfolio, global exchange rate fluctuations measured against the US Dollar, oil prices, inflation and

industrial production growth. Laid up tonnage, an industry specific factor, is also included in the analysis. Furthermore, the relationships between these global factors and shipping stock returns are examined across the countries in the analysis.

Chapter 4 includes the third paper, entitled “Determinants of Spreads on New High Yield Bonds in the Shipping Industry”. This paper concentrates on the US high yield bond market for shipping companies. It examines for the first time the characteristics of shipping high yield bonds and their primary pricing. This is carried out by testing for any relationships that may exist between a set of factors and the initial spread of 30 high yield offerings issued by shipping companies in the US market, during the period 1993-1998. The factors employed in the study are rating, callability, term (years to maturity), float (issue amount), default rate, security, 144A status, gearing, laid up tonnage and fleet age. The paper also examines the new issue spread of shipping high yield bond issues by year of issuance.

Paper 1 has been published in the International Journal of Maritime Economics, (Grammenos and Arkoulis, 1999) and an earlier version was presented at the International Association of Maritime Economists (IAME) Conference in London, in September 1997. Paper 2 has been accepted for publication in the same journal, subject to revision. The revised version is presented in this thesis. The third paper has also been accepted for publication in Transportation Research Part E: Logistics and Transportation Review.

### **1.3 Supply and Demand in the Shipping Markets**

The aim of this section is to discuss briefly the major forces that affect demand and supply in the shipping industry.

Freight rates – the most important income source for shipping companies – are determined by the interaction of demand for and supply of shipping services. Changes in demand and supply depend on the effects of changes in their determining factors (Metaxas, 1971).

Stopford (1997, p115) singles out ten important influences in the shipping markets, five affecting the demand and five affecting the supply of sea transport. The demand factors are the world economy, seaborne commodity trades, average haul, political events and transport costs, whereas the supply factors are the world fleet, fleet productivity, shipbuilding deliveries, scrapping and the freight rates.



### **1.3.1 The Demand for Sea Transport**

#### *World Economy*

The world economy is the most important single influence on ship demand. This close relationship is expected, since the world economy generates most of the demand for sea transport through the import of raw materials and the trade of manufactured products. Trends in the shipping markets, therefore, depend on developments in the world economy. Moreover, the similar timing of fluctuations in freight rates and world economy cycles has been documented (Isserlis, 1938). Three aspects of the world economy may cause changes in demand for sea transport. These are the business cycle, trade elasticity and the trade development cycle.

#### *Seaborne Commodity Trades*

Seaborne commodity trades influence shipping demand in the short term and long term. Short term changes are primarily caused by the seasonality of some trades such as agricultural products. Longer term demand changes depend on the economic characteristics of the industries that produce and consume the traded commodities. There are four types of long term changes: changes in the demand for the particular commodity, changes in the supply sources, relocation of processing and the shipper's transport policy (Stopford, 1997).

#### *Average Haul*

Average haul is the distance over which cargo is shipped. To take account of this distance effect, demand for sea transport is measured in terms of 'ton miles' which is

defined as the tonnage of cargo shipped multiplied by the average distance over which it is transported (Grammenos and Xilas, 1991).

An example of the effect on ship demand of changing the average haul is the closure of the Suez Canal that resulted in almost the double travel distance between Europe and the Arabian Gulf.

### *Political Events*

Political factors and unforeseen events also affect the demand for sea transport in the sense that when they occur they bring about a sudden and unexpected change in demand (Gripaios, 1959). Such examples include the Suez crisis, the Yom Kippur war, the Iran revolution in 1979 and the Gulf War in 1990.

### *Transport Costs*

Cost of sea transport is an important demand determinant. Cargo will be shipped from distant sources when the cost of reaching its destination stands at an acceptable level. According to a study by the European Economic Community in 1985, transport costs accounted for twenty per cent of the cost of dry bulk cargo delivered to countries within the Community (European Commission, 1985). Over the last century, the shipping community has managed to steadily reduce transport costs through improved efficiency, larger vessel sizes and effective organisation of the shipping operation.

### **1.3.2 The Supply for Sea Transport**

#### *World Fleet*

The physical size of the fleet in a particular time period depends on the physical fleet size of the previous time period, newbuildings, scrapping and losses, and vessel adjustments during the time period that can alter vessel size and carrying capacity on a permanent basis (Grammenos and Xilas, 1991). In the long run, the rate of fleet growth is determined by scrapping and deliveries, with a slow pace of adjustment to changes in the market.

#### *Fleet Productivity*

Fleet productivity is important in the determination of supply and is defined as the total ton miles of cargo shipments in the year divided by the deadweight fleet actively employed in carrying the cargo. Increasing productivity increases shipping supply since more cargo can be moved by the same number of ships, and it is equivalent to using a greater number of ships to move the same amount of cargo at a lower productivity level (Stopford, 1997).

Four main factors determine the productivity of a fleet of ships. These are speed, port time, deadweight utilisation and loaded days at sea.

#### *Shipbuilding Deliveries*

Shipbuilding production directly influences the level of output in the shipping markets and, hence, shipping supply. The delivery levels adjust to demand changes over a long period as the time lag between ordering and delivering a vessel is between one and

four years. Factors that influence shipbuilding prices are the market segmentation and vessel specification, market conditions, the second hand market, the availability of finance and terms and conditions in shipyards (Grammenos and Xilas, 1991).

### *Scrapping*

Scrapping is significant for the supply of sea transport, because it removes ships from the market. The balance between scrapped vessels and deliveries of new ships is crucial for the physical size of fleet. The main factors that determine the level of scrapping are vessel age, technical obsolescence, scrap prices and market conditions (McConville, 1999).

### *Freight Rates*

Freight rates also influence shipping supply in the sense that they motivate market participants to adjust capacity in the short term and to find ways of reducing their costs in the long term. When freight rates are at their peak no more vessels are available in the short run and the fleet operates at full capacity. Conversely, when freight rates are at low levels a large number of ships are laid up or being scrapped (Metaxas, 1971).

## 1.4 Cyclicality and The Shipping Investment Cycle

Cyclicality is an important characteristic of the shipping industry and as such it deserves particular attention. Freight rates behave in a cyclical manner causing a pattern of peaks and troughs. Changes in demand for and supply of shipping services cause these patterns, since it is their interaction that determines freight rates.

Cycles and their corresponding volatility play a major role in the shipping markets by determining the risk of shipping investment in an industry where there is great uncertainty about the future levels of vessel prices and cash flow income. The existence of cycles in the shipping industry has long been accepted as part of the business. In such an environment, the timing of the decision to buy, sell and charter ships is crucial (Stopford, 1997).

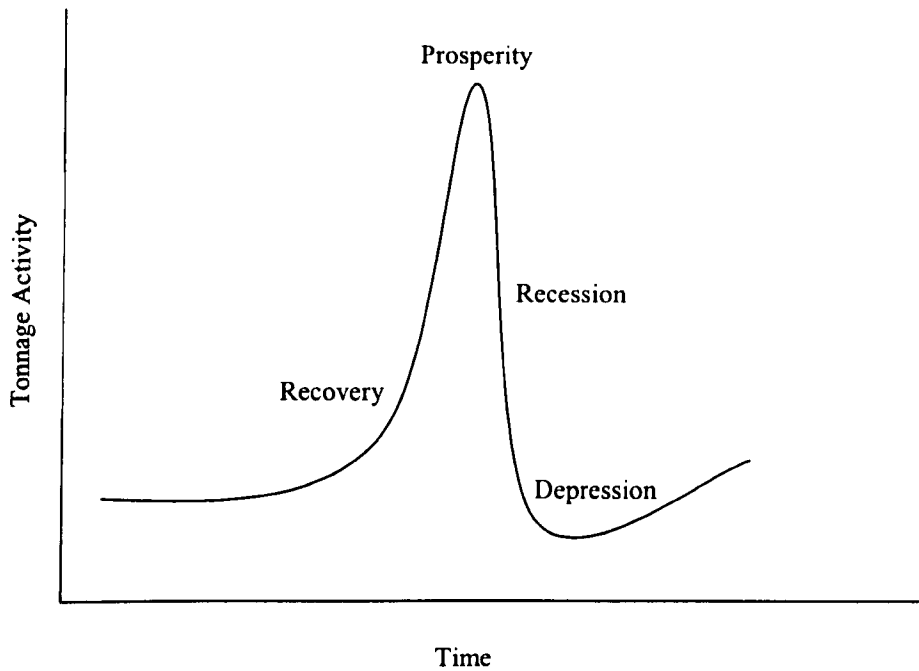
Shipping market cycles have been examined since the early twentieth century. Kirkaldy (1914) views the cycle as a consequence of the market mechanism in the sense that peaks and troughs are signs that the market is adjusting supply to demand by regulating cash flow. Fayle (1933) suggests that cycles are triggered by the world business cycle or random events such as wars that create vessel shortages. As a result, freight rates rise and shipping capacity is expanded as new investors enter the market. Fayle's perception of the cycle suggests a sequence of three events; a trade boom, a short shipping boom and a prolonged slump. Isserlis (1938) also commented on the connection of the shipping cycle and the world economy, by observing similar timing of fluctuations in freight rates and in world trade in the period 1872-1912.

Cufley (1972) focused on the sequence of three events in the cycle as well. Firstly, a shortage in vessel supply occurs, secondly freight rates rise and, thus, stimulate overordering of ships, leading to the third phase, market collapse and recession. Cufley also states that the prediction of the shipping cycle is impossible, because it is too irregular.

Hampton (1991) analyses short and long shipping cycles and stresses the important part played by market participants in the cycle and the way they respond to price signals received by the market. He also argued that market sentiment is important in determining the structure of cycles.

According to Metaxas (1971) fluctuations in the industry may be separated into four different stages with freight rates being the basic criterion in determining the different stages of the cycle. These are prosperity, recession, depression and recovery. The four stages of the shipping cycle are shown in Figure 1.1.

**Figure 1.1: Stages in Fluctuations**



In the stage of prosperity, that is taken as a starting point, freight rates are high and this results to high second hand prices as vessel acquisitions rise due to the positive market conditions, the existence of long term charters and the often liberal credit availability. In addition, the positive market sentiment leads to an increase in the level of newbuilding orders which, in turn, leads to high newbuilding prices and may often be accompanied by increased shipbuilding capacity. There is also a decrease in the number of laid up and scrapped vessels.

Increased vessel prices in the newbuilding and second hand markets lead to over investment and oversupply as newbuildings ordered in the prosperity period are delivered. As a result, freight rates start to fall and the industry enters the recession stage. Increased tonnage and the often reluctance of owners to lay up or scrap their

vessels further reduces freight rates and the depression period begins. Depression can be accentuated by possible continued credit availability and further newbuilding deliveries (Grammenos, 1979).

Recovery and the return to prosperity can take place only when the market oversupply is corrected and freight rates start to rise. This correction comes through increased scrapping and a reduced newbuilding orderbook and is often accompanied by stringent credit availability and reduced long term charters and shipbuilding capacity.

Thus, the shipping cycle is commonly viewed as a mechanism devoted to removing imbalances in the supply and demand of ships (Branch, 1981); and it is associated with the behavioural pattern of market players – shipowners, banks, shipyards, governments and charterers – to market conditions. In this context, therefore, it determines the levels of employment, governmental intervention, availability of finance, and investment in newbuildings, second hand vessels and scrappings.



## 1.5 Developments in Shipping Finance

Shipping is one of the world's most capital intensive industries. In the early 1990s the bulk shipping industry invested about \$20 billion each year on new and second hand vessel acquisitions (World Shipping Monitor, 1995). Therefore, capital payments can dominate the cash flow of shipping companies and financial strategy decisions are of utmost importance for the smooth running of shipping companies, their expansion and even their very existence.

Shipping companies, though, do not always satisfy the criteria of the financial community's requirements. Freight income and asset values fluctuate, and in several cases, financial structures lack transparency and audited financial information is not always readily available. This, coupled with the volatility in the shipping markets described in the previous section, may often create a negative perception to potential lenders and investors (Grammenos and Marcoulis, 1996). It has not been uncommon for ship values to gain or lose more than half of their value in a few months.

Paradoxically, however, shipping markets have suffered, on occasions, from too much finance. Liberal credit policies have created oversupply by encouraging a large newbuilding orderbook (Stokes, 1992, p.58).

An important development in shipping finance was the introduction of the steam ship in the 1850s and the registration of ships in the UK as sixty four shares that could be owned by individuals, partnerships or by investors in a joint stock enterprise<sup>2</sup>. At the

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<sup>2</sup> G. Atkinson (1854), 'The Shipping Laws of the British Empire', quoted in Palmer (1972), p.49.

time borrowing was not unusual. During the recession of 1904-11, however, many loans failed and as a result private equity became the main investment source until the 1950s (Sturmev, 1962).

In the 1950s there was an increasing interest on behalf of the banking community to finance the shipping markets, mainly confined to the tanker sector. Some banks – including Chase Manhattan Bank, Chemical Bank and Hambros Bank – became specialist banks for shipping, providing 60% of the value of an acquisition against a mortgage (Wijnolst and Wergeland, 1997).

The banking approach was conservative and the ‘cash flow’ financing to shipping was applied where repayment is based on cash flow generation.

Moreover, in the late 1950s, investment was concentrated on second hand vessel acquisitions by a number of young entrepreneurial shipowners who brought much needed equity into the shipping industry (Willingale, 1998). These new entrants came into the market in an attempt to buy ships cheaply and fix them on long term charters, so that banks are satisfied. With cash flow financing, banks felt more secure and were more flexible to their lending policies. This led to the first phase of bank shipping finance expansion that suffered, however, a temporary setback during the depressed markets (falling vessel earnings and prices) in the first half of the 1960s when a number of banks had undersecured non performing loans (Grammenos and Xilas, 1991).

The years 1967-1973 were significant for bank shipping finance. The world economy was enjoying very high growth levels, due to the rapid expansion of world trade and industrial development. This led to increasing demand for shipping services and, thus, shipping finance. In parallel, there was a trend of increasing vessel size that substantially increased the level of initial capital investment to levels beyond the capability of private equity as a major provider of shipping finance. These developments contributed to the second phase of bank shipping finance expansion. The shipping sector became a source of profitability and, thus, banks expanded their medium/long term asset portfolios, mainly by providing loans for the financing of vessel acquisitions in the second hand market. The industry was also attractive to them, because it offered opportunities for risk diversification and internationalisation (Grammenos and Xilas, 1991).

In general, the years 1967-1973, marked by the second closure of the Suez Canal, saw shipping as a glamour industry sector, resulting to the arrival of many new banks to the shipping scene, either individually or as part of bank syndicates. The majority of new banks, though, were without any prior shipping background and they lacked the necessary competence for asset evaluation.

This lack of expertise, together with the hardened competition between banks, resulted in a relaxation of loan conditions. Lending was often based on reputation and leading shipowners could acquire large finance sums, because of their established names. Financing limits were stretched to 100% or even 110% to cover working capital requirements. Credit facilities were to a large extent undersecured and granted with inadequate market research and insufficient analysis of existing charter quality.

Commercial bank finance also expanded in the newbuilding sector with top up finance being provided between vessel delivery price and other available forms of newbuilding finance such as 'soft' debt from governmental agencies.

The liberal bank credit policies, though, led to oversupply and proved disastrous for the shipping industry and the banks that provided finance. In addition, the first oil crisis in 1973 led to the collapse of the tanker market that was followed by a similar, less severe, fall in the dry bulk sector.

Freight rates declined sharply and, thus, the cash flow streams of shipping companies deteriorated to a great extent making debt servicing difficult and in many cases impossible. Numerous banks were left with undersecured problematic loans and the prospect of significant write offs. The crisis, however, was not fully appreciated by the banking community that continued to provide finance in the hope that adverse conditions would turn out to be purely a cyclical fluctuation, albeit of exceptional severity.

In 1976-77 a number of banks withdrew from the industry altogether and many members of the banking community reconsidered or established new shipping credit policies. Freight rates were, on average, not sufficient to cover running costs and by 1977 many shipowners were experiencing severe liquidity problems (Fearnleys, 1977).

This two-year period was followed by a market upturn in 1979 that was sustained through to the early months of 1981 (Wijnolst and Wergeland, 1997). The temporary

improving market conditions led some banks to firmly believe that the crisis was over. As a result, banks were again competing on cut-throat terms and the process of liberal credit build up, followed by plunging asset values and undersecured non performing loans was repeated through the mini boom, and led to oversupplied conditions and another market crisis in the first half of the 1980s (Stokes, 1992).

Problematic loans and past losses forced large parts of the banking sector to exert a credit squeeze in the industry, in ironic contrast to previous years. Sounder and more prudent credit policies were applied, together with thorough credit analyses. This was emphasised by the fact that funds targeted the second hand market and borrowers were carefully selected for specific safe projects.

After the crisis of the shipping industry in 1982-86, characterised by a sharp drop in freight rates and vessel market values, there was an erosion – in some cases destruction – in the equity base of shipping companies and a substantial decline in the role of banks as traditional providers of shipping finance. The focus in the second part of the 1980s has increasingly been towards the strengthening and broadening of the capital base of shipping companies, mainly in relation to attracting equity finance so that their gearing levels would be reduced (Grammenos and Xilas, 1991).

The above developments suggest that a better environment had been created for the utilisation of new shipping finance sources such as the public capital markets. This was further emphasised by the substantial amounts required to expand and replace the ageing wet and dry fleets worldwide, the internationalisation of the world capital markets and the regulatory changes in the industry.

In addition, developments in the banking sector, such as deregulation of financial markets, advances in technology, innovation, and the trend towards fee as opposed to interest rate generated income – particularly in conjunction with more stringent capital adequacy rules – have also been major contributory factors towards the utilisation of capital markets by shipping companies.

In 1990-91, when the fundamentals of shipping companies had become considerably sounder, shipping companies were faced with banks reducing their shipping portfolios as provisions for loan losses reached enormous proportions (Stokes, 1992). Moreover, loan losses occurred at a time when international banks were being forced to adjust their solvency ratios in order to comply with the new capital adequacy rules introduced by the Basle Committee under the auspices of the Bank for International Settlements (BIS) in January 1993. The scale of loan losses in conjunction with the BIS ratios brought about a degree of risk aversion in the shipping industry (Stokes, 1992) and signalled the trend of banks towards fee generated income as opposed to interest rate income (Grammenos, 1994).

These limitations on new credit availability also contributed towards the increasing importance of the capital markets as a shipping finance source in the 1990s. In this respect, increased consolidation has taken place and is expected to continue through mergers and joint ventures or pools so that companies with greater penetration, operational efficiency, negotiating strength with major charterers and shipbuilders, and stronger financial flexibility are created (Stokes, 1992; Grammenos and Choi, 1999).

Shipping funds entered the capital markets for speculative asset play reasons in the period 1987-1989. The purpose of their existence was to buy second hand vessels cheaply, trade and sell the vessels at a premium when a significant improvement in the resale market occurred. Net assets would then be distributed to shareholders. In addition, the companies intended to pay dividends from the available cash flow generated from operations. Other aspects regarding limited life funds are discussed in the next section.

The period 1987-1995 also witnessed a growth in the number and size of initial public equity offerings by shipping companies (Grammenos and Marcoulis, 1996). The popularity of the high yield debt market in the US increased since 1993. Conditions have been favourable and the industry was enjoying a turnaround since the crisis in the early 1980s. In addition, interest rates were at record low levels. The amortisation schedule of high yield bonds has been particularly attractive to shipping companies, since only interest is paid throughout the life of the bond and, therefore, substantial amounts can be used for alternative profitable investments. Moreover, a bond issue in the high yield market is often regarded as an opportunity to shipping companies to satisfy their possible long term plans of a future equity issue by gaining experience in modern financial market techniques.

## **1.6 Limited Life Shipping Companies (Shipping Funds)**

The appearance of shipping funds has been an important development in shipping finance. The aim of this section is to discuss briefly their major characteristics and the circumstances under which they entered the US equity capital markets.

Limited life shipping companies appeared during 1987-89, and were established by their promoters with a predetermined life of between five and seven years. These shipping funds raised equity for speculative asset play reasons (Grammenos and Dheere, 1991). Companies primarily intended to make second hand vessel acquisitions when the market was down, operate the vessels until there is a significant improvement in the resale market and then sell the vessels at a premium, liquidating the company and distributing its net assets to the shareholders. Dividend payments were also to be made from cash flow generated from operations.

The asset play activity was primarily due to the erosion of the equity base of shipping companies during the crisis of the eighties (Grammenos and Marcoulis, 1996) and the resulting withdrawal of many financial institutions from the shipping markets, as they were unwilling to provide funds. Furthermore, Grammenos and Dheere (1991) suggest that external factors persuaded investors and the promoters of funds that the timing was right to invest in the shipping markets. Such factors stemmed from the improving market conditions in the shipping industry that occurred in the latter half of the 1980s. There was a steady increase in the demand for shipping services, increased scrapping, extensive rationalisation of shipbuilding capacity, and the phasing out of certain government subsidies.



Funds in the shipping industry were viewed as investment vehicles allowing their promoters to provide managerial services without taking serious investment positions (Grammenos and Marcoulis, 1996). A general manager was appointed and took the responsibilities of the buying, selling and operation of the company's vessels. Stopford (1997) identifies two problems with their structure. Firstly, equity had to be raised before any acquisitions took place and companies were faced with the problem of finding good quality vessels at short notice. Secondly, their commercial and management structure was ambiguous, since, as limited life funds, they were not shipping companies, but at the same time they had to operate vessels for a period of up to seven years.

As expectations of shipping fund managers failed to realise, these problems came to surface. Companies operated fleets that often lacked quality and had a high age profile. This increased maintenance and repair costs and, in addition, insurance companies introduced substantially higher premia. These reasons, coupled with deteriorating market conditions manifested by dropping freight rates, led to the failure of shipping funds (Grammenos, 1996) and to sharp drops in their share prices<sup>3</sup>.

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<sup>3</sup> The share price performance of shipping funds is examined in Chapter 2 (Paper 1).

## **1.7 International Regulations in Shipping**

Since the 1950s the regulatory regime has become a central factor in the economics of the shipping markets. A complex regulatory system has evolved that has an impact on all aspects of the economics of operating ships. Ship design, maintenance standards, crewing costs, operating standards, company overheads, taxation, commercial confidentiality, pollution liability, and cartels are all subject to regulation (Stopford, 1997).

The two most important new regulations in the shipping industry during the 1990s that affected the cost and management structure of shipping companies, are the Oil Pollution Act 1990 (OPA90) and the International Safety Management (ISM) Code.

### **1.7.1 The Oil Pollution Act (1990)**

The OPA 90 was formulated in response to the public concern caused by the grounding of the *Exxon Valdez* in the Prince William Sound, Alaska in March 1989. In that incident more than 30,000 tons of crude oil were spilled. The fact that the legislation applies to all vessels operating in US waters, had a worldwide impact as more than 90 per cent of the tank ships calling on US ports operate under a foreign flag (NRC Marine Board, 1998).

The majority of the provisions of OPA 90 were targeted at reducing the number of spills through improved vessel design, operational changes, and greater preparedness. The Act also created a comprehensive scheme to ensure that sufficient financial resources are available to clean up a spill and to compensate persons damaged by a spill. In this respect, shipowners operating within the US navigable waters, up to three miles off shore or within the exclusive US economic zone up to 20 miles to sea from the shoreline, are required to carry a certificate of financial responsibility, demonstrating that they have sufficient financial means to cover a claim. Those failing to produce satisfactory documentation were banned from US waters and were liable to arrest or even forfeiture of the vessel (Wood, 1994).

Oil pollution liability is also addressed by the Act. In the event of a spill, the responsible party is the owner or operator of the tanker who is liable to fund compensation for the cleanup and pollution up to a liability limit of \$10 million or \$1,200 per gross ton, whichever is the greater. However, there is unlimited liability to the owner if the spill is caused by either (1) gross negligence or wilful misconduct, or

(2) violation of an applicable federal safety, construction, or operating regulation. This potential for unlimited liability was a major cause of concern for shipowners and their insurers, bearing in mind that the cost to Exxon for the cleanup and compensation resulting from the *Exxon Valdez* pollution is estimated around \$10 billion (Grammenos and Choi, 1999).

The Act also requires all vessels entering US waters to have double hulls. The legislation also stipulates that single hull tanker vessels of 5,000 gross tons or more will be excluded from US waters after 2010, if ordered after 30 June 1990 or delivered after 1 January 1994. Vessels equipped with a double bottom or double sides may be permitted to trade to the US through 2015, depending on their age.

These new design criteria provided by the OPA 90 had a direct impact on vessel construction costs that increased, on average by 10 to 15 percent, because the use of extra steel is required in a double hull structure. In addition, the cargo carrying capacity of a double hull vessel is 5 to 6 per cent less than that of a single hull vessel of the same dimensions (Grammenos and Choi, 1999).

The OPA 90 caused great controversy and many owners have seized operating within US waters. This has been due to the risks involved and also due to the prohibitive costs charged by protection and indemnity clubs for trading in this area (Wijnolst and Wergeland, 1997). However, the requirement of transporting oil still existed and for those operators prepared to take the risk of unlimited liability, a method of demonstrating professionalism and sound management control was necessary (Willingale, 1998).

The unlimited liability implied by the Act, has dramatically increased the risk that directors, managers and officers of shipping companies, charterers and operators may be personally liable as 'responsible parties' if a spill occurs from a vessel under their control or authority to control (Marine Money, 1995a). An additional reason why some tanker companies have entered the equity capital markets, therefore, has been to limit liability under the Act (Marine Money, 1995b). In this case, in the event of a spill, individuals are not liable under corporate law principles.

### **1.7.2 The International Safety Management Code (1998)**

The International Safety Management Code (ISM) (IMO, 1994) is a formal legislative agreement that focuses the attention of the international community on the management for the safe operation of ships and pollution prevention. In 1989, the International Maritime Organisation (IMO), an agency of the United Nations, adopted guidelines on management for the safe operation of ships and for pollution prevention “to provide those responsible for the operation of ships with a framework for the proper development, implementation and assessment of safety and pollution prevention management in accordance with good practice” (IMO, 1989).

These guidelines were revised in November 1991 and the ISM Code itself was adopted as a recommendation in 1993. In 1994, the Code became mandatory and a new Chapter IX entitled “Management for the Safe Operations of Ships”, was added to the Safety of Life at Sea (SOLAS) Convention.

The ISM Code has come into force in two phases. Phase I started on 1<sup>st</sup> July 1998 and ISM compliance became mandatory for all tankers, bulk carriers, gas carriers, passengers and cargo high speed craft greater than 500 gross tons. Phase II of the Code is scheduled to come into force on 1<sup>st</sup> July 2002 and applies to all other vessels above 500 gross tons not covered under phase I. These include general cargo ships, survey vessels, container ships, ocean tugs, mobile offshore drilling units, reefer ships, car carriers, livestock carriers, cement carriers and woodchip carriers.

The three main safety management objectives of the Code are to provide for safe practices in ship operation and a safe working environment, to establish safeguards against all identified risks, and to continuously improve safety management skills of personnel, including preparing for emergencies. Signatories to the agreement will prohibit vessels that are poorly crewed, maintained and operated from trading in their waters.

The Code requires a Safety Management System (SMS) to be developed, implemented and maintained by every shipping company, in order to ensure compliance with all mandatory regulations. The ISM Code is divided into 13 sections and a compliant SMS should include a number of functional requirements of the Code such as:

1. A safety and environmental protection policy;
2. Instructions and procedures to ensure safety and environmental protection;
3. Defined levels of authority and lines of communication between and amongst shore and shipboard personnel;
4. Procedures for reporting accidents and non conformities with the provision of the ISM Code;
5. Procedures for preparing for and responding to emergencies; and
6. Procedures for internal audits and management reviews.

Two types of certificates are required for all shipping companies under the Code. These certificates are issued by the state whose flag the ship is entitled to fly or by

recognised organisations responsible for verifying compliance with the requirements of the ISM Code and for issuing the appropriate certificates.

A Document of Compliance (DOC) is issued after it has been verified that the shipping company concerned has properly developed and implemented a SMS that complies with the ISM Code. Objective evidence must be produced to show that the SMS has been in operation for at least three months on board at least one ship of each type operated by the company. A Safety Management Certificate (SMC) is issued for each ship operated by the company after an initial verification of compliance by way of an external audit on board the particular ship.

The DOC, a copy of which should be kept on board each ship to be produced upon request, has a validity period of five years, subject to annual verification to check that the SMS is still functioning properly. The SMC also has a validity period of five years, but unlike the DOC, requires at least one intermediate verification within the validity period.

By focusing on the managerial aspects of the shipping business, the ISM Code represents a new direction in maritime regulation and raises new problems over the implementation and policing of such a complex system. In the long term, shipping companies that do not comply with the Code will be considered substandard and it is likely that they will be forced out of the shipping industry, if priority is given to complying vessels (Story, 1998).



This potential reduction in the number of players in the industry will possibly result in mergers, joint ventures and buy outs, with the larger companies being the beneficiaries of such deals. Ted Petropoulos with reference to Greek ship management companies, argued: "Indeed, it is in the smaller size sector where most of the regulatory pressures are being felt, and it is these companies that are fiercely objecting to increased international regulations and ISM" (Marine Money, 1997). Smaller companies suffer from higher costs, since the Code imposes the same sort of cost structure for all shipping companies. Therefore, there will be increased competition for operational efficiency, economies of scale and financial cost, all of which favour larger size companies (Grammenos, 1996). Moreover, the industry may segment into the niche (but not necessarily small) players who will survive, because they have dedicated clients and a small spread of vessel type, and probably few really large players (Willingale, 1998).

## **1.8 The Pecking Order Theory of the Capital Structure**

Private equity dominated as a source for shipping finance in the pre world war years and vessel acquisitions had been primarily financed from reserves and retained earnings. The trend, however, of increasing vessel size substantially increased initial capital investment to levels that private equity was insufficient to cover. Consequently, since the second half of the 1950s, bank shipping finance grew in importance and provided 60% to 90% of acquisition finance – in some cases even higher to satisfy working capital needs – together with specialised financial institutions and shipyards. After the crisis in the shipping industry in the early 1980s, shipping companies have increasingly used the capital markets for their financing needs (see Section 1.5). This order of preference in the choice of finance by shipping companies could be explained by the Pecking Order Theory.

The search for the optimal capital structure of firms by employing the correct mix of debt and equity and the right balance between internally and externally generated funds has been the subject of research for decades. The preferred traditional finance means for shipping companies over the years has been bank debt. This preference pattern may be explained by the Pecking Order Theory.

Donaldson (1961) observes that “managers strongly favoured internal generation as a source of new funds even to the exclusion of external funds except for unavoidable ‘bulges’ in the need for funds”. Scott and Martin (1975) find that larger companies tend to borrow more than smaller ones and also prove that there is a strong correlation

between the industry sector and the financial structure of the company and between company size and financial structure.

Myers (1984) formally put these arguments together and laid the foundations of the Pecking Order Theory. There are five main points that make up the Theory. Firstly, firms prefer internal to external finance and this order of preference is the basis of the pecking order. The second point applies to publicly listed companies and deals with their dividend policies. It states that firms adapt their target dividend payout ratio to their investment opportunities and try to avoid sudden changes in dividends, thus adopting a 'sticky' dividend policy.

The third point of the Theory suggests that firms first draw on their cash balances and use external financing only when internal funds have been exhausted. Fourthly, when external finance is required, firms issue the safest security first. That is, they start with debt, then possibly hybrid securities such as convertible bonds, then perhaps equity as a last resort. Finally, the fifth point states that firms do not have a predetermined, well defined target debt level and managers are not restricted in their borrowing activities by an upper limit of debt allowed to exist in their balance sheets.

Myers (1993) claims that the lack of a target debt ratio is a vital prerequisite for the Theory. In addition, the sequence of choice implied by the theory explains the negative correlation between profitability and leverage. Least profitable firms tend to borrow more, not because they have higher target debt ratios, but because they lack internally generated funds in the form of retained earnings. Thus, they have a greater

need for external funds and prefer debt, because it is the next best alternative in the pecking order.

## 1.9 Equity Public Offerings

Equity is represented by owner's funds, share capital, retained earnings and reserves. A public offering of equity is a sale of equity securities, made available publicly by already listed companies or companies about to be listed in stock exchanges.

### *Advantages of going public*

The primary advantage of issuing equity is the reduction in financial risk by raising funds without using debt and the corresponding obligations it entails (Brealey and Myers, 1988). Companies raising equity lower their gearing levels and, in contrast to debt interest and principal payments, do not have the obligation to pay dividends to shareholders.

A successful public offering of equity and stock exchange listing gains prestige for the company, improves its reputation, and increases its market coverage. The liquidity of the shares, which is enhanced through a public offering, may also have a positive influence on the company's market value.

Another advantage is that listed shares can be used as collateral in the future for loans or incentives for employees (Grammenos and Xilas, 1991). In addition, they can be used for mergers and acquisitions.

Finally, the probability of fraudulent actions of management is reduced, since there is a tighter control over the company.

### *Disadvantages of going public*

The major disadvantage of going public is the increase in the cost of capital of the firm, since equity is riskier and shareholders require a return on their investment. Equity also entails a dilution of control of the company, depending on the proportion of the firm's value that is offered to the public (Weston and Copeland, 1986). In addition, there are disclosure requirements and relevant information regarding sensitive areas such as salaries, terms of vessels' employment, etc. has to be furnished regularly. In this sense, the management's job becomes onerous and less flexible, as it has to devote time in acting as a 'public communicator' (Grammenos and Xilas, 1991).

Moreover, once the company obtains its listing and its shares are traded publicly, the market share price is influenced by factors beyond the management's control. Such an external factor is the performance of stock exchanges.

The one time direct and indirect costs involved in a public equity offering are substantial. Direct costs include the legal, auditing, advertising and road show expenses, and underwriting fees. The indirect costs are the management time and effort devoted to conducting the offering and, in some cases, the underpricing of the shares, when they are sold at an offering price that is lower than that prevailing in the market, shortly after the offering.

Furthermore, the older management generation may resist and find it difficult to adapt to the company's change of policy. Internal company changes may also involve

higher overhead costs, while operating performance and profitability may not increase in line.

## 1.10 High Yield Bond Offerings

High yield bonds are bonds rated below investment grade by the rating agencies. That is BB+ or lower by Standard and Poor's, and Ba1 or lower by Moody's Investors Service. These bonds, also known as 'junk' bonds, 'speculative grade' bonds or 'high interest' bonds, are often issued by high leveraged companies and carry a high yield in order to compensate investors for undertaking higher risk.

### *Advantages of High Yield Bond Offerings*

The major advantage to raising finance by issuing high yield bonds is the attractive amortisation schedule. Only interest is paid throughout the life of the bond, while the principal is paid at the end of maturity. This feature frees up substantial amounts of capital that can be used for reinvesting in the business. In addition, the long maturities of bonds may match the duration of vessel life closer than bank debt (Grammenos, 1996).

Access to funds is also relatively quick and three months is the normal time required for a deal to be completed and the funds to be available to the company. Moreover, the disclosure requirements of this market are fewer in comparison to equity offerings (Kricheff and Strenk, 1999).

The company is also provided with a diversified source of capital and access to US capital market funds. Furthermore, although there is a number of covenants in the high yield market, these are minimal restrictions that can also contribute to the better management of shipping companies (Grammenos and Choi, 1999). In addition, a



successful issue contributes to the credibility and publicity of the company in the market.

Finally, high yield bonds provide companies with a first exposure in the public capital markets. In this sense, this financial sector is often regarded as the stepping stone to a future full stock exchange listing.

#### *Disadvantages of High Yield Bond Offerings*

The most important disadvantage of high yield bond offerings is that it is an expensive means of financing. The cost of interest is high in comparison to traditional bank loans and takes the form of coupon payments. In addition, initial transaction costs are also considerable and include fees paid to the underwriter and rating agencies. Other costs incurred are legal fees and printing expenses.

As in the case of a public equity offering, there is loss of flexibility and lack of personal interface. Moreover, there is a degree of disclosure requirements to the rating agencies, investors and the Standard Exchange Commission (Fabozzi and Cheung, 1990).

When the high yield bond issue takes place through Rule 144A, liquidity is limited and the bonds are available only to a small number of investors, the Qualified Institutional Buyers (Altman, 1990).

Finally, prepayment is normally not allowed for a number of years, while there is a high penalty for the early retirement of the bonds.

## **1.11 High Yield Bond Defaults and Restructuring Options**

Several shipping high yield bond defaults have been witnessed since 1998. The main reasons for these defaults have been the inherent cyclical fluctuations in the industry and the worsening market conditions, principally a consequence of the economic crises in Asia and Russia. This resulted in a deterioration of credit quality and, in some cases, several changes were made in relatively short periods (Moody's Investors Service, 1999).

As the full impact of the Asian crisis begun to hit the freight markets, vessel values dropped heavily. This affected the valuations of several shipping companies even at the time their roadshows were taking place. Additionally, freight rates – the most important income source in the shipping industry – fell sharply in all shipping sectors. This troubled many companies, especially those that were highly geared and could not maintain the high interest payments involving high yield capital (Moody's Investors Service, 1999; Jefferies & Company, Inc., 1998).

Moody's definition of default was designed to rigorously assess the performance of its ratings as predictors of default. Consequently, Moody's definition is strict, and includes three types of default events: a) There is a missed or delayed disbursement of interest and/or principal, including delayed payments made within a grace period; b) An issuer files for bankruptcy (Chapter 11, or less frequently Chapter 7, in the US) or legal receivership occurs; or c) A distressed exchange occurs where (i) the issuer offers bondholders a new security or package of securities that amount to a diminished financial obligation (such as preferred or common stock, or debt with a

lower coupon or par amount), or (ii) the exchange had the apparent purpose of helping the borrower avoid default (Moody's Investors Service, 2000, p.3).

A defaulted bond is in essence a default on a debt obligation. Companies whose high yield bonds have defaulted and investors in such issues are faced with the task of reorganisation. In the US, corporate bankruptcy reorganisations take place under Chapter 11 of the US Bankruptcy Code. Firms that liquidate file under Chapter 7. First, though, distressed firms usually try to avoid bankruptcy by negotiating an out of court restructuring with their creditors. The aim of reorganisation is either to reduce interest and principal payments, to extend the payment dates, or to substitute equity for debt. The primary difference between the two approaches is that in bankruptcy there is court supervision.

In practice, more than nine in ten firms, attempt to restructure their debt out of court and file for Chapter 11 only when an agreement has not been reached (Gilson, 1999). Moreover, Gilson, John, and Lang (1990) find that approximately half of all US public firms that experienced financial distress in the 1980s managed to successfully restructure their debt out of court.

It is normally the case that out of court settlements are accomplished at much lower cost than a court supervised reorganisation. Part of this difference reflects savings in legal and other administrative costs. Chapter 11 filings generally impose a much heavier burden on the business, because of the greater demands placed on management's time and costly delays caused by litigation.

There are, however, several advantages to filing for bankruptcy under Chapter 11 of the US Bankruptcy Code. First the Code allows firms to issue new debt that ranks senior to all debt incurred prior to filing. Such debt, known as DIP financing (Debtor In Possession), allows firms to borrow on cheaper terms and conserve cash. Secondly, no interest is payable by the distressed firm on unsecured debt. Unfavourable leases can also be rejected under Chapter 11, subject to certain limitations. This may encourage lessors to grant the bankrupt firm more favourable terms. Furthermore, a reorganisation plan in Chapter 11 requires fewer creditors for its approval than an out of court agreement that usually requires the creditors' unanimous consent. Finally, the financial information required to be filed under Chapter 11 makes it an attractive solution to investors.

Prepackaged Chapter 11 filings are also adopted by an increasing number of distressed firms. This option enables the realisation of benefits of both out of court and court supervised reorganisation. Settlement takes typically less time, because the firm presents its claimholders with a preapproved reorganisation plan for a vote and files for Chapter 11 at the same time.

## **1.12 The Role of the Underwriter in Equity Offerings**

The main role of underwriters of equity offerings, usually investment banks or the investment arm of commercial banks is to underwrite and distribute the issue. In doing this, the underwriter takes the risk of adverse price fluctuations during the distribution period, in return for a fee and risks his reputation if the flotation is not successful. Large issues can be underwritten by syndicates (made up of financial institutions) so that the risk is spread.

The choice of underwriter is very important for the company. The range of underwriters is wide, depending on size (capital base), prestige and experience. The company's management, therefore, has to consider the past underwriting record of a number of investment banks and discuss its intentions with a number of underwriters. Another consideration is the matching of the size of the offering with the size and network of the underwriter (Grammenos, 1996).

There are three main forms of the underwriting agreement that are normally used for international equity issues. Under a firm commitment the underwriter buys the shares and holds the amount not sold to investors for its own account. Secondly, when equity issues are underwritten on a best effort basis, the underwriter acts as the company's agent in selling the offering. Finally, under the bookbuilding process, the underwriter collects bids from investors to determine the selling price.

Fees to the underwriter vary according to the risk taken in each method of distributing the shares. Charges are highest under the firm commitment basis, as in this case the

risk entailed is high and fees are paid to the underwriter both when the shares are bought and sold.

In pricing a common stock offering, the underwriter values the company concerned. There are various tools used for company valuation among which are the discounted cash flow, the net asset value, the economic value added and the multiples methods.

Furthermore, the underwriter assesses the ability of management to go public and sustain a positive share price performance in the aftermarket. One method for this assessment is based on the '6 Cs' of credit analysis from an investment perspective (Grammenos, 1989). Important factors taken into account are:

- The company's operational and financial performance – past and projected, including comparisons with the industry's trends
- Management character and capacity
- Market orientation
- Fleet composition and its position within the particular shipping market
- Fleet age and condition
- Fleet employment – spot vs. time charters
- Growth potential and strategic plan

### **1.13 The Role of the Underwriter in High Yield Bond Offerings**

The role of the underwriter is also very important in the success of a high yield bond issue. Leadership is provided to the issuer in drafting the registration statement and the prospectus, and in preparing for the presentations to the rating agencies and to institutional investors during the roadshow. The underwriter also negotiates the issue price, markets the securities and is responsible for educating investors about the shipping sector. In addition, the underwriter can act as the market maker for the bonds after the issue. Moreover, his reputation is at stake if the issue is not successful.

The main objectives of the underwriter in this financial sector are to introduce an inexperienced issuer to a relatively new market and to create and sustain a positive image with bond investors. In addition, the underwriter aims to achieve the lowest financing costs to the issuer and to develop aftermarket liquidity for the bonds.

Company assessment is also essential for underwriters of high yield bonds. Assessment is similar to that for companies issuing equity, however, the focus in this case lies more on the ability of the issuer to make timely interest payments and repay the debt to investors.

## **1.14 Major Findings of the Thesis**

Having discussed several aspects of the shipping markets that set a theoretical framework, the aim of this section is to discuss the findings of the research conducted in the three papers presented in this thesis.

The major findings of the thesis are presented in Tables 1.1A, 1.1B, and 1.1C in tabular form.



**Table 1.1A: Major Findings of Paper 1 presented in the Thesis. “The Long Run Performance of Shipping Initial Public Offerings”**

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*Period Covered:* 1987-1995

*Methodology:* Three performance measures (Cumulative Average Returns, Holding Period Returns and Wealth Relatives) and Regression Analysis

*Sample:* 27 shipping equity IPOs in 7 stock exchanges internationally

*Major Findings (2 trading years):*

- ◆ Cumulative Average Returns (CARs) for 24 months in the aftermarket: Stock Market Index Adjusted: CAR = -36.79% (significant from 15<sup>th</sup> month of seasoning onwards). MSCI Shipping Index Adjusted CAR = -8.43% (not significant)
  - ◆ Classification of IPOs according to:
    - Year of Issuance: Stock market underperformance a general phenomenon. Worst performing group in years 1987-1989 (includes six shipping funds).
    - First Day Returns (Underpricing): No clear pattern.
    - Across Countries: Widespread underperformance with respect to stock market indices. No underperformance with respect to the shipping industry, with the exceptions of Greece and the US.
    - Proportion of Equity Offered: No clear pattern.
    - Fleet Composition: Tanker companies perform in line with the shipping industry and ferry companies are the worst performing group.
    - Company Fleet Age: Clear inverse relationship with aftermarket performance.
    - Initial Gearing Level: Strong tendency for IPOs with high initial gearing levels to perform better.
  - ◆ Regression Analysis:
    - Significant relationships established between aftermarket performance and: Initial Gearing Level (positive), Fleet Age (negative)
-

**Table 1.1B: Major Findings of Paper 2 presented in the Thesis. “Macroeconomic Factors and International Shipping Stock Returns”**

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*Period Covered:* December 1989 – March 1998

*Methodology:* Regression Analysis, Multi Factor Model employing Global Macroeconomic Factors

*Sample:* 36 shipping companies listed in 10 stock exchanges internationally

*Major Findings:*

◆ Regression Analysis:

- There are factors that influence shipping stock returns, besides the world market portfolio
  - Significant relationships established between shipping stock returns and changes in:
    - Oil Prices (negatively)
    - Laid Up Tonnage (negatively)
    - Global US Dollar Exchange Rate (positively)
  - No significant relationships established between shipping stock returns and changes in:
    - Global Inflation
    - Global Industrial Production
  - The established relationships exhibit a consistent pattern across the six countries in the analysis
-

**Table 1.1C: Major Findings of Paper 3 presented in the Thesis. “Determinants of Spreads on New High Yield Bonds in the Shipping Industry”**

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*Period Covered:* 1993 - 1998

*Methodology:* Classification of the sample into groups according to the factors under analysis and Regression Analysis

*Sample:* 30 High Yield Bond Offerings by Shipping Companies in the US market

*Major Findings:*

- ◆ Classification of High Yield Bond Offerings according to:
    - Credit Rating: Lower rated bond issues carry higher new issue spreads.
    - Security Status: Secured offerings tend to carry wider new issue spreads.
    - Term to Maturity: Offerings with smaller term to maturity tend to carry wider new issue spreads.
    - Amount of Issue: Smaller issues tend to carry higher new issue spreads.
    - 144A Status: Rule 144A issues tend to carry higher new issue spreads.
    - Callability: Callable bonds tend to carry wider new issue spreads.
    - Gearing: Offerings from companies with high gearing tend to be associated with higher new issue spreads.
    - Fleet Age: No clear pattern emerges.
  - ◆ Univariate Regression Analysis: Statistically significant relationships are established between new issue spread and:
    - Credit Rating (negative)
    - Gearing (positive)
    - Laid Up Tonnage (positive)
    - Security Status (negative)
    - Term to Maturity (negative)
  - ◆ Multivariate Regression Analysis: Statistically significant relationships are established between new issue spread and:
    - Credit Rating (negative)
    - Gearing (positive)
    - Laid Up Tonnage (positive)
    - Significant increase in explanatory power by including Gearing and Laid Up Tonnage.
-

### **1.14.1 Paper 1: The Long Run Performance of Shipping Initial Public Offerings**

The aim of this paper is to examine for the first time the aftermarket performance of IPOs in the shipping industry for their initial two years of listing. The study period is 1987-1995 and the sample includes 27 IPOs of common stock issued in the stock exchanges of Greece, Hong Kong, Norway, the Philippines, Singapore, Sweden and the United States.

Three measures are used in the paper, consistent with empirical evidence (e.g. Ritter, 1991; Levis, 1993), to calculate aftermarket performance for the first and second listing anniversary. These are cumulative adjusted returns, holding period returns and wealth relatives. All three performance measures are calculated against local stock market indices as well as the shipping industry. The Morgan Stanley Capital International Index (MSCI) for shipping equities is employed as a proxy for the shipping markets.

Offerings are first categorised according to certain criteria in an attempt to establish patterns that may influence aftermarket performance. Regression analysis is subsequently performed to confirm or reject any relationship that is established in the first part of the analysis. The factors deemed to have a role to play in the performance of shipping IPOs in the aftermarket are the proportion of equity offered to the public, the initial level of gearing, first day returns, fleet composition and fleet age. In addition performance is measured by country and year of issuance.

Particular attention is also paid to the six shipping investment funds that are included in the sample and their aftermarket performance. Shipping funds are discussed in section 1.6 of this chapter and merit this additional analysis due to their special characteristics and the circumstances in which they entered the equity capital markets in the United States.

Cumulative average adjusted returns (CARs) exhibit a gradual and steady decline for two years of trading in the aftermarket. With respect to local stock market CARs, returns fall to  $-36.79\%$ , whereas the respective figure for MSCI adjusted CARs is  $-8.43\%$ . Only the former CAR series is significant, however, from the 15<sup>th</sup> trading month onwards, contradicting empirical evidence (Ritter, 1991) that suggests IPOs underperform even when performance is measured against similar size and industry firms. This finding is attributed to unfavourable conditions in the shipping markets following the listings of several companies and to positive future expectations that did not materialise.

Evidence on aftermarket performance when shipping IPOs were ranked according to their year of issuance shows that IPOs performed in line with their local stock market indices and the MSCI index for their first trading year. However, with respect to two trading years, performance was considerably worse when measured against that of the local stock market indices. Moreover, stock market underperformance seems to be a general phenomenon for the most years under analysis. The worst performing group emerges for IPOs that came to the market during the period 1987-89 and contains all the six shipping funds in the sample.

With respect to first day returns, no clear pattern emerges to establish a relationship between aftermarket performance and underpricing. The worst performance, though, is for the group of companies that had positive initial returns, again due to the fact that most of the shipping funds in the sample fall under this category.

Performance for the first trading year is similar across the different countries in the sample, both for the local stock markets and the MSCI index adjusted returns, exception being the Norwegian IPOs that underperform in both cases. For the second trading year, stock market underperformance is evident for shipping IPOs in all countries, whereas offerings in the US and Greece also underperform the MSCI index. The shipping funds account for this in the US, as they were all issued in American stock exchanges. Greek IPO underperformance is attributed to adverse conditions in the passenger ferry sector that followed their stock market registration.

No pattern emerges for aftermarket performance with respect to the proportion of equity offered to the public. The worst performer, though, is the group offering the highest percentage of equity to the public. Again, this is due to the bad performance of the shipping funds, as they offered 98.10% of their equity, on average.

Performance for the first year of trading across different fleet compositions appears to be similar with respect to both the local stock markets and the shipping industry. For the second year of aftermarket performance, though, the passenger ferry sector is the worst performer for the reasons stated earlier.

Categorising the IPOs in the sample by their corresponding company fleet age produces no pattern for the first listing year. A clear inverse relationship emerges, however, between fleet age and performance for two years in the aftermarket, with IPO groups from companies with a young fleet clearly being the best performers. This important finding can be attributed to the profound implications the fleet age profile of shipping companies may have on their operating and financial performance. On one hand, it affects costs (e.g. maintenance, repairs and insurance costs) and, therefore, income, while, on the other, it influences chartering opportunities and the perception of investors.

A reduced sample of 19 IPOs is also ranked according to their companies' gearing levels at the time of listing. This is because eight companies were debt free at the time of issue. In this case, no pattern emerges for the first trading year. With respect to the second year in the aftermarket, though, there appears to be a strong tendency for IPOs with higher comparative initial gearing levels to perform better, as manifested by the fact that the group with the highest geared companies is the best performer.

The better performance for offerings from highly geared shipping companies may be attributed firstly to the higher expected return required by investors for holding the riskier, highly geared stock issues; and secondly to the trend of a decrease in gearing by the shipping companies in the sample by their first listing anniversary. In fact, closer examination revealed that 13 out of 19 companies in this sub sample stated that debt repayment was an intended use of their proceeds. Moreover, the average debt to equity ratio falls from 1.41 at the time of issue to 0.72 at the end of the first trading year.

Subsequent univariate regression analysis generally confirms the above findings. Aftermarket performance is negatively related to fleet age and positively related to the initial gearing level of the shipping companies in the sample. Moreover, these two variables remain significant in a multivariate context.



### **1.14.2 Paper 2: Macroeconomic Factors and International Shipping Stock Returns**

The objective of this paper is to examine the relationship between shipping stock returns internationally and a set of prespecified global macroeconomic risk variables for the first time. The study sample includes 36 companies that are listed in the stock exchanges of ten different countries worldwide. These are Denmark, Finland, Hong Kong, India, Japan, Norway, Singapore, Sweden, the United Kingdom and the US. The period of analysis is December 1989 – March 1998.

The macroeconomic factors included in the analysis are the returns on the world equity market portfolio, global exchange rate fluctuations measured against the US Dollar, oil prices, inflation and industrial production growth. Monthly changes in laid up tonnage is also included in the analysis as an industry specific factor. Furthermore, the effects of these global risk factors are examined across the countries in the analysis.

The above variables are deemed to influence the returns of shipping stocks due to their strong links with the forces that determine supply and demand in the shipping markets and, hence, freight rates.

In the paper, consistently with empirical evidence (e.g. Wasserfallen, 1989), the expected components of the global factors are filtered out by using Auto-Regressive Moving Average models and their unexpected components are used as explanatory variables. In addition, dynamics are included in the estimation procedure as past

studies (e.g. Poon and Taylor, 1991) have suggested that the relationship between macroeconomic impacts and stock returns may not be contemporaneous. Multivariate least squares methods are used for estimation in the paper, as common coefficients are imposed on the macroeconomic factors.

In addition to estimating the full model that includes all of the macroeconomic factors under examination, the one factor market model is also estimated and includes only the world equity market portfolio as an explanatory variable.

Results suggest that there are factors in the global macroeconomic environment, which – in addition to the world market portfolio that remains the driving force behind international stock returns – influence the returns of shipping common stock worldwide.

Firstly, the constant in both the one factor and the multi factor specification models is negative and statistically significant. This suggests that shipping companies have, on average, been overpriced during the period analysed.

With respect to the parameter estimation of the global macroeconomic factors, it is found that oil prices and lay up tonnage are negatively related to shipping stock returns internationally, whereas a positive relationship is detected for the exchange rate variable. Moreover, no significant relationships are established between the returns of shipping equities and the global risk measures of inflation and industrial production.

The negative relationship between oil prices and shipping stock returns may be partly attributed to the association of oil with the world economy, as was demonstrated by both oil crises in the 1970s, when high oil prices eventually led to overcapacity in the shipping markets and consequently lower freight income; and partly to the fact that oil is an important component of voyage costs in terms of fuel.

Laid up tonnage is a strong indicator of market conditions in the shipping industry. An increase in laid up vessels is a sign of bad conditions, since vessels are inoperative due to low freight rates, and shipowners anticipate a further market downturn. These adverse effects in profitability are reflected in lower shipping stock returns.

The positive relationship established between the global US dollar exchange rate and shipping stock returns suggests that a dollar depreciation implies higher returns. This is due to the fact that the various currencies used for revenue and cost components are all measured against the US dollar internationally. A change, therefore, in the value of the dollar may have implications for profitability.

Regression analysis is also performed for the returns of shipping companies in six different countries included in the sample. Results from this estimation suggest that the global risk factors in the analysis exhibit a consistent pattern in their relationships with international shipping stock returns. In addition, world market betas differ across countries with respect to their magnitude. In the case of India, a negative world market beta is observed. The highest positive world beta is that of Norway, whereas the lowest is that for US shipping companies.

### **1.14.3 Paper 3: Determinants of Spreads on New High Yield Bonds in the Shipping Industry**

The purpose of the third paper is to analyse the primary pricing of shipping bonds in the high yield bond sector and examine the effects of a set of factors on their new issue spread for the first time. In addition, the offerings are also examined by year of issuance. The sample includes 30 bond offerings issued by shipping companies in the US high yield debt market during the period 1993-1998.

The factors employed in the study are credit rating, callability, term (years to maturity), float (issue amount), the prevailing one year default rate in the sector, security status, 144A status, the two month percentage change in laid up tonnage, gearing and fleet age at the time of issue.

Examination of the offerings by their year of issuance reveals that the issuing activity is concentrated in two distinct time periods, namely 1993 and 1997-98. This clustering of high yield bond issues coincides with low prevailing interest rates and high volumes of issuance in the high yield market from other industrial sectors. Moreover, the first cluster coincides with high equity IPO activity by shipping companies, as documented in empirical evidence (Grammenos and Marcoulis, 1996).

The majority of shipping companies in the sample raised funds to replace and/or restructure banking debt with the more attractive – but more expensive – amortisation schedule offered by high yield bonds. The long maturities of bonds may match closer

the duration of vessel life, whereas substantial amounts are freed up, because only interest is payable throughout a bond's life.

Bonds in the sample are classified into groups according to the factors or criteria in the analysis so that any patterns that emerge between them and the initial issue spread can provide useful insight as to the forces that may influence primary pricing. Regression analysis is then performed to statistically confirm or reject these possible patterns.

Classifying the sample in credit rating classes reveals a clear pattern. Lower rated issues exhibit higher initial spreads in comparison to higher rated ones. This is because a higher default probability is associated with bonds of a low credit quality and, hence, the higher initial spreads. In addition, offerings of smaller sizes tend to be associated with lower credit ratings.

Bonds are also categorised with respect to their security status, term to maturity, issue amount, 144A status, callability, gearing and fleet age.

Regarding security, it appears that secured offerings carry wider spreads than unsecured ones, contrary to expectations. A closer examination, though, into the credit rating of the secured issues reveals that almost half of the secured issuance volume falls under the three lowest rating classes, accounting for this difference in initial spread.

Offerings with a smaller term to maturity also tend to have higher spreads. Bad credit quality accounts for this spread difference as well, as approximately two thirds of the issuance volume for offerings with a term to maturity of ten years or less is rated B3 or less by Moody's.

Smaller issues tend to carry higher spreads, because of their lower marketability, however, they constitute only a small portion of the total amount raised in the sector. Issues that came into market through rule 144A and those with a call option also tend to carry higher spreads than public and non callable bonds, respectively. In the case of 144A deals, the higher spread is due to the lower liquidity in this market until registration with the Securities Exchange Commission takes place, whereas callable bonds offer higher spreads to compensate investors for taking the risk of being forced to reinvest at a possible lower rate.

Offerings from shipping companies with higher debt to equity ratios also tend to carry wider spreads. This is attributed to the increased financial risk of such issues. Moreover, no specific pattern emerges between initial spread and different groupings of fleet age. Nevertheless, the highest new issue spread is observed for bond offerings by companies that operate the oldest fleet. This higher risk premium is expected, since older vessels often require higher maintenance and repair costs and, in addition, they may restrict chartering opportunities. Moreover, the average fleet age in the sample stands at 14.31 years, suggesting that vessels, on average, are going to be close to the end of their economic life at maturity.

Univariate regressions confirm the above findings and five factors emerge with a statistically significant coefficient. These are gearing, rating, laid up tonnage, security, and term to maturity. Rating exhibits the highest correlation with new issue spread ( $R^2=0.59$ ), whereas the corresponding figures for gearing ( $R^2=0.38$ ), laid up tonnage ( $R^2=0.37$ ), term ( $R^2=0.29$ ), security status ( $R^2=0.27$ ), and 144A status ( $R^2=0.11$ ) are also considerable. The signs of all coefficients are consistent with expectations apart from that of the security status variable. In this case, the negative sign indicates that secured offerings carry higher spreads. This, however, is attributed to the bad rating quality of a substantial amount of the secured issuance in the sample, as explained above.

Multivariate regression analysis includes all the factors under examination. Three variables emerge as statistically significant and they are rating, gearing and laid up tonnage. These factors explain as much as 71.01% of the variance in the spread of new issues, as indicated by the  $R^2$  of the model. Moreover, the increase of 12% in explanatory power arising from the inclusion of gearing and laid up tonnage in the estimation is statistically significant. This finding is important as it suggests that ratings may have not fully incorporated the potential effects of gearing and market conditions, as credit risk factors.

Consistently with past evidence (Fridson and Garman, 1998) rating appears to be the most significant factor in the pricing of shipping high yield bonds. This is because agencies weigh up a variety of different factors in assigning ratings. Specifically for shipping companies, these factors include management quality, the cyclical nature of freight rates, economic conditions in the shipping markets at the time of issue and the

companies' operating position, customer base, chartering mix and fleet. The final assigned rating, therefore, is related to the ability of shipping companies to sustain future cash flow generation and make timely payments of interest and principal. Lower rated bond offerings are associated with higher default probabilities and, hence, higher initial spreads

The inclusion of gearing and laid up tonnage in the final model adds significantly to the explanatory power of the model as stated above and indicates that industry factors have a role to play in the pricing of shipping high yield bonds.

Gearing has profound financial implications, particularly at times when market conditions are unfavourable and when highly geared companies are heavily exposed in the spot charter market. These risks, therefore, are reflected in higher new issue spreads.

Laid up tonnage is also important as an indicator of conditions in the shipping industry. An increase in the number of vessels being laid up implies worsening conditions. In addition, less employment opportunities are available and freight rates remain at low levels. Therefore, high yield bond offerings that are issued at times when there is increased laid up tonnage and, hence, greater uncertainty, carry higher spreads.



## **1.15 Conclusion and Academic Contribution of the Thesis**

Following the summary of the findings of this thesis, this section is concluded with an overview of the findings that contribute to the general shipping finance literature.

The academic contribution of the thesis is that for the first time, several factors that have a role to play in the equity and high yield debt capital markets as sources of shipping finance have been empirically uncovered. These factors are derived from the findings of the three papers presented in this thesis and are summarised in Table 1.2.

Market conditions and the degree of leverage of shipping companies appear as the two most prominent factors related to the pricing and performance of both equity and high yield bond offerings in the shipping industry.

The importance of the state of the shipping markets is illustrated by the findings of papers 2 and 3. Specifically, the second paper shows that market conditions, approximated by laid up tonnage, are reflected on the returns of shipping equities internationally, whereas in the third paper, laid up tonnage is found to be an important primary pricing factor in the high yield sector for shipping companies.

Papers 1 and 3 highlight the role of gearing, as calculated by the debt to equity ratio. With respect to the international equity markets, paper 1 illustrates that gearing at the time of issue is positively related to the long run performance of shipping IPOs. With respect to the high yield debt market, the third paper demonstrates that gearing is an important factor to consider in the initial pricing of shipping high yield bonds, by

detecting a positive relationship between new issue spread and gearing at the time of the offering.

Other factors that are important for equity offerings by shipping companies are the age of the companies' fleets, exchange rates measured against the US dollar and the price of oil.

In paper 1, it is shown that the age of vessels is negatively related to the long run performance of shipping IPOs. In paper 2, it is found that shipping stock returns internationally are negatively related to oil prices and positively related to a dollar depreciation.

Moreover, credit rating appears to be the dominant factor in the primary pricing of shipping bonds in the US high yield debt market. It emerges as the most important pricing factor as documented in paper 3.

In addition, the fact that gearing and laid up tonnage emerge as statistically significant in a multivariate context and increase the explanatory power of the model is also important. This finding suggests that rating agencies may have not taken fully into account the potential effects of these two variables when making their credit risk assessments.

**Table 1.2: Important Factors in Equity and High Yield Capital Markets for Shipping Companies**

Factor	IPO Aftermarket Performance (Jan 1987 – Dec 1995)	International Stock Returns (Dec 1989 – March 1998)	High Yield Bond Pricing (Jan 1993 – Dec 1998)
Gearing	+		+
Laid Up Tonnage		-	+
Credit Rating			-
Fleet Age	+		
Oil Prices		-	
US \$ Exchange Rate		+	

Note: (+) indicates a positive relationship, (-) indicates a negative relationship, and where no sign appears no significant relationship has been detected for the corresponding factor

## **1.16 Usefulness of the Thesis Findings**

The findings of this thesis can be useful to shipping companies, portfolio managers, and investment bankers. A variety of factors – both company specific and factors linked to macroeconomic developments in the shipping industry and the world economy – have been identified that may have a role to play in the pricing and performance of equity and high yield bond issues by shipping companies, for the periods under examination. Thus, in a highly capital intensive and cyclical industry such as shipping, these factors and conditions merit particular attention from the shipping and financial communities.

### **1.16.1 Usefulness and Implications of the Findings for Shipping Companies**

Several findings of the thesis are useful to shipping companies, depending on whether they are entering the equity or the high yield bond market.

With respect to the equity markets, the degree of leverage and the fleet age of vessels are important company specific factors. High gearing when making an initial equity offering appears to favour the performance of the issue, since investors seek compensation for taking higher risk. Equity issues by shipping companies that operate young fleets may also perform well. Young vessels have a longer economic life, entail lower running costs, and create a positive perception of the company in the eyes of charterers and investors.

Gearing should also receive the attention of shipping managers with respect to the high yield bond sector where it emerges as an important primary pricing factor. Bond offerings by highly geared shipping companies carry, on average, higher spreads than offerings by lower geared companies. In contrast to the equity capital markets, high leverage in this financial sector appears to be negatively related to pricing. Shipping managers, therefore, should pay particular attention to gearing levels when tapping this financial sector, as the cash flow cost involved in the form of interest payments is considerable.

The macroeconomy has a major role to play for shipping companies in entering both the equity and the high yield debt markets. Market conditions have been found to influence stock returns, whereas in the high yield sector they are important in pricing

and, in addition, are associated to the probability of default. In this respect, careful evaluation of the state of the shipping markets is crucial.

Finally, oil prices and movements in the dollar exchange rate ought to be carefully monitored as they affect share price performance.

One implication of the thesis findings is the possible trend of the capital structure of shipping companies to move towards a higher level in the pecking order, as they increasingly resort to the global financial capital markets for finance. This trend has been due to a number of factors among which is the need for fleet replacement. Other factors include financial globalisation and the introduction of international regulations in the industry that have increased costs and the initial capital investment required to levels that cannot be covered by private equity and/or retained earnings. These developments encourage shipping companies to redefine their corporate objectives and strategies in order to become larger in size, so that higher operational efficiency, economies of scale, and financial flexibility can be achieved.

### **1.16.2 Usefulness and Implications of the Findings for Investors and Portfolio Managers**

The strategy of investors and portfolio managers in the capital markets is to select a proper mix of stocks, bonds and other financial instruments so that return is maximised subject to their risk profiles. In order for this to be achieved and provided that the shipping industry is selected in their portfolios, it is essential that the fundamental characteristics of shipping companies and the shipping markets are analysed. This can provide insight as to the features that are related with the performance of their stock and bond portfolios. Findings of the thesis are, therefore, useful in this respect.

Factors that are important for the performance of shipping stocks from a macroeconomic viewpoint are market conditions, oil prices and US dollar exchange rates. Furthermore, gearing and fleet age are material elements of investment analysis for the aftermarket performance of shipping equity offerings.

The most informative factor in the high yield debt market is credit rating. Therefore, ratings assigned to shipping companies should be carefully analysed and interpreted by investors, as they convey important information with respect to the issuer's ability to generate and sustain cash flow generation, so that timely payments of interest are made. In addition, ratings also take into account the vulnerability of the issuer to economic cycles. However, the finding that gearing and laid up tonnage – a proxy for market conditions – are important pricing factors adds significant value to the investment selection process.

These findings are of particular interest to high yield managers who rely heavily on the new issue market, because liquidity after the offering is often limited. Moreover, bond investors who adopt a buy and hold strategy can also benefit, by paying particular attention to the above factors, as the regular payment of coupons – hence bond yield – may be affected.

Speculative investors in shipping equities and high yield bonds may also benefit from the findings of this thesis. For example, investing in shipping stocks when oil prices are rising, may suggest a negative return.

In addition, taking into account that investor focus is increasingly inclined towards an industry oriented approach, investors and portfolio managers can benefit from the findings documented in this thesis, by adding to their diversification capacities; and, thus, allocate a proportion of their portfolios in shipping equities and/or high yield bonds.



### **1.16.3 Usefulness and Implications of the Findings for Investment Banks**

The responsibilities of investment banks demand the thorough understanding and analysis of the shipping markets and companies. The important factors in the equity and high yield debt capital markets identified in the thesis affect the cost of capital of shipping companies and, thus, warrant particular attention by investment banks. Furthermore, a successful issue of bonds or equity in both the primary and secondary markets is a prerequisite in establishing and maintaining their reputation.

The evidence provided in the thesis can benefit investment banks in the pricing and structure of high yield bond and common stock offerings. Credit rating is not the only informative factor to consider when pricing shipping high yield bonds. Findings suggest that gearing and laid up tonnage are additional important factors in this respect. For example, the underwriter is to pay particular attention to the gearing levels of the shipping company concerned and adjust the offering price accordingly, as issues of highly geared companies entail more risk. For equity offerings, fleet age is an important pricing factor, as young vessels are likely to boost share price performance in the aftermarket.

Investment banks may also use the findings of the thesis to improve their advisory services to customers and investors. For instance, in periods of increased laid up tonnage the offering of shares or high yield bonds may be postponed, because market conditions are deteriorating. Additionally, in the case of equities, a smaller percentage of the company's value may be offered to the public, since the success of the issue is threatened.

### **1.17 Thesis Limitations and Suggestions for Future Research**

A possible limitation of this thesis may be that the list of factors examined is not exhaustive. Future research, in this respect, can provide fruitful evidence. For example, the author has attempted to include the issuers' chartering policy in the analyses, as it may have a major role to play in the pricing and performance of shipping equities and high yield bonds. The information, however, contained in company prospecti proved insufficient in several cases. Future research might devise a workable approach to quantify and include this variable in such analyses, as noted in paper 3.

Management quality is another potentially important factor in raising finance for shipping companies in the public capital markets. Specifically, the ability and stamina of managers to adapt to the cyclical fluctuations of the shipping industry, particularly in weathering market crises, are of utmost importance. In this respect, resourcefulness in income generation and cost budgeting are critical in ensuring survival. Quantifying, however, these management attributes can be hazardous and subjective. Future research can shed more light into this matter.

An additional area of interest for future research would be the examination of factors that led to a number of defaults by shipping companies in the high yield debt market (see Section 1.11). Such an analysis can relate several pricing characteristics of high yield bonds to their default probability and would benefit shipping companies, investors and underwriters. Furthermore, any pricing factors that are related to the probability of default can add value in the rating process.

Another suggestion for future research is to examine the relationships established in this thesis by comparing them to other industries in the public capital markets. Such comparisons can be of particular benefit to portfolio managers and optimisation techniques can be applied for the purpose of forming portfolios, according to certain criteria, depending on their risk profiles. These portfolios can include a mix of stocks and bonds selected from a variety of countries and can also be diversified across different industrial sectors.

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## **Chapter 2: The Long Run Performance of Shipping Initial Public Offerings**

Costas Th. Grammenos and Angelos G. Arkoulis\*

### **ABSTRACT**

*This paper examines for the first time the performance of Initial Public Offerings (IPOs) in the shipping industry for the initial twenty four months of trading in the secondary market. In the analysis a sample of 27 shipping IPOs issued in the stock exchanges of seven different countries in the period 1987-1995 is used. Aftermarket performance is measured against the local stock market indices of each IPO and against the Morgan Stanley Capital International (MSCI) index for the shipping equity market. The portfolio of shipping IPOs in the sample underperforms the local stock market indices by as much as 36.79% by the end of the second anniversary of public listing, but there is no evidence of underperformance in relation to the MSCI Shipping index. Furthermore, the two year holding period returns of the dataset are found to be positively related to the initial level of gearing and negatively related to the fleet age of the companies at the time of the offering.*

**Keywords:** Shipping initial public offerings; aftermarket performance; gearing; fleet age.

\* City University Business School, Department of Shipping, Trade and Finance. We would like to thank Professor Mario Levis for his useful remarks and suggestions. This paper was first presented at the 1997 International Association of Maritime Economists (IAME) Conference in London.

## **2.1 Introduction**

The equity capital markets have been a minor source of capital for the shipping industry throughout the years. Owners' funds and retained earnings have provided a small percentage of equity in the financing of vessels in the secondhand and the newbuilding markets after the 1950s, while banks, specialised financial institutions and shipyards have been the main providers of debt, ranging from 60% to 90% - sometimes even higher - of the market value or the shipbuilding price of vessels. This has been due to a number of factors, such as: the ready availability of finance by the global banking system which has - since the 1960s - been internationalised; the development and strengthening of the Eurodollar market, which was able to provide finance to an industry whose income and most banking transactions were made in US dollars; the availability of state supported provision of finance to the shipbuilding industry or its provision through the international commercial banking industry; the reluctance of the owners of shipping companies to dilute control and disclose information; and the unattractiveness of the shipping industry to institutional and private investors due to its cyclicity and, therefore, inability to provide stable income streams.

The severe crisis of the shipping industry in the early eighties - characterised by a sharp drop in freight rates and market values of vessels - led to the decrease or erosion of the capital base of many shipping companies in major shipping centres such as Hong Kong, London, New York, Oslo and Piraeus. Furthermore, the large number of international banks that provided shipping finance declined sharply in the mid and late

eighties. This was mainly due to the realisation of substantial losses from non-performing shipping loans and the sale, between 1984 and 1986, by the banks of their main loan security, the vessels, whose market values have decreased in many cases between 50% and 60%; also due to the more stringent Capital Adequacy Rules discussed in the 1980s and introduced in 1993 by the Basle Committee, the banking trend towards fee generated income, and the regulatory changes in the shipping industry.

The recent regulatory changes in the shipping industry stem from the introduction of the Oil Pollution Act 1990 (OPA90) and the International Safety Management (ISM) Code (July 1998). The OPA90 calls for stringent measures to be taken by ships entering US waters: every new vessel must have a double hull while the right of single hull vessels to enter US waters is phased out according to year of built. Furthermore, the liability of the shipowner and the parties related to ship ownership to pay damages is unlimited, if negligence or violation of regulations can be proved. All vessels will be required to be of double hull by the year 2015. These requirements inflate construction costs by 10-15%, inducing at the same time the replacement of second hand vessels by newbuildings. As a consequence, the need for substantial external funding arises.

The ISM Code stems from continuing failures in the safe management and operation of ships and is mandatory from 1 July 1998. The Code's objective is to reduce the human error element by creating an industry standard of good management. Its three

main principles are the improvement of safety of seafarers, the protection of property, and the reduction of the pollution incidents at sea. As a consequence, the Code, in conjunction with the intensification of controls by Classification Societies; Port States; P&I Clubs and oil companies induces a level playing field in terms of competition. Such developments may lead to an increase in the size of shipping companies in order to achieve economies of scale and higher operational efficiency.

This recognition, coupled firstly with the substantial amounts required (Grammenos, 1989; Peters, 1993) to replace the ageing wet and dry fleets worldwide<sup>1</sup> and secondly the internationalisation of world equity markets, has created a better environment for the utilisation of equity and debt markets as an available source of shipping finance.

Numerous studies document the pricing and the performance of Initial Public Offerings (IPOs) of common stock in the short, medium, and long run. Previous empirical work, however, has not focused on shipping IPOs, exception being the study by Grammenos and Marcoulis (1996). They examine for the first time the major features of shipping companies that go public either to fund their growth or for other purposes such as vessel acquisitions, asset play and debt repayment. The paper shows that the number and size of shipping companies raising public capital have increased during 1983-1995 and that the majority of shipping companies entering the capital markets were new companies being created from old ones or resulting from merger activities.

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<sup>1</sup> According to 1988 estimates, approximately US\$200 billion would be needed in the nineties for world fleet replacement. This amount rose to US\$400 billion, according to 1993 broader estimates.

In the same study, the initial return<sup>2</sup> characteristics of 31 shipping IPOs were analysed and it was found that shipping IPOs exhibit relatively small but statistically significant underpricing, this being attributed to the international sale and purchase market in the industry that limits information asymmetries, and to the fact that the market value of shipping IPOs is closely linked with the value of their underlying physical assets - their vessels.

In addition, the authors document that shipping funds exhibit similarities to IPOs of closed end funds and property companies<sup>3</sup>. The seven shipping funds in their sample have an average first day return of 2.51%.

The present paper concentrates on examining the performance of shipping IPOs in the aftermarket. No previous study has performed this task. The scope, therefore, of this paper is to fill this gap in the literature by presenting evidence on the long run performance of IPOs in the shipping industry, by using a sample of 27 shipping IPOs of common stock that are listed in the stock exchanges of seven countries. Performance is measured against the local stock exchange indices of the issues and against the Morgan Stanley Capital International (MSCI) Shipping Index that is taken as a proxy for the shipping market. Furthermore, the effects of various factors on the aftermarket performance of shipping new issues are examined, these factors being the

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<sup>2</sup> As measured by first day returns.

<sup>3</sup> e.g. Peavy III (1990) and Weiss (1989) do not find evidence of underpricing for closed end fund IPOs, and Wang and Chang (1992) find that property IPOs are not underpriced. On the other hand, Levis and Thomas (1995) find evidence of some underpricing for 105 UK funds, but its magnitude is rather low and stands at 1.91%.



proportion of equity offered, the initial level of gearing, fleet composition and fleet age. Moreover, the paper examines performance in the aftermarket by year of issuance and country.

There is a wide literature base on the long run performance of IPOs. Most, if not all, of the studies indicate that IPOs perform poorly in the secondary market. Aggarwal and Rivoli (1990), using a sample of 1598 IPOs that went public in the US in the period 1977-1987, document an abnormal return of -13.73% at the end of the first year of trading. Ritter (1991) reports evidence of IPO underperformance beyond the first year of trading. His sample of 1526 IPOs in the US during 1975-1984 underperformed similar size and industry firms by 29% by the third year anniversary of their public listing.

Poor performance of IPOs in the long run has also been documented for other countries. Levis (1993) finds that 712 IPOs in the UK underperformed the Hoare Govett Smaller Companies Index<sup>4</sup> by 8.31% by the end of their third year of listing. Uhlir (1989) shows that German IPOs underperformed the market by 7.41% in their first year of trading, while Aggarwal, Leal, and Hernandez (1993) report three year market adjusted returns of -47%, -19.6% and -23.7% for Brazil, Mexico and Chile, respectively. McGuinness (1993) reports that 92 IPOs issued in Hong Kong in the period 1980-1990 underperformed the market by 4.60% in their first year of trading. Furthermore, Peavy III (1990) documents that 41 IPOs of closed end funds issued in

the US in the period 1986-1987 underperformed the market by 12.79% in the first 100 days of trading, whereas Wang, Chan, and Gau (1992) document that 87 IPOs of real estate companies issued in the US during 1971-1988, underperformed similar size and industry firms by 7.48%, during the first 190 trading days.

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<sup>4</sup> Long run underperformance is also present using alternative benchmarks.

## 2.2 Data and Methodology

The sample used is comprised of 27 shipping companies that went public by issuing common stock during the period 1987-1995, in the stock exchanges of Greece, Hong Kong, Norway, the Philippines, Singapore, Sweden and the US. The companies are presented in appendix 1, by country and by year of issuance. The sample can be considered relatively small, because the focus of the study is on companies whose prime business is in the operation of vessels (i.e. shipyards are excluded). However, all shipping IPOs - in the tanker, dry and ferry sectors - issued in these countries over the period of examination are included in the sample.

Table 1 provides details on the size, proportion of equity offered, age of the company and fleet, and gearing of the companies in our sample of shipping IPOs<sup>5</sup>.

The average size of all shipping companies going public is US\$150.65 million. Companies in the Far Eastern countries are by far the largest and exhibit an average size of US\$247.56 million. Greek companies have the lowest average size of US\$5.44 million, whereas the size of Norwegian, Swedish and US shipping companies is close to the overall average.

The mean proportion of equity offered varies across countries. It fluctuates between 80% in the US to 29% in the Far East and 25% in Greece. The average figure, however, for the US is very high, because six US limited life funds gave out 98% of

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<sup>5</sup> Company Size is calculated as the number of post IPO shares times the offer price. The proportion of equity offered is calculated as: gross proceeds / size of company at the time of the offering; debt to

their equity. The remaining three US companies offered 48.8% of their equity to the public. Similar percentages of equity were offered by Swedish (38%) and Norwegian (45%) companies.

The average gearing level of shipping IPOs at the time of the offering is 1.40,<sup>6</sup> but this figure exhibits considerable variation across countries. It is quite high in the US and Norway standing at 3.88 and 2.21 respectively, whereas it is much lower in the Far East, Sweden and Greece standing at 0.89, 0.74 and 0.41, respectively. Average gearing of US companies may not be a very representative figure, because the six US listed funds entered the market as new companies free of debt. Average gearing also exhibits considerable variation within some countries as is indicated by its standard deviation. In Norway it is higher than the mean, standing at 2.49 and in the US it is also very high at 3.38. In the Far East and Sweden it is lower standing at 0.58 and 0.17 respectively, whereas in Greece it is a very low 0.10.

The average fleet age of the shipping IPOs is 13.39 years. Greek companies are the outlier here with an average age of 25 years, 12 years older than the all country average. This is because all the Greek companies in our sample operate coastal vessels, which often have a higher economic life than other bulk carrier or container vessels. Fleet age at the time of the offering is broadly similar for Norwegian, Far Eastern and US shipping IPOs, standing at 11.21, 12.97 and 12.69 years, respectively. The US average fleet age, though, is driven up by the shipping funds with an average

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equity ratios are computed as: long term debt / shareholders' equity; fleet age is the average age of the vessels of the companies at the time of the issue.

<sup>6</sup> Our sample includes one Norwegian company, Atlantic Containers, whose debt to equity ratios is 8. Excluding this company the average gearing ratio drops to 1.03 which is close to the median gearing of the whole sample (0.90).

fleet age of 13.78 years. The average age of the remaining US listed shipping companies is 9.38 years. Swedish IPOs exhibit the lowest average fleet age, 9.15 years.

Six companies included in the sample are shipping funds and initially entered the capital markets for speculative asset play reasons. These companies appeared in the US during the period 1987-89 and were established by their promoters as limited life shipping funds. In other words, their life was predetermined to last between five and seven years. Their purpose was to buy second hand vessels at a market downturn, trade the vessels until the market improved significantly, and liquidate the company by selling the vessels at a premium distributing its net assets to its shareholders. Apart from the to-be-generated revenue from the eventual sale of the vessels, it was also the companies' intention to pay dividends out of operational cash flows. Reasons for the appearance of such funds included the erosion of the equity base of the shipping companies during the crisis of the eighties and the resulting reduction in the number of financial institutions willing to provide capital for the shipping industry, as well as the willingness of some shipowners to utilise the equity capital markets not only for speculation, but also in order to maintain their companies in the public domain<sup>7</sup>.

Prices at the end of the first day of trading, the last day of the first trading month and at the end of each month for a two year period in the aftermarket, were collected from DataStream International and converted into US dollars (where applicable). Other details regarding individual characteristics of each IPO - i.e. size, proportion of equity

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<sup>7</sup> For a thorough discussion of the nature of shipping funds see Grammenos and Marcoulis (1996).

offered, debt to equity ratios, age of the fleet, and fleet composition - were obtained from the individual offer prospecti and the annual reports of each company.

For each issue,  $i$ , three measures of performance are calculated:

i) The first day return,  $R_i$  is defined as the percentage change in price from the offering date to the close of the first trading day:

$$R_i = (P_1 - OP) / OP \quad (1)$$

where  $P_1$  is the closing price on the first trading day and  $OP$  is the offer price.

ii) The first month adjusted return,  $ar_{i1}$ , defined as the realised return from the close of the first trading day to the last calendar day of the first trading month,  $r_{i1}$ , less the equivalent benchmark return,  $r_{m1}$ . The time interval, therefore, of  $ar_{i1}$  ranges from 1 to 30 calendar days.

$$ar_{i1} = r_{i1} - r_{m1} \quad (2)$$

iii) The long run return which assesses the aftermarket performance for the 24 months following the first month of trading. Monthly abnormal returns<sup>8</sup>,  $ar_{it}$ , are calculated for each issue as follows:

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<sup>8</sup> Monthly returns are based on the last day of the month of which the stock is traded, incorporate dividend payments and where applicable are adjusted for splits and/or rights.

$$ar_{it} = r_{it} - r_{mt} \quad (3)$$

where  $r_{it}$  is the raw return for IPO  $i$ , in month  $t$ , and  $r_{mt}$  is the benchmark return for the corresponding month.

When calculating monthly abnormal returns as above, an implied assumption regarding systematic risk is that the beta coefficient is equal to unity. This is unlikely to affect the essence of our results. Authors have shown that the average beta of newly listed firms is higher than one<sup>9</sup>. Therefore, the measures of abnormal performance used are likely to provide conservative estimates of IPOs' underperformance (Levis, 1993).

Two benchmarks are employed in the study. Firstly, to adjust for stock market movements, the MSCI equity index of each stock exchange in which each company is listed is used. Secondly, to adjust for industry effects the MSCI Shipping Index is employed as a benchmark. All indices are calculated in US dollars, include dividends and were collected from DataStream International.

The MSCI indices are value-weighted and aim for 60% coverage of the total market capitalisation for each market. The chosen list of stocks includes a representative sample of large, medium, and small capitalisation companies from each local market, taking into account the stocks' liquidity. Furthermore, stocks with restricted float or cross-ownership are avoided.

A variety of indices exists that is based on each segment of the shipping industry. The MSCI Shipping Index has been chosen, however, because it is representative of the overall conditions in the shipping markets. It comprises of companies in the shipping industry that differ in size, fleet composition and specialisation. This is illustrated in Figure 1 that plots the values of the index for the time period under analysis. The rising freight rates both in the tanker and dry bulk sectors of the market for the years 1988-1989 are reflected in the index, together with the worsening market conditions in the second half of 1990 and during 1992. The apparent improving conditions in the industry that prevailed in 1993 and 1994 are also well captured by the index.

To facilitate comparability with existing empirical evidence, the same measures of long run performance are employed as in Ritter (1991) and Levis (1993). Therefore, the average adjusted return on a portfolio of  $n$  IPOs for month  $t$  is the simple arithmetic average of the benchmark adjusted returns:

$$AR_t = \frac{1}{n} \sum_{i=1}^n ar_{it} \quad (4)$$

The cumulative benchmark adjusted aftermarket performance from the beginning of the first full calendar month of trading to event month  $q$  is the summation of the average benchmark adjusted returns:

$$CAR_{1,q} = \sum_{t=1}^q AR_t \quad (5)$$

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<sup>9</sup> e.g. Ibbotson (1975) and Clarkson and Thompson (1990).



The statistical significance of CARs is assessed by:

$$t(CAR_t) = \frac{CAR_t \cdot \sqrt{n}}{\sqrt{t \cdot \text{var} + 2 \cdot (t-1) \cdot \text{cov}}} \quad (6)$$

where  $t$  is the event month,  $\text{var}$  is the average (over 24 months) cross sectional variance, and  $\text{cov}$  is the first order autocovariance of the ARt series.

When a firm in portfolio  $p$  is delisted from the DataStream database, the portfolio return for the next month is an equally weighted average of the remaining firms in the portfolio. Thus, the cumulative adjusted return for months 1 to 24 involves monthly rebalancing, with the proceeds of a delisted firm equally allocated among the surviving members of the portfolio  $p$  in each subsequent month.

As an alternative to the use of cumulative average benchmark adjusted returns which implicitly assumes monthly portfolio rebalancing, two year holding period returns (HPR) are also computed as:

$$HPR_i = \prod_{t=1}^{24} (1 + r_{it}) - 1 \quad (7)$$

where  $r_{it}$  is the raw return of firm  $i$  in event month  $t$ . This measures the total return from a buy and hold strategy where an IPO is purchased on the first day of the first full calendar month and held until either its second year anniversary or its delisting

whichever is first. In order to interpret this 2-year total return, wealth relatives are computed as:

$$WR = \frac{1 + \text{average 2-year total return on IPOs}}{1 + \text{average 2-year total return on a market benchmark}} \quad (8)$$

A wealth relative of greater than 1.00 can be interpreted as IPOs outperforming the market benchmark, whereas a value below 1.00 indicates IPO underperformance<sup>10</sup>.

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<sup>10</sup> We also employed another approach in the analysis to check if our results are robust to different performance measures. Average buy and hold abnormal returns, defined as  $HPR_i - HPR_m$  [Barber and Lyon (1997)] have also been calculated. Results not reported here, point to qualitatively similar conclusions to the performance measures used throughout the paper and are available from the authors on request.

### 2.3 Results and Discussion

#### *Cumulative Adjusted Returns*

Table 2 reports the cumulative average benchmark adjusted returns (CARs), excluding first partial month returns, for the 24 months in the aftermarket. Separate results are shown for both benchmarks. Both CAR series exhibit a gradual but steady decline during the 24-month period following the first month of trading. They fall to -36.79% (market adjusted), and -8.43% (MSCI Shipping adjusted). However, only the market adjusted CAR series becomes significantly negative in the 15<sup>th</sup> month of trading. The MSCI Shipping adjusted CAR series remains insignificant throughout the first 24 months of trading<sup>11</sup>.

This latter finding is not consistent with existing empirical evidence. As mentioned above, most of the studies have shown that IPOs perform poorly in the secondary market even when performance is measured against similar size and industry firms. Ritter's (1991) sample, for instance, underperforms a portfolio of industry and size matched firms. Moreover, when aftermarket performance was categorised by industry, he found that in 11 out of 14 cases, IPOs underperformed their corresponding industry group.

The fact that the portfolio of shipping IPOs underperformed their local stock market indices by their second anniversary of public listing, but not the MSCI Shipping Index

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<sup>11</sup> In order to evaluate the aftermarket performance of the portfolio of IPOs for the local investor, all the performance measures are re-calculated without translating prices and local stock market indices into US dollars. Cumulative average abnormal returns for the two years in the aftermarket are -37.23% (market-adjusted) and -12.81% (MSCI Shipping adjusted). Only the former CAR series is statistically significant, from the 15<sup>th</sup> month of trading. All other relevant results are available from the authors.

implies that conditions in the shipping industry have been unfavourable for some years after a number of shipping companies chose to go public and/or that expectations for many companies have not been realised.

This implication is particularly strong for companies that entered the capital markets in the periods 1988-89 and 1993-94<sup>12</sup>. Five companies going public during the first period were asset play companies (shipping funds). These companies experienced severe underperformance as is discussed in the next sub-section. The majority of companies that issued stock in 1993-94 were tanker operators. Tanker companies entered the capital markets in this period, at a time when there had been signs of future improvement in this sector. Such signs were increased vessel scrapping and the slow tanker fleet replacement through newbuildings. However, these expectations were not realised and tanker freight rates for the two years of trading in the aftermarket for these 12 issues remained low.

#### *Aftermarket performance by Year of Issuance*

In Table 3 first day returns and aftermarket performance are categorised by their year of issuance. The one and two year holding period returns and wealth relatives based on the two benchmarks are shown. It can be seen that aftermarket performance varies depending on the year of issuance and on the benchmark employed. Average wealth relatives for the first year in the aftermarket are close to unity both with respect to the shipping industry (0.98) and with respect to the stock market indices (1.00). However, for the second year of trading, it can be seen that wealth relatives with respect to the

shipping industry are consistently higher than those based on the stock market indices. The average wealth relative for the second year of trading for the stock market adjusted returns is very low and stands at 0.68. This indicates that shipping IPOs severely underperformed their local stock market during their second year of listing.

The fact that most wealth relatives based on the local stock market returns are quite low for most of the years under analysis, indicates that market underperformance is a general phenomenon. This is not the case, though, for wealth relatives calculated on the basis of the MSCI Shipping Index performance. In most instances, wealth relatives are close to unity. Nevertheless, it is evident, that the worst performing IPO group emerged in the years 1987-1989, when six out of nine companies entered the capital markets for asset play. When an outlier (Stolt Nielsen) that has a 2-year HPR equal to 121% is dropped from the sample, the average 2-year HPR for 1988 falls to -12.31% and wealth relatives for the year fall to 0.67, and 0.79. The average 2-year HPR for the asset play companies alone is -30% and their corresponding wealth relatives are 0.53 and 0.62.

The severe underperformance of the shipping funds can be attributed to the fact that they entered the capital markets when market conditions and prospects appeared to be favourable for the shipping industry. External factors, that persuaded promoters of shipping funds and potential investors that the timing was right for investing in the shipping industry, were the improving shipping markets as manifested by increased scrapping followed by rising demand for shipping services, and the rationalisation of

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<sup>12</sup> Grammenos and Marcoulis (1996) have shown that the number of shipping IPOs is clustered around these two distinct time periods. Eight shipping companies go public in 1988-89, whereas twelve issue

the shipbuilding industry along with the fading out of governmental shipbuilding subsidies<sup>13</sup>. These expectations, however, were not realised. Furthermore, the shipping funds operated fleets with a high age profile. This increased their running costs, particularly those of maintenance and insurance.

#### *Aftermarket Performance categorised by First Day Returns<sup>14</sup>*

To further examine the relationship between initial and long run performance, firms are categorised according to their level of first day returns in Table 4. Ritter (1991) and Levis (1993) found that there is a tendency for offerings with the highest initial returns to do worst in the aftermarket. In both cases, this tendency was partly attributed to the fact that investors are periodically overoptimistic about the earnings potential of newly issued firms<sup>15</sup>.

In our case, however, no such pattern is evident. It can be seen, though, that IPOs that were overpriced (negative initial returns) are the worst performing group in our sample, both by their first and second anniversary of public listing. Four of the companies in this group are shipping funds. As discussed above, underperformance for such asset play companies was severe. Furthermore, when a single company is dropped from the second group of IPOs (Stolt Nielsen), wealth relatives drop to 0.73 (market adjusted) and 0.81 (MSCI Shipping adjusted) for the first year of trading, and 0.54 (market adjusted) and 0.80 (MSCI Shipping adjusted) for the second year of

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common stock for the first time in 1993-94.

<sup>13</sup> Grammenos and Marcoulis, (1996).

<sup>14</sup> calculated as in Equation (1).

<sup>15</sup> Furthermore, evidence provided by DeBondt and Thaler (1985, 1987) demonstrates that, at least for low capitalisation stocks, there is a negative relation between past and subsequent abnormal returns on individual securities using holding periods of a year or more.

trading. No clear relationship can be established, therefore, between the level of initial returns and aftermarket performance.

#### *Aftermarket Performance across Countries*

In Table 5 the aftermarket performance of shipping IPOs is categorised by country. Wealth relatives for the first year of trading indicate that performance across countries is similar. Those that are based on market performance are close to one, whereas those based on the MSCI Shipping Index are slightly above unity. The notable exception, however, in both cases is Norway, which exhibits wealth relatives below one for both cases.

By the second year of listing, wealth relatives based on the local stock market indices are consistently less than one, confirming the incidence of widespread underperformance in this respect. This is not the case, though, for wealth relatives measured against the MSCI index performance. Long run performance for shipping IPOs in Norway, Sweden, and the three Far Eastern countries has been similar to the performance of the shipping market as indicated by their corresponding wealth relatives. Companies in Greece and the US, however, have on average underperformed the industry. All three Greek IPOs included in the sample are ferry companies and were introduced into the Athens Stock Exchange in 1994 (Strintzis and DANE) and 1995 (NEL). For the two years following their listing, conditions in this market segment have been adverse. Consequently, long run performance of these companies has been poor. Six of the US companies are shipping funds. As mentioned above, these companies have been exceptionally poor performers. When they are

excluded from the analysis, wealth relatives for the US rise to 1.02 (market adjusted) and 1.24 (MSCI Shipping adjusted).

*Aftermarket Performance categorised by Proportion of Equity Offered*<sup>16</sup>

Table 6 reports the aftermarket performance of shipping IPOs categorised by proportion of equity offered. This differs across countries and stock exchanges. In the stock exchanges of Athens and Stockholm it is required that at least 25% of the company shares are owned by the general public. In Norway, the Oslo Stock Exchange regulations specify that for a company to obtain a public listing there must be at least 500 shareholders. In Hong Kong and Singapore, listing requirements specify either the minimum of 25% of total capital, or not less than HK\$50,000,000 and \$1,500,000 (whichever is higher) must be in public hands (in the case of Singapore in the hands of not less than 500 shareholders). In the Philippines, the applying company must have a minimum authorised capital stock of at least \$15,000,000, of which a minimum of 25% must be subscribed and fully paid. With respect to the US stock exchanges, requirements vary according to which stock exchange the company seeks listing. In the NYSE there must be at least 1,100,000 publicly held shares outstanding, in the case of the AMEX there must be at least 500,000 publicly held shares outstanding, and finally, in the case of the NASDAQ there must be at least 100,000 publicly held shares outstanding.

In general, no relationship is established between aftermarket performance and the proportion of equity offered to the public, both by the end of the first and the second

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<sup>16</sup> The proportion of equity offered is calculated as: gross proceeds / size of company at the time of the offering.



year of listing. It can be seen, though, that the group with the highest proportion of equity offered is the worst performing group in the aftermarket. This can be partly explained by the bad performance of the shipping funds included in this group, which offered, on average, 98.10% of their equity. The bad performance of asset play companies, as mentioned above, can be attributed partly to the high costs incurred - in terms of insurance and maintenance - due to the high average fleet age of their vessels (13.78 years), in addition to adverse market conditions. Furthermore, the agency problem that may exist when owners of a company hold such a small stake of their own equity, could also account for the bad performance of such companies.

#### *Aftermarket Performance by Fleet Composition*<sup>17</sup>

In Table 7, long run performance is categorised by the fleet composition of the companies. Performance by the end of the first anniversary of public trading is similar across different fleet compositions and is close to that of the local stock markets and the shipping market, as manifested by the wealth relatives. However, the two year performance measures indicate that performance varies across different fleet compositions. The worst performing group is that of ferry companies. As mentioned above, conditions in this shipping sector were unfavourable for the two years following the public listing of these companies, and this is reflected in their share performance.

Companies that operate in the dry bulk sector also exhibit underperformance both with respect to the stock market where they are listed and to the shipping industry.

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<sup>17</sup> Companies are classified according to their primary activities (70% or more) as tanker, dry bulk, passenger and diversified operators.

However, three shipping funds are included in this group. When they are dropped, wealth relatives rise to 0.58 (market adjusted) and 1.04 (MSCI Shipping adjusted). Finally, performance of shipping IPOs in the tanker sector has been similar to the performance of the shipping market, as indicated by the corresponding wealth relative of 1.00.

#### *Aftermarket Performance by Fleet Age*<sup>18</sup>

In Table 8, long run performance is categorised by the age of the fleet of the companies in the sample. No pattern emerges for the first year of trading; however, there is a clear inverse relationship between the age of the fleet of the companies in the sample and performance for the two years after listing. The two groups with the lower fleet age are the best performing groups with wealth relatives equal to 1.07 and 1.26 (market adjusted), and 1.10 and 1.18 (MSCI Shipping adjusted). This pattern is not surprising. The age profile of a company's fleet may have direct and profound financial implications. Grammenos and Marcoulis (1996) have pointed out the importance of the fleet age of a shipping company: first, it affects operating costs and therefore its income; secondly, it influences the perception of the company in the eyes of charterers and investors.

Although new vessels are normally much more expensive, it is not clear whether they are favoured by the existence of a two-tier market. In such a market, new modern vessels will command a monetary premium over old ones. In the case of tankers, Tamvakis (1995) does not find enough evidence to support a two tier market hypothesis in the period 1989-1993. As a result, it is possible that in a good market

both old and new vessels earn roughly the same freight. This would imply that in a good market older vessels may earn more profits, while, provided they were bought when the market was 'low', they may survive a bad market less painfully than new vessels, since new ones would have the additional burden of high capital outlay and debt repayment.

However, operating older ships may entail relatively higher running costs, e.g. fuel, insurance costs, manning requirements and maintenance<sup>19</sup>. Furthermore, factors such as the US Oil Pollution Act of 1990<sup>20</sup> and often the reluctance of major oil companies and other first class charterers to employ older vessels may result in the creation of a two-tier market, in a number of cases in terms of monetary premiums, but mostly in terms of preference for employment.

#### *Aftermarket Performance by Initial Gearing<sup>21</sup> Level*

In Table 9, aftermarket performance is categorised by the gearing level of the companies at the time of going public. The debt to equity ratios of the companies in the sample are used. It should be noted that in this case, the sample is reduced to a total of 19 companies, due to the fact that eight IPOs were gearless at the time of going public<sup>22</sup>. No pattern emerges in this case either for the first year of trading. Nevertheless, the group with the highest debt to equity ratios is the best performer

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<sup>18</sup> Fleet age is the average age of the vessels of the companies at the time of the issue.

<sup>19</sup> It should be noted that two sister vessels may be in a materially different operating state if the one is well maintained and the other not.

<sup>20</sup> OPA 90 is designed to protect US waters from oil pollution; it requires vessels to have double hulls therefore increasing newbuilding costs; it also imposes unlimited liability for damage resulting from oil spills therefore increasing insurance costs. Furthermore, OPA 90 provides for the gradual phasing out of older single hull vessels.

<sup>21</sup> see footnotes 5,6.

<sup>22</sup> The six shipping funds were not geared at the time of their offerings.

with wealth relatives above 1, both with respect to the local stock market index and the MSCI Shipping Index.

In the second year of trading, the best performing group is again that with the highest average initial gearing level. All four companies in this group exhibit positive two year HPRs. There is, therefore, a strong tendency for IPOs with higher initial gearing levels to do better in the aftermarket. The group with the lowest average initial gearing level appears to be a good performer with respect to the MSCI Shipping Index. Only one issue in this group (Jinhui Holdings), however, has a positive 2 year HPR equal to 40%. Excluding this company from the group, the wealth relative based on the MSCI Shipping Index drops to 0.96.

Shipping companies in the seventies and eighties had quite high gearing levels. Debt/equity ratios of 3 or higher were not unusual. This proved to be quite painful during the crisis period of the mid-seventies and the first part of the eighties, and in a number of cases catastrophic; particularly for companies which did not generate stable income through medium or long term time charters and/or contracts of affreightment but operated in the spot market (Grammenos, 1995). After the crisis, though, shipping companies have maintained a more conservative approach towards gearing with debt to equity levels above 2.5 being less normal.

Three IPOs in our sample with high debt to equity ratios, Atlantic, Teekay Shipping and William<sup>23</sup>, enter the capital markets with the primary purpose of reducing their

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<sup>23</sup> Debt to equity ratios for these companies were 8.01, 1.75 and 1.47 respectively, at the time of the offering.

debt levels. Moreover, 13 out of 19 of the companies in the sample state in their offer prospecti that a proportion of the proceeds of their offerings is to be used for repaying a portion of their long term debt. In fact, the average debt to equity ratio for the sub-sample of 19 companies drops from 1.41 (pre-IPO level) to 0.72 by the end of the first year of trading. Furthermore, the debt to equity ratio for the second year in the aftermarket is similar and stands at 0.78.

This apparent trend of shipping companies reducing their debt levels, alongside financial institutions becoming more stringent in their lending policies<sup>24</sup>, could also improve the industry's attractiveness in the eyes of investors. Furthermore, Grammenos and Marcoulis (1996) have found that gearing is also positively related to the degree of underpricing for shipping offerings. The positive association of aftermarket performance and the initial gearing level has the following explanation. Higher gearing levels reduce the value and increase the risk of a shipping company. Therefore, investors require higher rates of return in order to be compensated for taking more risk. In addition, it can be said that since investors in the shipping industry tend to correlate high levels of debt with offerings of a higher risk class, the lower debt to equity ratios of publicly quoted shipping companies (13 out of 19) in the aftermarket is perceived as a positive signal, hence the positive association with aftermarket performance.

### *Regression Results*

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<sup>24</sup> However, in 1995 increased competition among international financial institutions in attracting desirable clientele, has led to an increase in financial leverage of shipping companies sometimes accompanied by relaxation in the required securities [Grammenos (1995)].

To examine more closely the effects of the local stock markets and the MSCI Shipping Index on the aftermarket performance of shipping IPOs, univariate regression analysis is performed. More specifically, two sets of regressions are carried out. For the first set, the dependent variable is the one year holding period return for each IPO, whereas for the second, the dependent variable is the two year holding period return for each IPO.

The independent variables used in both cases are: the local stock market index (M), the MSCI Shipping Index (MSCI), first day returns (INRET), the percentage of equity offered to the public at the time of the offering (%EO), the initial gearing level<sup>25</sup> (GEARING) and the natural logarithm of the age of the fleet<sup>26</sup> (LAGEF) of the IPOs at the time of the offering. Furthermore, to test whether performance is affected by the fleet composition of the issues in the sample, three binary variables are used, namely (TANKER) for companies that operate in the tanker sector, (DRY) for companies that operate in the dry cargo sector and (FERRY) for companies that operate in the ferry sector of shipping. A binary variable (FUND) is also employed in the analysis to test whether the six shipping funds in the sample perform on average worse than the remaining companies.<sup>27</sup>

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<sup>25</sup> The fact that we found that shipping companies with high debt at the time of the IPO perform better in the aftermarket than shipping companies with low debt, led us to question whether holding period returns are related to changes in gearing from the time of the offering. For this purpose, regression analysis is performed. Specifically, the changes in gearing from the time of the offer to the end of the first year of trading are regressed on one year holding period returns and the changes in gearing from the time of the offer to the end of the second trading year are regressed on two year holding period returns. No significant relationships are established in either case. Results not reported here, are available from the authors.

<sup>26</sup> Many empirical studies that examine age as a determinant of aftermarket performance use the natural logarithm of one plus the age in years as the explanatory variable [e.g. Ritter (1991)].

<sup>27</sup> We also employed another technique, a ranking procedure, to test for the effects of first day returns, the percentage of equity offered to the public, the age of the fleet and the gearing level, on aftermarket returns. Ranking is based on the groupings of tables 4, 6, 8 and 9 and the four variables created through this ranking procedure are RINRET, R%EO, RGEARING, and RAGEF, respectively.

Regression results are shown in Table 10<sup>28,29</sup>. With respect to the first set of regressions where the dependent variable is the first year holding period return, it can be seen that cross sectional betas are quite similar both with respect to the local stock market indices (M) and the MSCI Shipping Index (MSCI) are quite different and their coefficients stand at 0.55 and 0.93, respectively. One would expect these values to be slightly above 1.00, given the findings of several studies that the average beta for newly listed firms is greater than one<sup>30</sup>. The coefficient of MSCI, though, is increased to 1.15 when two shipping funds, B&H Bulk and B&H Ocean are excluded from the sample. One year HPRs for these firms are 36.34% and 39.03%, respectively, whereas the return on the MSCI Shipping Index is 14.06% and 73.71% for the corresponding period.

The coefficient of the local stock market index (M) drops to 0.46 for the second set of regressions, although that of the MSCI Shipping Index (MSCI) is almost the same and stands at 0.82. The distortion of the effect of the shipping market by the above two funds is more evident for the second year of trading. The 2-year HPR for B&H Bulk is -7.77%, while the corresponding return for the MSCI index is 75.99%. Accordingly, the 2-year HPR for B&H Ocean is 3.39%, whereas that of the MSCI index is 46.76%. Excluding these two companies from the sample the coefficient of MSCI is dramatically higher and stands at 1.85. This suggests that aftermarket performance of shipping IPOs is dominated by conditions in the shipping market by the end of both their first and second trading years.

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<sup>28</sup> For both sets of regressions, parameters were estimated using Ordinary Least Squares.

Regarding the remaining explanatory variables, results for both sets of regressions, generally confirm the findings discussed in the previous section of the paper. In panel A of the table univariate regressions for each variable are performed. Aftermarket performance for the first 24 months of trading is found to be positively related to the initial gearing level of shipping IPOs, and negatively related to fleet age. In addition, panel B of Table 10, demonstrates that when gearing and fleet age are simultaneously introduced as explanatory variables, both their coefficients remain statistically significant in a multivariate setting<sup>31</sup>.

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<sup>29</sup> Both sets of regressions were also performed for a reduced sample that excludes the six shipping funds. Results, available from the authors, are essentially the same.

<sup>30</sup> see footnote 10.

<sup>31</sup> The coefficient of INRET is statistically significant, however, this is due to one company (Frontline) that has a first day return equal to 83.33% and can be regarded as an outlier. When this company is dropped from the analysis the coefficient of INRET becomes negative and is highly insignificant. Aftermarket performance is therefore unrelated to the degree of underpricing. No other relationship is established.



## **2.4 Summary and Conclusions**

This paper examines for the first time the performance of shipping IPOs in the aftermarket. The analysis includes a sample of 27 shipping IPOs that were issued during the period 1987-1995 in the stock exchanges of Greece, Hong Kong, Norway, the Philippines, Singapore, Sweden and the US. Performance is measured for the first 24 months of trading against the local stock market indices of each IPO and against the Morgan Stanley Capital International (MSCI) Shipping Index.

Average cumulative adjusted returns demonstrate that the portfolio of shipping IPOs in the sample underperformed their local stock market indices by 36.79%, by the end of their second anniversary of public listing. However, no underperformance was documented when IPO returns were adjusted by the MSCI Shipping Index. This was attributed to the adverse conditions that prevailed in the shipping market for certain years during the period under analysis and to the poor performance of the six shipping funds included in the sample.

Furthermore, holding period returns and wealth relatives were calculated as performance measures for the portfolio of the companies in our sample. Aftermarket performance was ranked by year of issuance and it was found that IPOs performed as well as the shipping market for most of the years in the analysis, in their first year of trading. For the second year of trading, though, shipping new issues performed poorly in the period 1987-1989. This was attributed to the bad performance of the six shipping funds in the sample.

Different countries display similar performance in the aftermarket. Wealth relatives for the first year in the aftermarket based on both the local stock market and the MSCI Shipping Index indicate underperformance for companies in Norway. Wealth relatives for the second year of listing indicate that Greek and US companies have performed poorly. In the case of Greece, underperformance of three Greek ferry companies was attributed to the adverse conditions that prevailed in this sector after their listing in 1994 and 1995. Poor performance in the US is documented, because all six asset play companies were issued in this country in the period 1987-1989.

Similar performance in the aftermarket is documented across different fleet compositions of the companies, for the first year of their public trading. For the second year of trading, though, performance was particularly bad for ferry companies. Finally, wealth relatives based on the MSCI Shipping Index were found to be very close to unity for firms that operate in the tanker sector.

Aftermarket performance was also ranked by the proportion of equity offered, initial gearing and fleet age. No pattern is evident in the case of the proportion of equity offered to the public at the time of the offering. Companies, though, that are on the highest grouping of equity offered did substantially worse in the aftermarket. Again, this was attributed to the bad performance of the six shipping funds that fall under this category.

In Grammenos and Marcoulis (1996) it is documented that the level of gearing immediately prior to going public is positively related to underpricing. In this paper, the initial gearing level emerges as an important factor of aftermarket performance.

Wealth relatives for the second year of trading, as well as regression analysis, indicate that IPOs with higher debt to equity ratios at the time of the offering perform better in the aftermarket. This is attributed to the higher rates of return required by investors for taking more risk and to the lower financial leverage of the companies in the secondary market, that is perceived as a positive signal. In fact, the average debt to equity ratio for the sample drops from 1.41 at the time of the offering to 0.72 and 0.78, by the end of the first and second trading years, respectively.

Fleet age was found to be negatively related to performance in the long run. Offerings with a younger fleet do better in the long run than those with an older one, as is indicated both by wealth relatives in the second trading year and regression results. This finding is not surprising. Operation of older ships usually involves higher running costs in terms of maintenance and repairs, insurance and oil consumption.

Another finding of the paper is that the long run performance of shipping IPOs is more in line with the shipping market - as proxied by the MSCI Shipping Index - than the local stock market for each issue. Moreover, aftermarket performance in the longer run is driven mostly by industry factors; when regression analysis is performed, the only significant effects on two year performance are those of fleet age and the gearing level of the companies at the time of their offerings.

Finally, there is an equally important conclusion based on our findings. The cyclical nature of the shipping industry, the variety of shipping companies that are listed on stock exchanges, and the diversity of their performance which is linked to microeconomic (company-specific) and macroeconomic (world economy and the

overall shipping industry) factors and conditions require a thorough understanding of both factors and conditions as well as sound investment analysis skills. In this context, there is great need to educate the investment analyst for the benefit of both the investors and the shipping companies.

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**Table 2.1: Sample Descriptive Statistics**

Country	ALL	HELLAS	NORWAY	FAR EAST	SWEDEN	US
Mean Size of Company (US\$million)	150.65	54.44	137.76	247.56	147.70	149.95
Median Size of Company (\$million)	100.23	34.22	162.99	292.35	147.70	75.24
Proportion of equity offered (%)	54%	25%	45%	29%	38%	80%
Standard Deviation (%)	31%	3%	23%	7%	5%	32%
Mean Gearing of Company at the time of going public	1.40	0.41	2.21	0.89	0.74	3.88
Standard Deviation	1.72	0.10	2.49	0.58	0.17	3.38
Mean Age of Company at the time of going public (Years)	7.07	13.33	5.75	16.75	0.00	3.80
Standard Deviation (Years)	11.28	10.60	9.13	19.96		7.74
Mean Age of the fleet at the time of going public (Years)	13.39	25.00	11.21	12.97	9.15	12.69
Standard Deviation (Years)	5.40	0.75	3.39	5.86	5.44	2.99
Number of IPOs	27	3	9	4	2	9

**Table 2.2: Cumulative Average Adjusted Returns for Shipping Initial Public Offerings, 1987-1995. Excluding Initial Returns.**

Month of Seasoning	Number of Firms Trading	Local Stock Market Index Adjusted		MSCI Shipping Index Adjusted	
		CAR %	t-statistic	CAR %	t-statistic
1	27	-3.73	-1.91	-2.02	-0.83
2	27	-5.53	-1.95	-3.40	-1.17
3	27	-4.40	-1.25	-1.03	-0.61
4	27	-1.20	-0.29	1.92	0.34
5	27	-2.33	-0.51	0.60	-0.07
6	27	-4.69	-0.94	-0.55	-0.5
7	27	-4.94	-0.91	0.01	-0.42
8	27	-7.41	-1.28	-1.86	-0.82
9	27	-8.72	-1.42	-1.90	-0.83
10	27	-11.11	-1.71	-2.49	-0.86
11	27	-11.26	-1.65	-2.62	-0.95
12	27	-10.89	-1.53	0.22	-0.53
13	27	-10.67	-1.44	1.51	-0.23
14	27	-12.42	-1.62	0.58	-0.37
15	27	-15.39	-1.97	-2.59	-0.88
16	27	-18.59	-2.26	-3.27	-0.98
17	27	-21.91	-2.58	-6.91	-1.42
18	27	-24.54	-2.81	-5.21	-1.14
19	27	-29.19	-3.25	-7.72	-1.42
20	26	-31.95	-3.41	-9.85	-1.54
21	25	-32.91	-3.36	-9.10	-1.41
22	24	-36.51	-3.57	-11.72	-1.61
23	24	-36.38	-3.47	-8.39	-1.32
24	24	-36.79	-3.44	-8.43	-1.28

*Note:* t-statistics are computed using Equation (6).

**Table 2.3: Long Run Performance by Year of Issuance for Shipping Initial Public Offerings, 1987-1995. Excluding Initial Returns.**

Year	Number of Issues	Average 1st Day Return	Average 1-Year HPR %	Average 2-Year HPR %	Wealth Relatives			
					First Year		Second Year	
					Stock Market Indices	MSCI Shipping Index	Stock Market Indices	MSCI Shipping Index
1987	1	-2.5	36.84	-7.74	1.58	1.20	0.80	0.52
1988	4	18.72	58.36	21.01	1.25	1.09	0.92	0.99
1989	4	3.87	-19.98	-40.49	0.71	0.80	0.46	0.71
1990	2	8.48	-7.45	-33.10	1.04	1.15	0.72	0.95
1991	1	5.83	24.69	40.00	0.94	1.61	0.49	1.33
1993	6	1.61	2.86	-17.29	0.82	0.93	0.70	0.99
1994	6	6.75	-9.47	-15.69	0.79	1.01	0.71	0.93
1995	3	2.90	-3.44	-9.92	0.88	0.94	0.66	0.87
All Issues	27	5.77	6.27	-8.93	1.00	0.98	0.68	0.91

*Note:* Wealth Relatives are defined in Equation (8).

**Table 2.4: Long Run Performance by First Day Return Categories for Shipping Initial Public Offerings, 1987-1995. Excluding Initial Returns.**

1 <sup>st</sup> Day Return (%) Category	Number of Issues	Average 1-Year HPR %	Average 2-Year HPR %	Wealth Relatives			
				First Year		Second Year	
				Stock Market Indices	MSCI Shipping Index	Stock Market Indices	MSCI Shipping Index
<0	8	4.02	-18.78	0.88	0.89	0.62	0.74
0.00 - 2.00	6	12.86	0.12	0.94	0.97	0.74	0.95
2.01 - 8.00	7	3.78	-9.69	0.89	1.08	0.60	0.95
8.00+	6	5.58	-3.94	0.98	1.14	0.82	1.08
All Issues	27	6.27	-8.93	1.00	0.98	0.68	0.91

*Note:* Wealth Relatives are defined in Equation (8).

**Table 2.5: Long Run Performance by Country for Shipping Initial Public Offerings, 1987-1995. Excluding Initial Returns.**

Country	Number of Issues	Average 1-Year HPR %	Average 2-Year HPR %	Wealth Relatives			
				First Year		Second Year	
				Stock Market Indices	MSCI Shipping Index	Stock Market Indices	MSCI Shipping Index
ELLAS	3	2.71	-29.62	0.91	1.11	0.55	0.73
NORWAY	9	-2.55	-0.88	0.79	0.94	0.74	1.02
FAR EAST*	4	9.64	-6.85	0.92	1.08	0.61	1.01
SWEDEN	2	16.43	-19.34	1.16	1.19	0.77	0.94
US	9	16.47	-8.47	1.00	0.97	0.69	0.82
All Issues	27	6.27	-8.93	1.00	0.98	0.68	0.91

*Note:* Wealth Relatives are defined in Equation (8).

\* The Far Eastern Countries included in the analysis are Hong Kong, the Philippines and Singapore.

**Table 2.6: Long Run Performance by Proportion of Equity Offered for Shipping Initial Public Offerings, 1987-1995. Excluding Initial Returns.**

Proportion of Equity offered Category %	Number of Issues	Average 1-Year HPR %	Average 2-Year HPR %	Wealth Relatives			
				Stock Market Indices	MSCI Shipping Index	Stock Market Indices	MSCI Shipping Index
0.01 - 30.00	11	14.42	-1.97	0.98	1.12	0.70	0.98
30.01 - 50.00	5	3.62	-8.10	0.93	1.02	0.77	1.00
50.01 - 85.00	4	6.90	10.58	0.85	1.00	0.78	1.12
85.01+	7	-0.92	-31.61	0.86	0.84	0.53	0.64
All Issues	27	6.27	-8.93	1.00	0.98	0.68	0.91

*Note:* Wealth Relatives are defined in Equation (8).

**Table 2.7: Long Run Performance by Fleet Composition for Shipping Initial Public Offerings, 1987-1995. Excluding Initial Returns.**

Fleet Composition	Number of Issues	Average 1-Year HPR %	Average 2-Year HPR %	Wealth Relatives			
				Stock Market Indices	MSCI Shipping Index	Stock Market Indices	MSCI Shipping Index
Tanker	11	3.29	-2.62	0.81	0.98	0.74	1.00
Dry Bulk	7	5.00	-17.17	1.17	1.02	0.56	0.80
Passenger	4	2.16	-34.07	0.92	1.03	0.54	0.68
Diversified	2	49.16	9.00	0.88	1.02	0.86	0.89
Other	3	-2.99	8.78	0.89	1.00	0.86	1.20
All Issues	27	6.27	-8.93	1.00	0.98	0.68	0.91

*Note:* Wealth Relatives are defined in Equation (8).



**Table 2.8: Long Run Performance by Fleet Age for Shipping Initial Public Offerings, 1987-1995. Excluding Initial Returns.**

Fleet Age Category (Years)	Number of Issues	Average 1-Year HPR %	Average 2-Year HPR %	Wealth Relatives			
				Stock Market Indices	MSCI Shipping Index	Stock Market Indices	MSCI Shipping Index
5.30 - 9.19	6	7.25	1.93	1.07	1.05	1.07	1.10
9.20 - 10.83	6	18.84	20.38	1.17	1.16	1.26	1.18
10.84 - 13.17	5	4.78	-24.82	0.92	0.90	0.76	0.65
13.18 - 16.00	5	0.27	-20.71	0.88	0.90	0.74	0.84
16.00+	5	-1.98	-29.45	0.95	1.00	0.73	0.73
All Issues	27	6.27	-8.93	1.00	0.98	0.68	0.91

*Note:* Wealth Relatives are defined in Equation (8).

**Table 2.9: Long Run Performance by Initial Gearing Level\* for Shipping Initial Public Offerings, 1987-1995. Excluding Initial Returns.**

Gearing Level Category	Number of Issues	Average 1-Year HPR %	Average 2-Year HPR %	Wealth Relatives			
				Stock Market Indices	MSCI Shipping Index	Stock Market Indices	MSCI Shipping Index
0.297-0.465	5	5.86	-3.02	0.93	1.16	0.62	1.05
0.466-0.948	5	5.10	-25.12	0.95	1.10	0.63	0.82
0.949-1.618	5	-15.47	-19.96	0.71	0.79	0.62	0.82
1.619+	4	54.06	60.35	1.29	1.35	1.16	1.44
All Issues	27	6.27	-8.93	1.00	0.98	0.68	0.91

*Note:* Wealth Relatives are defined in Equation (8).

\* The Initial Gearing Level of the Shipping IPOs is proxied by the Debt to Equity Ratio, defined as: Long term Debt / Total Shareholders' Equity

**Table 2.10: Regression Results<sup>1</sup>**

<i>Panel A: Univariate Regression Results</i>		
<u>Independent Variable<sup>2</sup></u>	<u>First 12 Months</u>	<u>First 24 Months</u>
M	0.55*	0.41*
MSCI	0.93*	0.82*
MSCI <sup>3</sup>	1.15*	1.85*
INRET	0.48*	0.34*
INRET <sup>4</sup>	-0.24	-0.31
%EO	-0.13	-0.23
GEARING	0.05	0.13*
LAGEF	-0.18	-0.41*
TANKER	-0.05	-0.08
DRY	-0.02	-0.11
PASSENGER	-0.05	-0.30*
FUND	-0.05	-0.31*
RINRET	0.03	0.12
R%EO	-0.08	-0.08
RGEARING	0.08	0.31*
RAGEF	-0.05	-0.19*

<i>Panel B: Multivariate Regression Results</i>	
<u>Independent Variable</u>	<u>First 24 Months</u>
GEARING	0.12*
LAGEF	-0.31*
RGEARING	0.30*
RAGEF	-0.14*

*Notes:*

1. Sample comprises of 27 Shipping Initial Public Offerings issued in the Stock Exchanges of seven different countries during the period 1987-1995.
2. Definitions of the variables are given in the text.
3. Sample excludes two shipping funds, B&H Bulk and B&H Ocean.
4. Sample excludes one company, Frontline, with a first day return of 83.33%.

\* indicates significance at the 5% level

**Appendix 2.1: Shipping IPOs partitioned by Country Year of Issuance**

Company	Year of Offer
<u>Hong-Kong, the Philippines and Singapore</u>	
Pacific Carriers	1990
Jinhui	1991
Osprey Maritime	1994
William	1995
<u>US</u>	
B & H Bulk Carriers	1987
B&H Ocean Carriers	1988
Global Ocean Carriers	1988
Stolt Nielsen	1988
MC Shipping	1989
B&H Maritime Carriers	1989
Nortankers	1989
BT Shipping	1989
Teekay	1995
<u>Sweden</u>	
Frontline	1988
United Tankers	1990
<u>Norway</u>	
Awilco	1993
First Olsen	1993
Bona	1993
Western Bulk Shipping	1993
Smedvig Tankship	1993
Nordic American	1993
Atlantic	1994
Jinhui Shipping and Transportation	1994
Larvik	1994
<u>Greece</u>	
Srintzis	1994
Dane	1994
NEL	1995

## **Chapter 3: Macroeconomic Factors and International Shipping Stock Returns\***

Costas Th. Grammenos and Angelos G. Arkoulis

### **ABSTRACT**

*The aim of this paper is to present evidence, for the first time, about the relationships of global macroeconomic sources of risk with shipping stock returns internationally, for the period 1989:12 – 1998:3. For this purpose, a sample of 36 shipping companies (listed in 10 stock exchanges worldwide) is used in the study. The return on the world equity market portfolio and innovations in the following prespecified set of global macro variables are employed in the analysis: a) industrial production; b) inflation; c) oil prices; d) fluctuations in exchange rates against the US dollar; and e) laid up tonnage. Several significant relationships are established between returns of international shipping stocks and global risk factors: Oil prices and laid up tonnage are found to be negatively related to shipping stocks, whereas the exchange rate variable displays a positive relationship. In addition, it is found that, in general, the macroeconomic factors exhibit a consistent pattern in the way in which they are linked to the shipping industry, across countries.*

**Keywords:** Global macroeconomy; shipping stocks; industrial production; inflation; oil prices; exchange rates; laid up tonnage.

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### **3.1 Introduction**

Studies on industry returns and risk have been performed at a national level. Saunders and Yourougou (1990), and Isimbabi (1994), for example, compare the stock market perception of banking risk to other industrial sectors – such as utilities, petroleum refining, and others, in the US. Both studies employ a multi factor model in an attempt to examine the sensitivity of returns of companies in each industry to a set of macroeconomic and industry risk factors. Berry, Burmeister and McElroy (1988), Eun and Resnick (1992), Chen and Jordan (1993), and Kavussanos and Marcoulis (1997) are studies that also use industrial classification within the same country. In addition, previous studies have examined risk pricing in relation to a set of macroeconomic factors according to size (Chen, Roll and Ross, 1986; Poon and Taylor, 1991) and according to industry classification (Chen and Jordan, 1993).

Studies on stocks in the shipping industry have been very limited in number and scope. For instance, Grammenos and Marcoulis (1996) examine a cross section of shipping stock returns by using a set of microeconomic factors. The sensitivities of shipping stock returns to global macroeconomic factors, however, have not been examined in the past.

The objective of this paper is to fill this gap in the literature by presenting evidence about the relationships of world macroeconomic news with shipping stock returns internationally. For this purpose, several global macroeconomic risk variables are constructed in the spirit of Ferson and Harvey (1994), and their relationships with the

returns of 36 shipping companies that are listed in 10 different stock exchanges around the globe during the period December 1989 - March 1998, are examined.

The highly international nature of the shipping industry and the complex mechanism through which freight rates are determined by the interaction of supply and demand makes such a study particularly interesting at the global macroeconomic level. Furthermore, the industry is segmented (dry bulk, tanker, their sub markets and liner) to a large extent, with each sector reacting differently - in many cases - to a change in demand and/or supply. From a macroeconomic perspective, though, one is interested in the total - or average - effects of such changes in the shipping industry as a whole. It is primarily on this basis that we choose the global macroeconomic factors to be used in the analysis of this paper.

Moreover, the risk/return profile of the shipping industry in relation to the macroeconomy can be beneficial to those investors who are considering investing in shipping equities, in the sense that they can include them in their portfolios either for diversification or even for speculation purposes, by timing their investment appropriately.

In this paper, the set of prespecified global risk variables includes the returns on the world equity market portfolio, global exchange rate fluctuations measured against the US Dollar, oil prices, inflation and industrial production growth. Monthly changes in laid up tonnage is also examined, as an important shipping industry factor that proxies market conditions. Empirical evidence suggests that the relationships of macroeconomic factors with industry returns offer little similarities. Berry, Burmeister

and McElroy (1988) and Kavussanos and Marcoulis (2000), for instance, find that the macroeconomy has different effects across several different industries in the US. This makes a priori expectations difficult to determine. The effect of a global risk factor could be positive in a particular industry, and negative or insignificant in another, depending on specific industry characteristics.

In an efficient market, prices should reflect all available information at any point in time. Thus, as has been suggested by Chan, Chen and Hsieh (1985), Bernard (1986), Wasserfallen (1989) and Poon and Taylor (1991), innovations in macroeconomic factors are the relevant explanatory variables of the risk premia awarded in the stock market. Therefore, Auto-Regressive Moving Average (ARMA) models are used to filter out the expected component of each macroeconomic variable, and the unexpected components are used as explanatory variables.

The most important findings of this paper are the several significant relationships that are established between returns of international shipping stocks and the global risk factors considered. Oil prices and laid up tonnage are found to be negatively related with shipping stocks, whereas the exchange rate variable has a positive relationship. Moreover, no significant relationships were detected, regarding the global measures of inflation and industrial production. In addition, the relationships of the global factors with the returns of shipping companies were tested in six different countries. It is found that, in general, the macroeconomic factors exhibit a consistent pattern in the way in which they are connected to the shipping industry, across different countries.



The paper is organised into five sections. The next section describes the macroeconomic variables included in the study and discusses the methodological aspects of the approach employed to empirically test for the long run impacts of these variables on international shipping stock returns. Section 3 describes the data and the derivation of the global risk factors. The results are discussed in section 4, while section 5 summarises the findings and offers concluding remarks.

### 3.2 Theory / Methodology

Although empirical studies on modelling the macroeconomic determinants of stock returns have focused on a similar set of variables (e.g. Chen, Roll and Ross, 1986; Hamao, 1988; Martinez and Rubio 1989; Wasserfallen, 1989; Poon and Taylor, 1991; Chen and Jordan, 1993), the pricing relationships detected in each case differ. However, in the shipping markets, the forces that establish equilibrium in the supply and demand for shipping tonnage and, thus, freight rates – the most significant source of income for shipping companies – provide us with an insight of a priori expectations. Stopford (1997) identifies five factors that are believed to influence the demand for, and five factors believed to influence the supply of, shipping transport. The demand factors are the world economy, seaborne commodity trades, average haul, political events, and transport costs. The supply factors are the world fleet, fleet productivity, shipbuilding deliveries, scrapping, and freight rates.

This set of expected influences on supply and demand provides a backdrop for this study that attempts to uncover the pricing relationships between international shipping stock returns and unanticipated changes in the returns of the world equity market and the following prespecified set of global macroeconomic factors: a) exchange rates, b) global inflation, c) changes in oil prices, d) growth in industrial production, and e) laid up tonnage, a factor specific to the shipping industry. Equation (1) expresses this mathematically:

$$R_i - R_f = f ( WdRET, UdG10FX, UTLP, UdOIL, UdG7IP, LAYUP ) \quad (1)$$

where  $R_i$  is the return of company  $i$ ,  $R_f$  is the risk-free interest rate,  $WdRET$  is the excess return on the world equity market,  $UdG10FX$  is unexpected changes in global exchange rates against the dollar,  $UTLP$  is unexpected global inflation,  $UdOIL$  is unexpected changes in oil prices,  $UdG7IP$  is unexpected changes in global monthly industrial production, and  $LAYUP$  is unexpected changes in laid up tonnage.

The empirical version of equation (1) can include a constant, which is expected to be zero if there is no mispricing of stocks. When the intercept is positive, stocks are underpriced and vice versa.

The excess return on the world equity market,  $WdRET$ , is the monthly logarithmic return of the Morgan Stanley Capital International (MSCI) World Equity Index in excess of the risk free rate, and is taken as a proxy for the 'world market' portfolio. The MSCI price indices are value-weighted and aim for 60% coverage of the total market capitalisation. The chosen list of stocks is formed from the share prices<sup>1</sup> of approximately 1600 securities in 22 countries and includes a representative sample of large, medium, and small capitalisation companies from each local market, taking into account the stocks' liquidity. Furthermore, stocks with restricted float or cross-ownership are avoided. The variable has been used in empirical studies in the past. Harvey (1991) finds that the MSCI World Equity Index has considerable explanatory power in the set of 22 MSCI country returns.

Several empirical studies investigate and establish a relationship between foreign exchange risk,  $dG10FX$ , and equity returns, in a number of cases. The findings of

Dumas and Solnik (1995), for instance, justify the existence of time-varying foreign exchange risk premia in the international financial markets. Ziobrowski and Ziobrowski (1995) reach similar conclusions in an international context. Hamao (1988) finds that unanticipated changes in foreign exchange do not explain the returns from a cross-section of stocks listed in the Tokyo Stock Exchange. In contrast, Ferson and Harvey (1994), using a similar aggregate measure of exchange risk as in this paper, found a significant average risk premium across 18 national equity markets.

The shipping markets are heavily oriented towards international trade and, therefore, foreign exchange rate volatility may have a substantial effect on shipping equities. Foreign exchange risk has been a concern for the shipping industry since the breakdown of the Bretton Woods agreement in the early 1970s. McConville (1999) identifies a direct and an indirect effect of exchange rates on shipping. On one hand, since freight rates are quoted in dollars, an appreciation of the dollar relative to other currencies will probably increase effective freight rates. A dollar depreciation, conversely, will effectively decrease freight rates. On the other hand, from a macroeconomic viewpoint, a move in exchange rates may affect the shipping industry indirectly, by increasing or decreasing the level of international trade, thus, making exports of the major trading countries cheaper (or more expensive) and, consequently, increasing (reducing) the demand for shipping.

Leggate (1999), in an attempt to quantify the impact of foreign exchange rate movements on the operating results of the shipping industry, asserts that the importance of this issue stems from the fact that a volatile foreign exchange market

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<sup>1</sup> Share prices included in the indices are adjusted for any rights issues, stock dividends and/or splits.

exists in an industry where revenue is fixed in US dollars. Her findings suggest that exposure to such risks can have a positive or a negative effect on expenditure denominated in non US dollars, depending on the direction of movement in the exchange rate. Consequently, operating profits can rise or fall sharply, simply because of such movements.

Unexpected global inflation, UTLP, is another potential worldwide source of risk<sup>2</sup>. It is particularly important for the shipping industry, because of the repercussions it has on international trade and, consequently, on the world economy and the profitability of shipping companies. These repercussions may be beneficial in the real world, depending upon the net impact of differential inflation rates. However, in this paper the analysis focuses solely upon a global aggregate measure of inflation. Ferson and Harvey (1994) include such an inflation variable in their study following the intuition that inflation may be priced if it has real effects. For example, higher inflation may signal higher levels of economic uncertainty, which makes consumers worse off. Kavussanos, Marcoulis, and Arkoulis (2001) also include a similar aggregate global inflation measure in studying the effects of a set of global macroeconomic factors on international industry stock returns.

Several studies include oil prices, as an important systematic factor, that is believed to influence stock returns. Findings have, however, been contradictory. Chen and Jordan (1993), for example, find that oil prices are negatively related to stock returns in the US, while Chen, Roll and Ross (1986) find a marginally significant positive

relationship. Hamao (1988), on the other hand, examines oil price risk in Japan, but does not establish a significant relationship.

World oil production has grown from 66.9 million barrels per day in 1990 to 75.3 million barrels per day in 1998 (International Energy Agency, Monthly Oil Market Reports). The oil tanker fleet on January 1<sup>st</sup> 1989, had 5,689 ships, totalling 244.8 million deadweight tons, accounting for 39.8% of the total world merchant fleet. By the beginning of 1999, the oil tanker fleet had grown to over 7,000 ships, totalling 289.6 million deadweight tons, and representing 38.5% of the total world merchant fleet tonnage (Shipping Statistics and Market Review, March 1999). The oil trade and oil prices, therefore, are particularly important in the shipping industry, mainly because of their unique influence on world economic growth and, hence, on the supply and demand for seaborne trade. The impact of oil prices on world economic activity has been well illustrated by both oil crises in 1973 and 1979. Oil prices rose significantly and as a consequence freight rates fell sharply, due to overcapacity – firstly in the tanker sector and then in the dry bulk sector – and reduced demand for oil imports, due to inflationary pressures and poor economic conditions.

In addition, fuel is the single most important item of voyage costs, representing 47% of the total<sup>3</sup>. Therefore, a rise in oil prices would increase costs and thus restrict the profitability of a shipping company. The above suggest a negative relationship between oil prices and shipping stock returns.

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<sup>2</sup> Unexpected changes in real interest rates, is also a potential variable to be included in this study. However, as Chen and Jordan (1993) point out, because of the Fisher effect this variable is perfectly negatively correlated with the unexpected inflation rate, and was therefore not considered.

<sup>3</sup> Stopford (1997) quotes this figure based on an analysis of a ten year old Capesize bulk carrier under a Liberian flag at 1993 prices.

There has been some empirical evidence on the effect of changes in the level of industrial production on average stock prices. Chen, Roll and Ross (1986) and Kavussanos and Marcoulis (2000), study the effect of US industrial production in the US market, while Hamao (1988), examines the same relationship using Japanese data. Results regarding this variable, however, have not been conclusive. Poon and Taylor (1991) study the effects of unexpected changes in industrial production in the UK equity market and find a negative effect on UK equities. Chen and Jordan (1993) find no association between the variable and stock returns, while Hamao (1988) detects a positive association between the variable and Japanese equities.

Financial theory regarding this variable suggests a positive association with stock returns, on the grounds that higher industrial production implies improving economic conditions and, therefore, higher stock returns (Chen, Roll and Ross, 1986). Isserlis (1938) notes that fluctuations in freight rates and cycles in the world economy exhibit similar patterns. Furthermore, by examining the relationship between the growth rate in OECD industrial production and the growth rate in seaborne trade, Stopford (1997) reaches the conclusion that cycles in the OECD economy invariably mirror cycles in sea trade during the period 1963-1995. Since industrial production is the major parameter affecting the demand for sea transport through world trade, the relationship between global industrial production and international shipping stock returns is also expected to be positive.

The final factor included in the analysis, laid up tonnage, is specific to the shipping industry and is closely linked to the equilibrium of supply and demand for seaborne

trade and hence with the determination of freight rates. According to McConville (1999), laid up tonnage is "... the barometer giving a clear indication of the economic and commercial condition of the industry". In periods of recession, vessels are laid up because no remunerative employment can be found and market conditions make it uneconomic to trade. Conversely, in periods of prosperity, there is little or no laid up tonnage and freight rates are sustained at high levels. Zannetos (1966) has shown that, the greater the capacity of laid up (tanker) vessels, the lower freight rates will be. The variable, therefore, is expected to be negatively related to shipping stock returns.

Several authors (e.g. Wasserfallen, 1989; Poon and Taylor, 1991) have suggested that the relationship between returns and the macroeconomy may not be contemporaneous. On one hand, if markets are efficient, the reaction of the international stock market may lead the performance of the economy. On the other hand, any macroeconomic impact could be slow and affect returns in the long run. These dynamics are incorporated in the model, and 1 monthly lead, 1 monthly lag and the contemporaneous values of each risk factor are included as additional regressors in the specification of equation (1).

A widely applied methodology to estimate the parameters of equation (1) has been that of Fama and MacBeth (1973). This methodology involves estimating equation (1) across companies for every month in the sample period and saving the resulting time-series of the coefficient estimates (the betas). Returns are then regressed on the estimated betas and standard t-tests are performed to examine whether the effect of the explanatory variables is, on average, significant.



Although the Fama - MacBeth (1973) methodology has been used in studies similar to ours (e.g. Chen, Roll and Ross, 1986; Poon and Taylor, 1991), estimating our model as a system of equations is a more appealing approach. For instance, when the error terms are correlated across individual equations (companies), the Seemingly Unrelated Regression (SUR) methodology is applicable. The SUR methodology, adjusts for the cross-equation correlation and leads to estimates which are more efficient than OLS (Brown, Kleidon, and Marsh, 1983; Jaffe, Keim, and Westerfield, 1989). Moreover, estimating our model as a system of equations is more advantageous, since common parameters can be imposed over the regressors (the macroeconomic factors) and, thus, assume the role of averages.

However, in the case where the explanatory variables are identical across equations, estimation of the system by SUR methods produces estimates equivalent to Ordinary Least Squares (OLS), and there is no gain in efficiency (see Theil, 1971 for a formal proof). However, if there are cross equation constraints on the parameters, such as when imposing common coefficients on the macroeconomic factors, Multivariate Least Square (MLSQ) methods are used to estimate the equations as a system as in Kavussanos and Marcoulis (2000).

### 3.3 Data

Our sample consists of 36 shipping companies that are listed in 10 stock exchanges worldwide and whose shares have been actively traded in the period December 1989 to March 1998. The focus of the study is on companies whose prime business is in the operation of vessels (i.e. shipyards are excluded); hence, all such shipping companies that are listed in these stock exchanges, over the period of examination, are included in the sample.

Monthly data on stock prices ( $P_{it}$ ) adjusted for stock splits and stock dividends, and dividend yields ( $DY_{it}$ ) for the stocks of these companies are obtained from DataStream International Service. These are used to calculate holding period returns, measured in US dollars<sup>4</sup>, for each company  $i$ , as:  $R_{it} = \ln(P_{it}/P_{it-1}) + DY_{it}$ . Company excess returns are obtained by subtracting the one month US treasury bill rate.

Summary statistics and first order augmented unit root tests for the monthly excess returns of the companies are presented in Table 1. Companies in the table are classified according to the country in which they are listed. The average monthly excess return for 28 out of the 36 shipping companies is negative, while their industry average is -0.63%. This return is lower than the corresponding excess return on the MSCI World Equity Index, which is marginally positive and stands at 0.22%. Total average risk in the industry, as measured by the average standard deviation of monthly excess returns, is 11.82%, much higher than the standard deviation of the MSCI Index, which is 3.82%.

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<sup>4</sup> All non-US dollar currencies were converted into US dollars at the end of the month exchange rates, defined as US dollars per unit of local currency.

Coefficients of skewness are on average negative, whereas coefficients of kurtosis are, on average, positive. None, however, is significantly different than zero.<sup>5</sup> Finally, first order augmented unit root tests confirm that all shipping company monthly excess return series are stationary. Consequently, they can be used to make inferences in models such as equation (1), and produce meaningful results (Engle and Granger, 1987).

The explanatory variables entering equation (1) are defined as follows: WdRET is the US dollar monthly logarithmic excess return on the MSCI World Equity Index, where the 1-month US Treasury Bill rate is used as the risk-free rate. That is:  $WdRET_t = \ln(PI_t/PI_{t-1}) - USTB_t$  where  $PI_t$  is the world equity index value (including dividends) in US dollars. dG10FX is the monthly unanticipated global exchange rate against the US dollar in 10 industrialised countries (G-10). It is derived by calculating the log first difference in the trade-weighted US dollar price of the currencies of the 10 industrialised countries<sup>6,7</sup>. TLP is the real GDP weighted inflation rate in the G-7 countries. Country inflation rates are derived as logarithmic first differences of consumer price indices. LAYUP is the logarithmic first difference in laid up tonnage for tankers and dry cargo vessels in deadweight tons, for vessels of 300 grt/gt and over. dOIL represents the percentage change in oil prices, the latter measured as the current month US dollar price per barrel of Brent Oil (FOB). dG7IP is the weighted average of monthly industrial production growth rates in the G-7 countries, with real GDP as weights. All data series required for the construction of the global macro

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<sup>5</sup> Coefficients of skewness and kurtosis are distributed asymptotically as  $\sqrt{T} \cdot SK \cong N(0,6)$  and  $\sqrt{T} \cdot KU \cong N(0,24)$ , where  $T=100$  in this case.

<sup>6</sup> The 10 industrialised countries are the G-7 countries (excluding the United States), plus the Netherlands, Belgium, Sweden, and Switzerland. The G-7 countries are: Canada, France, Germany, Italy, Japan, the United Kingdom, and the United States.

<sup>7</sup> The trade weights are each country's US dollar denominated FOB imports, expressed as a percentage of total imports in the G-10 countries.

variables are collected from DataStream International, with the exception of LAYUP. This series is obtained from the Shipping Statistics Yearbooks 1989-1997, published by the Institute of Shipping Economics and Logistics (Institut für Seeverkehrswirtschaft und Logistik) in Bremen, Germany.

Univariate ARMA models for each macroeconomic variable are used to filter out the expected component of the series. The unexpected components are then used as explanatory variables in estimating equation (1), as suggested by Wasserfallen (1989), and Poon and Taylor (1991). We filter the series of the variables so that the creation of spurious relationships and possible errors in variables problems are avoided (Poon and Taylor, 1991). Table 2, shows the autocorrelations of the series (up to 12 lags) and the Box - Pierce Q-statistic (at lag 20). It can be seen that only WdRET and LAYUP are noisy enough to be treated as innovations, whereas all the remaining four series are serially correlated.

Based on the investigation of the autocorrelations of TLP, dOIL, dG10FX, and dG7IP, and on the Akaike (1973) and Schwartz (1978) information criteria, the best ARMA model is chosen and the residuals from the fitted process are used to proxy the unanticipated components of these series. Parameters of the chosen ARMA models and their standard errors are shown in Table 3. The new variables created are UTLP, UdOIL, UdG10FX, and UdG7IP. Autocorrelations and Q-statistics associated with these variables confirm that these series are white noise.

Having derived innovations in the set of macroeconomic variables, we test for their effects on shipping stock returns. In Table 4, the contemporaneous correlation matrix

of the global risk factors is presented. The only significant correlation is that between UdOIL and UTLP (+0.5282). The values of these correlation coefficients do not suggest that multicollinearity is present in the estimated model.

### 3.4 Empirical Tests and Results

The relationships of the innovations in macroeconomic factors on shipping industry stock returns are examined by employing MLSQ to estimate equation (1), including contemporaneous, lead and lag values of each of the explanatory variables. Dynamics are incorporated in the model, as Poon and Taylor (1991) and Wasserfallen (1989) argue that lead and lag values of each macroeconomic variable have a role to play, since the former reflect the slow impact of macroeconomic shocks while the latter reflect expectations.

The general - to - specific modelling procedure is adopted in the estimation, in order to select the 'best' model. Past empirical tests on macroeconomic factors and stock prices have been conducted by presenting models with each of the factors entering the model alone or in combination with other macro factors (e.g. Chen, Roll and Ross, 1986; Wasserfallen, 1989). This approach has been criticised on the grounds of presenting results which are subject to omitted variables bias (Spanos, 1986). Therefore, in this paper, we first estimate the most general model for the period January 1990 - February 1998, with all the variables included and end up with a model that includes only the set of significant factors. This approach remedies the possible omitted variables problem that may occur otherwise.

Results from the above estimation procedure are reported in Table 5. Panel A of the table shows the significant lead, lag and contemporaneous values of the coefficients of

the factors, whereas Panel B shows the derived long run coefficients<sup>8</sup> and their significance. Panel C presents the long run coefficients of a model that includes only WdRET as an explanatory variable.

The constant in both the one factor and the multi factor specification is negative (-0.0068 and -0.0077 respectively) and statistically significant, suggesting that shipping companies have, on average, been overpriced during the period analysed. Moreover, under the one factor specification the intercept is higher (less negative), suggesting lower overpricing. This can possibly be explained by the fact that factors other than the market capture part of the mispricing.

The long run world market beta is positive and statistically significant, standing at 0.8113 for the single factor specification and at 0.7941 for the multi factor specification. The difference suggests that the inclusion of macroeconomic factors in the estimation procedure remedies the omitted variables problem that may be present under the one factor specification.

Changes in oil prices, UdOIL, and laid up tonnage, LAYUP, are negatively related to shipping stock returns. Both results are in line with our expectations, as discussed earlier.

The coefficient of the exchange rate variable, UdG10FX, is found to be positive. In other words, a dollar depreciation implies higher returns, since exchange rates are

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<sup>8</sup> The long run coefficient of each variable can be interpreted as the long run impact of that factor, on the returns of international shipping stocks.

measured in US dollars per national currency units. A possible explanation for this finding is that fluctuations in exchange rates against the dollar have implications on profitability and, as discussed earlier, can affect the shipping market indirectly. This may happen when movements in exchange rates occur in such a way as to make exports of major trading nations more competitive, thus altering the level of international trade and the demand for shipping services.

Global unexpected industrial production, UdG7IP, and unexpected global inflation, UTLPI, have not been found to have an effect on international shipping stock returns. This result was to a certain degree surprising, given the close association between seaborne trade – hence the world economy - and the two variables. A possible interpretation is that the influence these two factors may have on shipping stock returns is already captured by the remaining macroeconomic factors.

In Table 6, we show the results of estimating equation (1) for the returns of shipping companies in six different countries, according to our sample<sup>9</sup>. In general, the global factors exhibit a consistent pattern in the way in which they affect shipping stocks internationally, and the significant relationships established so far hold for companies in most of the countries under analysis.

Oil prices, UdOIL, and laid up tonnage, LAYUP, are negatively related to the returns of shipping companies for four countries under analysis, whereas the exchange rate variable, UdG10FX, exhibits a positive relationship with shipping stock returns for three countries. A possible explanation for the insignificance of this variable in the US



and Hong Kong is that the unit of account in the former country is the US dollar, while the currency of Hong Kong is pegged to the US dollar. This may also apply to the case of India, where, since 1995, revenue and almost all costs for Indian companies are made in US dollars. Prior to that, freight revenue in local currency was guaranteed in dollar terms. Regarding unexpected changes in inflation, UTLP, no significant relationship is established. This is not the case, however, for the measure of global industrial production, UdG7IP, where it is found to be negatively related to stock returns in the case of Hong Kong. This finding contradicts empirical evidence in the sense that higher industrial production implies improving economic conditions and, thus, higher stock returns.

An interesting observation can be made with respect to the world market betas. Their magnitude differs across countries and in the case of India, a negative world market beta is observed. The lowest positive world beta is that of the US, whereas the highest is that of Norway.

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<sup>9</sup> Equation (1) has not been estimated for countries where only one company is included in the sample.

### **3.5 Conclusions**

This is the first study to examine the long run impact of several sources of global risk on international shipping stock returns. For this purpose, a multi factor model is employed, with the return on the MSCI World Equity Index taken as a proxy for the world market. The analysis incorporates innovations in the following pre-specified set of macroeconomic factors: a) exchange rates, b) global inflation, c) changes in oil prices, d) industrial production growth, and e) laid up tonnage, a factor specific to the shipping industry. Recent literature suggests that the relationship between macroeconomic impacts and stock returns may not be contemporaneous. Dynamics in the model are incorporated by including 1 monthly lead, 1 monthly lag and the contemporaneous values of each risk factor as additional regressors. The long run impact of a particular variable is then calculated.

Results suggest that there are factors other than the world market that influence returns of stocks in the shipping industry, suggesting that use of the multi factor model is more appealing than the traditional single factor specification.

Several significant relationships are established between returns of international shipping stocks and the global risk factors considered. Oil prices and laid up tonnage are found to be negatively related to shipping stock returns, whereas the exchange rate variable exhibits a positive relationship. No significant relationships were detected, regarding the global measures of inflation and industrial production.

Moreover, the global factors were examined in relation to the stock returns of shipping companies in six different countries. Generally, results demonstrate that the macroeconomic factors exhibit a consistent pattern in the way in which they are related to the shipping industry.

To conclude, findings in this paper have been encouraging. For the first time, a prespecified set of global macroeconomic risk variables are used and tested for their impacts on stock returns of the shipping industry. More importantly, several significant relationships, have emerged which, in turn, have several implications for the potential investor in shipping equities, who can increase his diversification capacity or even speculate by timing his investment.

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**Table 3.1: Summary Statistics and First Order Augmented Unit Root Tests**

	Mean	Standard Deviation	Skewness	Excess Kurtosis	ADF(1)
<b>USA</b>					
BT SHIPPING	-0.0135	0.1363	0.0528	0.6507	-6.8479
GLOBAL OCEAN CARRIERS	-0.0145	0.1408	0.3568	0.5988	-6.6938
INTERNATIONAL SHIPHOLDING	-0.0031	0.0612	0.3596	0.2284	-7.9362
MC SHIPPING	-0.0105	0.1407	0.0203	3.7780	-8.3872
OMI CORPORATION	-0.0043	0.1016	-0.3912	0.1375	-6.5640
OVERSEAS SHIPHOLDING GROUP	-0.0026	0.0814	-0.2281	-0.0960	-6.4527
STOLT NIELSEN	0.0009	0.0959	0.0693	0.5219	-6.8417
ANANGEL AMERICAN	-0.0049	0.0721	-0.1182	0.4641	-6.0106
B&H OCEAN CARRIERS	-0.0052	0.1569	0.1328	1.0008	-8.1632
<b>NORWAY</b>					
LEIF HOEGH	-0.0012	0.0866	-0.5686	0.2976	-7.4665
AWILCO	0.0013	0.1385	-0.0611	0.3824	-5.5664
BERGESEN	-0.0061	0.0947	-0.9499	1.8618	-6.1504
BONHEUR	0.0016	0.1146	-0.2618	0.2230	-6.3118
FARSTAD SHIPPING	0.0080	0.1160	0.5791	2.5736	-6.2791
GANGER ROLF	0.0017	0.1113	-0.2745	0.2258	-6.1553
STORLI	-0.0031	0.1021	-0.6306	1.2879	-6.8604
WILHS.WILHELMSSEN	0.0022	0.1083	-0.5569	1.3921	-7.1511
NCL HOLDING	-0.0184	0.2132	0.1364	1.6128	-7.1627
<b>SWEDEN</b>					
ARGONAUT	-0.0173	0.1342	-0.4844	0.3188	-6.8339
CONCORDIA MARITIME	-0.0069	0.1255	-0.1894	1.5615	-7.5960
STENA LINE	-0.0122	0.1220	0.1735	2.1681	-5.2462
NORDSTROM & THULIN	-0.0072	0.1049	-0.3370	0.1059	-5.8394
<b>FINLAND</b>					
BIRKA LINE	-0.0034	0.0975	0.4412	1.3736	-5.4312
<b>DENMARK</b>					
J.LAURITZEN HOLDINGS	-0.0128	0.1171	-0.3736	-0.0892	-7.2588
<b>UK</b>					
JAMES FISHER	0.0010	0.1127	0.3450	6.8821	-7.1408
LONDON & OVERSEAS FREIGHTERS	-0.0077	0.1184	1.7881	8.0438	-5.7407
JACOBS HOLDINGS	0.0029	0.1074	0.2762	2.6288	-6.7422
SEACON HOLDINGS	-0.0022	0.0913	-0.0430	1.5324	-8.4142
<b>HONG KONG</b>					
WAH KWONG	-0.0150	0.0954	0.2718	2.3944	-6.0869
IMC HOLDINGS	-0.0128	0.1201	-0.2412	2.3458	-8.4954
ORIENT OVERSEAS	-0.0048	0.1348	0.2883	4.0474	-7.1294
<b>SINGAPORE</b>					
NEPTUNE ORIENT LINES	-0.0089	0.1062	0.8097	12.3143	-7.4822
<b>JAPAN</b>					
MITSUI OSK LINES	-0.0189	0.1117	0.2855	-0.2079	-7.6291
<b>INDIA</b>					
GREAT EASTERN SHIPPING	-0.0014	0.1549	0.5721	1.1160	-7.1659
ESSAR SHIPPING	-0.0167	0.1754	0.5253	2.0424	-6.3466
VARUN SHIPPING	-0.0115	0.1535	0.5467	3.5351	-7.2964
Industry Average:	-0.0063	0.1182	0.0645	1.9237	
MSCI World Equity Index	0.0022	0.0382	-0.4615	0.7412	-7.4414

**Table 3.2: Autocorrelations of the Monthly Macroeconomic Series.**

Series	Autocorrelations												Q-statistic (lag 20)
	Lag 1	Lag 2	Lag 3	Lag 4	Lag 5	Lag 6	Lag 7	Lag 8	Lag 9	Lag 10	Lag 11	Lag 12	
WdRET	-0.0740	-0.0274	-0.0610	-0.1480	0.0918	-0.0801	0.1710	0.0570	0.1060	0.0126	-0.1140	0.0102	22.80
LAYUP	-0.0413	0.0614	0.0719	-0.0689	0.0849	-0.0355	-0.0381	0.1990	-0.0631	0.0175	-0.1400	-0.0397	17.70
TLP	0.2990*	-0.0382	-0.1030	0.0415	0.2680*	0.2770*	0.2650*	0.0477	-0.0856	-0.1120	0.1240	0.4390*	79.10*
DOIL	0.2310*	0.0394	-0.0836	-0.2850*	-0.3060*	-0.1120	-0.1660	0.0665	0.1530	0.1230	0.1090	0.0666	46.40*
dG10FX	-0.0837	-0.2280*	-0.0529	0.0546	-0.1250	0.1150	-0.2070*	0.1760	-0.0113	-0.1980	-0.0098	0.4400*	60.50*
dG7IP	-0.2280*	-0.0425	0.2810*	-0.0391	0.1090	0.1490	-0.2200*	0.1540	0.1640	-0.1910	0.1160	0.2200*	72.30*
UTLP	0.1810	0.0133	-0.1340	-0.0568	-0.0625	0.0582	0.1460	0.0345	0.0048	-0.0306	0.0391	-0.1420	13.80
UdOIL	0.1440	-0.0439	-0.0857	0.0137	0.0175	0.0098	-0.0029	-0.0045	-0.0172	-0.0586	-0.0925	-0.0351	9.81
UdG10FX	0.0285	-0.0991	0.0051	-0.1130	-0.0571	0.0050	-0.0731	0.1580	0.0440	-0.1290	-0.0712	-0.1030	19.70
UdG7IP	0.0047	-0.0364	-0.0381	0.0308	0.0154	-0.0024	0.0408	-0.0586	0.0144	0.0337	0.0741	0.0673	7.73

*Notes:*

1. Table displays partial autocorrelations for 12 lags and the Box - Pierce Q-statistic for 20 lags.
2. WdRET is the return on the M.S.C.I. World Equity Index, TLP is the G-7 inflation rate, LAYUP is laid up tonnage for tanker and dry bulk vessels in deadweight tons, dOIL represents changes in the U.S. dollar price per barrel of Brent Oil, dG10FX is the G-10 aggregate exchange rate against the U.S. dollar, and dG7IP is monthly industrial production in the G-7 countries. UTLP, LAYUP, UdOIL, UdG10FX, and UdG7IP are the unexpected components of TLP, LAYUP, dOIL, dG10FX, and dG7IP, respectively.
3. ‘\*’, and ‘\*\*’ indicate significance at the 5%, and 10% level respectively.

**Table 3.3: ‘Best’ ARMA models.**

G-7 Inflation Rate (TLP)		Changes in Brent Oil Price (dOIL)		G-10 Aggregate Exchange Rate against the US Dollar (dG10FX)		G-7 Monthly Industrial Production (dG7IP)	
Constant	0.0005*	Constant	0.0028	Constant	0.0009	Constant	0.0010
TLP(-5)	0.1612*	DOIL(-4)	-0.2535*	DG10FX(-7)	-0.1470*	DG7IP(-1)	-0.2687**
TLP(-12)	0.5023**	DOIL(-5)	-0.2650**	DG10FX(-12)	0.4269**	DG7IP(-3)	0.2985**
		DOIL(-7)	-0.2041*			DG7IP(-4)	0.2066*
						DG7IP(-5)	0.1815*
						DG7IP(-7)	-0.2381**
						DG7IP(-12)	0.2190*
AIC:	-9.8652	AIC:	-2.0156	AIC:	-3.8565	AIC:	-7.2724
SBIC:	-12.6255	SBIC:	-4.7493	SBIC:	-6.6162	SBIC:	-9.9280

*Notes:*

1. TLP is the G-7 inflation rate, dOIL represents changes in the U.S. dollar price per barrel of Brent Oil, dG10FX is the G-10 aggregate exchange rate against the U.S. dollar, and dG7IP is monthly industrial production in the G-7 countries.
2. AIC: Akaike Information Criterion
3. SBIC: Schwarz Bayes Information Criterion
4. \*\*, and \* imply significance at the 1% and 5% levels respectively

**Table 3.4: Correlation Matrix of the World Risk Factors.**

Variable	WdRET	UTLP	UdOIL	UdG10FX	UdG7IP	LAYUP
WdRET	1.0000					
UTLP	-0.1625	1.0000				
UdOIL	-0.0966	0.5282*	1.0000			
UdG10FX	-0.0597	0.1098	-0.0492	1.0000		
UdG7IP	-0.1877	0.0902	0.0901	-0.1425	1.0000	
LAYUP	0.0726	-0.0693	-0.0456	-0.0152	0.0312	1.0000

*Notes:*

1. WdRET is the return on the M.S.C.I. World Equity Index, TLP is the G-7 inflation rate, LAYUP laid up tonnage for tanker and dry bulk vessels in deadweight tons, dOIL represents changes in the U.S. dollar price per barrel of Brent Oil, dG10FX is the G-10 aggregate exchange rate against the U.S. dollar, and dG7IP is monthly industrial production in the G-7 countries. UTLP, LAYUP, UdOIL, UdG10FX, and UdG7IP are the unexpected components of TLP, LAYUP, dOIL, dG10FX, and dG7IP, respectively.
2. \*\*\* indicates significance at the 5% level.



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**Table 3.5: Regressions of  $R_t - R_f = f ( WdRET, UdG10FX, UTLP, UdOIL, UdG7IP, LAYUP )$  for the returns of 38 shipping companies, for the period January 1990 – February 1998.**

<b>PANEL A: Multi Factor Estimates (Significant Lagged, Lead, and Current coefficient values)</b>							
VARIABLE:	Constant	WdRET	UTLP	UdOIL	UdG10FX	UdG7IP	LAYUP
Lagged Values (-1)	...	0.2958***	...	-0.0597**	...	...	-0.0986***
Current Values	-0.0077***	0.4983***	...	...	0.3882***	...	-0.1033***
Lead Values (+1)	...	...	...	-0.0491**	...	...	-0.0692**

<b>PANEL B: Multi Factor Estimates (Significant Long Run coefficients)</b>							
VARIABLE:	Constant	WdRET	UTLP	UdOIL	UdG10FX	UdG7IP	LAYUP
Long Run Values:	-0.0077***	0.7941***	...	-0.1088***	0.3882***	...	-0.2711***

<b>PANEL C: Single Factor Estimates (Significant Long Run coefficients)</b>		
VARIABLE:	Constant	WdRET
Long Run Values:	-0.0068**	0.8113***

*Notes:*

1. WdRET is the return on the M.S.C.I. World Equity Index, TLP is the G-7 inflation rate, LAYUP laid up tonnage for tanker and dry bulk vessels in deadweight tons, dOIL represents changes in the U.S. dollar price per barrel of Brent Oil, dG10FX is the G-10 aggregate exchange rate against the U.S. dollar, and dG7IP is monthly industrial production in the G-7 countries. UTLP, LAYUP, UdOIL, UdG10FX, and UdG7IP are the unexpected components of TLP, LAYUP, dOIL, dG10FX, and dG7IP, respectively.
2. '\*\*\*', and '\*\*\*\*' indicate significance at the 1% and 5% levels, respectively.

**Table 3.6: Regressions of  $R_i - R_f = f( WdRET, UdG10FX, UTLP, UdOIL, UdG7IP, LAYUP )$  for each country, for the period January 1990 – February 1998.**

Variable:	Constant	WdRET	UTLP	UdOIL	UdG10FX	UdG7IP	LAYUP	Number of Companies
USA	-0.0048	0.6519***	...	-0.2008***	...	...	...	9
Norway	-0.0017	1.1111***	...	...	0.4089**	...	-0.5485***	9
Sweden	-0.0109	0.8045***	...	-0.1983**	1.1022***	...	-0.5199***	4
UK	-0.0020	0.8372***	...	...	0.9184***	...	-0.2748***	4
Hong Kong	-0.0144	0.8177***	...	-0.1923**	...	-2.9710**	-0.2497***	3
India	-0.0051	-0.6634**	...	-0.2983**	...	...	...	3

*Note:* WdRET is the return on the M.S.C.I. World Equity Index, TLP is the G-7 inflation rate, LAYUP laid up tonnage for tanker and dry bulk vessels in deadweight tons, dOIL represents changes in the U.S. dollar price per barrel of Brent Oil, dG10FX is the G-10 aggregate exchange rate against the U.S. dollar, and dG7IP is monthly industrial production in the G-7 countries. UTLP, LAYUP, UdOIL, UdG10FX, and UdG7IP are the unexpected components of TLP, LAYUP, dOIL, dG10FX, and dG7IP, respectively.



## **Chapter 4: Determinants of Spreads on New High Yield Bonds in the Shipping Industry**

Costas Th. Grammenos and Angelos G. Arkoulis\*

### **ABSTRACT**

*This paper examines for the first time the primary pricing of high yield bond offerings in the shipping industry. This is performed by testing for the relationships between the new issue spread of 30 high yield bond offerings issued by shipping companies in the US market, during the period 1993-1998 and the following factors: rating, callability, term, float, default rate, security status, 144a status, gearing, laid up tonnage and fleet age. We find that credit rating is the major pricing determinant, however, company financial leverage and shipping market conditions are two important factors that should be taken into account by the interested parties, in addition to credit rating, when pricing shipping high yield bond issues. Our findings are of particular interest to shipping companies who view this type of shipping finance as a means of increasing financial flexibility and as a stepping stone to the equity markets; to rating agencies that can assess more accurately the credit risk of shipping companies; to investors who can improve their investment selection process by considering additional factors that are related to bond pricing; and to financial underwriters who can price shipping high yield bonds more precisely.*

**Keywords:** High yield bonds; shipping companies; rating; gearing; laid up tonnage.

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## 4.1 Introduction

Credit risk models have attracted attention in recent years, because a significant shift has occurred in debt and loan markets. This shift involves the creation of major new markets in credit derivatives and the unprecedented growth in the pre-existing markets for loan sales and securitisations. Moreover, for the first time bank treasurers have been able to manage their credit risks actively. These models also facilitate the pricing of portfolios of exposures included in securitisations.

Another factor that contributed to the increasing interest in credit risk models is the fact that they can be used as a basis for banks' calculations of regulatory capital. This stems from the greater marketability of credit exposures and the growing focus of banks on the assessment of economic risk that has led to strains in the existing regulatory framework instituted by the 1988 Basel Accord (Jackson and Perraudin, 2000).

Anderson and Sundaresan (2000) compare a variety of firm value based models of contingent claims. They find that models fit reasonably well, indicating that variations in leverage and asset volatility account for much of the time series variations of observed corporate yields.

Crouhy, Galai, and Mark (2000) provide a survey of current credit risk models. These can be broadly classified into (i) mark-to-market models that estimate the distribution

of portfolio value at some future date allowing for credit quality declines, even if they are short of full default, and thereby generate measures of portfolio Value-at-Risk (VaR), and (ii) default-mode models that estimate the distribution of total defaults on exposures in the portfolio over a given horizon.

Caouette, Altman, and Narayanan (1998) also provide a survey of credit risk models. They classify them into those based on accounting data and market values (e.g. Altman, 1968, 1993; Altman, Haldeman, and Narayanan, 1977), stock price (KMV Corporation, 1995) and into consumer finance models and credit models for small business, real estate, and financial institutions.

With respect to the public debt market for high yield bonds, credit analysis is examined by several high yield handbooks (e.g. Fridson, 1989; Fabozzi and Cheung, 1990; Altman, 1990), however, no explicit link is made with valuation. The restricted liquidity in the secondary market makes trading in large sums difficult. As a consequence, high yield managers rely heavily on the new issue market. Given, therefore, that the performance of portfolio managers is sensitive to their valuation skills in the primary market, the limited empirical work on the pricing of high yield bonds is surprising.

An exception is the study of Fridson and Garman (1998). The authors, in their attempt to establish objective valuation criteria, identify several observable factors and test for their impact on the new issue spread of bond offerings in the non investment grade

sector for the period 1995-96. Their analysis suggests that the pricing of newly issued high yield bonds is sensitive to quantifiable characteristics of the issue and the prevailing market conditions. Factors such as rating, term and secondary market spreads explain more than half of the variance in risk premiums.

Although there is a limited number of studies that analyse shipping offerings in the equity capital markets (e.g. Grammenos and Marcoulis, 1996; Grammenos and Arkoulis, 1999), public debt finance for the shipping industry has not yet been researched. The objective in this paper is to fill this literature gap and present evidence for the first time on the primary pricing of shipping high yield bond issues. This is performed by identifying a set of factors, in line with Fridson and Garman (1998), and testing for any effects they may have on the new issue spread of 30 high yield bond offerings issued by shipping companies in the US market during the period 1993-1998.

The need for shipping funds, in conjunction with the structural changes in the shipping market – driven primarily by changes in the regulatory environment – induce shipping companies to seek different financing means. In addition, shipping companies will tend to become more efficient by forming alliances – such as pools – or to increase their size by mergers and acquisitions, following the recent trend in the oil, banking and other sectors. These developments imply an increasing need for capital and, thus, we believe that there will be renewed interest in raising shipping funds through the

high yield market in the future, despite a number of shipping high yield bond defaults witnessed since 1998.

The shipping industry is of interest due to its distinctive characteristics. These are cyclical and high volatility, and the potential effects gearing can have on shipping company operations, in an environment where large swings in freight rates and vessel values can occur in very short periods of time.

The factors employed in the study are rating, callability, term (years to maturity), float (issue amount), default rate, security, 144a status, gearing, laid up tonnage and fleet age. The latter three factors are important for shipping companies. In addition, taking into account the increasing focus towards an industry oriented investor approach (Kavussanos, Marcoulis and Arkoulis, 2001), the issuer's industry category has a role to play in the primary market of high yield bonds (Fridson and Garman, 1998).

The paper is organised into five sections. The next section describes the variables included in the study. In section 3 we discuss several characteristics of our sample. In section 4 regression results are presented, whereas section 5 summarises the findings and offers concluding remarks.

## 4.2 Data and Methodology

The sample is comprised of 30 high yield debt offerings issued by shipping companies during the period January 1993 to December 1998 in the US market<sup>1</sup>. The analysis includes all high yield offerings by shipping companies<sup>2</sup> in the period under examination, whose prime business is in the operation of vessels in the tanker, dry and ferry sectors<sup>3</sup>.

In examining the pricing of high yield bonds in the shipping sector we filtered out the influence of fluctuations in the general level of spreads, as in Fridson and Garman (1998). The offering yield of each high yield bond issue in the sample is expressed as a spread over the same day yield on a Treasury security with the same maturity.

We then sought to identify factors that cause variations in this new issue spread across the 30 issues in the sample. The majority of the factors<sup>4</sup> included in the analysis have been tested in past studies – in similar or other context – and market practitioners believe them to have a material influence on pricing. These are rating, float, term, security, callability, 144a status, and the rate of default for high yield bonds.

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<sup>1</sup> The shipping high yield bond offerings in the sample are presented in the Appendix by date of issue.

<sup>2</sup> One offering with a spread over Treasury of 1381 basis points at issue and a maturity of four years was considered an outlier and, thus, was excluded from the sample.

<sup>3</sup> Some of the companies diversify their operations within these sectors.

<sup>4</sup> Fridson and Garman (1998) examine the effects of 19 variables on new issue spread. We do not employ the same total of independent variables, as this would make inference tests impossible. Moreover, some of the variables were not available to the authors.

Fridson and Garman (1998) suggest that the issuer's industry category may affect pricing. Therefore, we tested three additional factors that we believe have a role to play in the pricing of non investment grade bonds in the shipping sector, namely laid up tonnage, company fleet age and pre issue gearing.

Descriptions of the variables<sup>5</sup> employed in the analysis and their sources are shown in Table 1.

### *Rating*

Rating is regarded as the most important factor in the pricing of high yield bonds. Fridson and Garman (1998) find rating to have by far the highest correlation with new issue spreads, among all the variables employed in their analysis.

Bonds in the high yield debt market are considered non investment grade and are rated Ba1 or below by Moody's and BB+ or lower by Standard & Poors'. Table 2 shows the rating scales of the two agencies. Agency ratings are credit risk measures and reflect an assessment of the bond issuer's creditworthiness. The primary focus of rating agencies is the predictability of future cash generation by the issuing company so that timely payments of interest and principal can be made. A rough guide of the company's capacity to repay debt obligations is provided by Moody's with the main

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<sup>5</sup> We also employed a ranking procedure to test for the effects of float, term, fleet age and gearing on new issue spread. Rankings are based on the groupings of tables 5 and 6, respectively. Results are qualitatively similar and are available from the authors. With respect to the laid up tonnage variable both the one month and three month percentage change in laid up tonnage were tested. Only the former proved to have a significant effect on new issue spread. The natural logarithm of one plus the fleet age in years was also employed as an explanatory variable. No significant relationship is established. Again, results are available from the authors.

areas of focus being: industry trends, national political and regulatory environment, management quality, basic operating and competitive position, financial position and liquidity sources, company structure, parent company support agreements, and special event risk (Moody's Investors Service, 1999).

This general list of credit factors varies considerably depending on which industry the issuer operates in. Accordingly, ratings assigned to shipping bond issues take into account factors that are related to the general conditions in the shipping markets, the ability of shipping companies to sustain future cash flow generation and their vulnerability to economic cycles (Moody's Investors Service, 1999; Jefferies & Company, Inc., 1998).

In an industry of a highly cyclical nature such as shipping, there are great uncertainties regarding the direction of future freight rates – the main income source for shipping companies – and fleet value. A decline in charter rates affects earnings and, therefore, the company's ability to repay principal at maturity. Ratings in this context also reflect the chartering policy of the issuer. Operators with aggressive charters in the spot market can find themselves unable to even repay interest in the face of adverse changes in the shipping business environment.

Additional factors incorporated in credit quality ratings of shipping companies are related to the companies' fleet (size, age, utilisation), financial leverage, market position in the segment of operations, management track record, the customer base,



regulatory innovations in the industry and other issue specific factors such as the secured or unsecured nature of the notes and the covenants included in the indenture.

Rating is measured here with a ranking dummy variable in accordance with the Moody's rating scale, as in Fridson and Garman (1998), by assigning the value of 1 to issues with the highest credit quality (Ba1) up to 7 for issues with the lowest credit quality (Caa1). Lower rated issues are associated with higher default probabilities, therefore, we expect a positive relationship between this variable and new issue spreads of shipping high yield offerings.

### *Callability*

Bonds in the high yield market often come with a call option (24/30 in our sample) that allows the issuer to retire the bonds at specified prices before maturity. Typically, a high yield bond with a 10 year maturity has a 5 year call protection.

Kalotay (1997) argues that the choice the issuer of a callable bond has, is beneficial in the sense that the outstanding debt can be refinanced at a lower rate if interest rates are expected to decline. In addition, calling a bond is also valuable to the issuer in the face of an upgrade in the offering's rating quality, since in this case, a lower default risk premium is expected to be paid on new borrowings.

On the other hand, Fridson and Garman (1998) suggest that the early retirement of a high yield bond is a cost to the investor who is forced to reinvest at a lower rate of

interest. On these grounds Fridson and Garman (1998) expect and find that callable bonds have larger spreads than non callable bonds. Based on this rationale, we expect to find the same relationship, so that investors who hold callable bonds are compensated for taking this risk.

### *Term*

Primary pricing may also be influenced by the maturity term of a bond. In line with Fridson and Garman (1998), we measure term as the number of years to final maturity.

Kim, Ramaswamy, and Sundaresan (1993) attempt to identify a pattern for callable bonds between yield spread and term by dividing their sample into different groups of maturities. They find that spread is smallest for issues with short maturities, highest for those with intermediate maturities, and declining for bonds with the longest term. Fons (1994) finds that spread increases with maturity for investment grade bonds, but decreases with maturity for high yield bonds. Longstaff and Schwartz (1995) observe a positive association between spread and bonds with a maturity of 5 to 10 years that becomes negative for bonds with a longer term.

Fridson and Garman (1998) include this variable in their analysis of primary pricing of high yield bonds and expect their results to support those of Fons (1994). They find, however, that maturity is negatively related to spread. In light of these contradictory findings, we let any relationship that exists between new issue spreads of shipping bonds and term to be determined empirically.

### *Float*

The principal amount of a bond outstanding at issue – also known as ‘float’ – is employed as a proxy for liquidity. Other measures derived from historical trading such as price volatility, trading volume and bid/asked spreads have been criticised in the past<sup>6</sup> and are not applicable, since we examine new issue offerings. Moreover, float can be precisely measured at the time of issue.

The importance of liquidity in pricing a high yield bond is documented in past studies (e.g. Cornell, 1992). Fisher (1959) argues that larger bond issues have lower risk premiums than smaller bond issues. He attributes this to the fact that the uncertainty evolving around the market price of a large issue is not as great as that of smaller ones, because small issues trade in a thinner market.

Consistent with Fisher (1959), Fridson and Bersh (1996) detect a statistically significant negative relationship between newly issued high yield bonds in their sample and principal amount outstanding at issue, across different sizes. Fridson and Garman (1998) include the variable in their paper, but do not find any correlation between float and new issue spread. Based on Fisher’s arguments we expect smaller issues to be associated with larger spreads in the case of shipping bonds.

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<sup>6</sup> e.g. Fisher (1959) postulates that bid ask spreads and trading volume are not good marketability proxies, because of insufficient data in the over the counter market.

### *Default Rate*

The default rate variable is included in the analysis as a measure of credit risk in the high yield market as a whole. Surprisingly, past studies have not explicitly linked the variable to primary pricing<sup>7</sup>. Some have examined its contribution as a credit risk variable in evaluating the overall risk premium in the high yield market (e.g. Fridson and Johnson, 1996), whereas others include it to study the determinants of aggregate default rates (Fridson, Garman, and Wu, 1998; Halweke and Kleiman, 1996; Johnson, Fridson and Zhong, 1996).

Fridson and Garman (1998) expect a positive association between default rates and new issue spreads, but do not detect a statistically significant correlation. Following the view that higher default rates imply a higher risk premium for high yield bonds, we also expect a positive relationship, because investors would demand a higher spread for compensation.

### *Security*

Fridson and Garman (1998) model seniority of security as a pricing factor of non investment grade bonds, by including a variable that indicates subordination. They find that subordinated issues have a higher yield than senior issues. This is explained by the fact that subordinated bonds have greater default severity than senior bonds. In the event of liquidation, subordinated debt is junior in claim to other debt on assets and technically senior debt investors will normally be paid in full before subordinated debt holders get back any money.

All of the issues, though, in our sample of shipping bonds are senior debt issues, however, they differ with respect to whether they are secured or unsecured. Senior secured bonds are collateralised by assets, in the case of shipping companies their vessels – usually in the form of a first preferred mortgage. Unsecured debt is not backed by any assets and in terms of debt claims is subordinated to senior secured indebtedness.

It is in this respect that we model ranking, by using a dummy variable to indicate that an issue is unsecured. Since unsecured issues rank below secured debt, we expect the former to carry wider spreads.

#### *144a Status*

The decision to issue debt privately or publicly may affect its pricing. The Securities Exchange Commission (SEC) adopted Rule 144a in 1990 to create a secondary market for high yield bonds. The advantage for issues under the rule is the speed with which they are brought to the market, because review and registration with the SEC is not required.

The norm, though, is that 144a deals are done with registration commitment attached, and in this respect they are indistinguishable from public debt. However, until registration the issue can only be distributed to a smaller number of investors (QIBs) and secondary market trading takes place in the PORTAL market. This may represent

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<sup>7</sup> with the exception of Fridson and Garman (1998)

lower liquidity and, thus, in line with Fridson and Garman (1998), we expect that 144a issues in our sample carry larger spreads.

### *Gearing*

The importance of gearing in the shipping industry and in raising shipping finance in the capital markets has been highlighted in past studies. Grammenos (1995) notes that the high debt to equity ratios shipping companies sustained in the 1970s and 1980s – ratios of 3 or higher were not unusual at the time – proved to be quite painful during the crises over these two decades. During these crises, high leverage has been disastrous for companies that did not have a stable cash flow income through medium/long term charters and/or contracts of affreightment, but were too heavily exposed in the spot market. Since high swings can occur in freight rates and vessel values in very short periods of time, gearing in the shipping markets becomes a double edge sword: in periods of prosperity, gearing provides the shipowner with an increased cash flow capacity to exploit any opportunities available in the investment front; in times of depression, though, the shipowner may not cover operating expenses, let alone the repayment of the loan.

Grammenos and Marcoulis (1996) detect a positive relationship between gearing and the degree of underpricing for initial public offerings of common stock for shipping companies, in contrast to Hegde and Miller (1995). The authors attribute this to the negative investor perception towards highly geared shipping companies and to the potentially catastrophic effects of high debt in the face of adverse changes in the

freight rate market, particularly for companies that do not secure sufficient cash flow by solid charters.

Grammenos and Arkoulis (1999) find that highly leveraged shipping IPOs perform better during the first two years in the aftermarket than lower geared companies. They explain this by the fact that a compensating return is required for taking more risk. Furthermore, they suggest that the lowering debt to equity ratios observed for the majority of companies in their sample after their IPO, is perceived as a positive signal by investors. In view of these findings, we also expect bonds from highly geared issuers in the high yield market to be associated with wider spreads.

#### *Laid up Tonnage*

Laid up tonnage is an indicator specific to the shipping industry and is closely linked to the equilibrium of supply and demand for vessels and, hence, with the determination of freight rates. McConville (1999, p.73) characterises laid up tonnage as ‘... the barometer giving a clear indication of the economic and commercial condition of the industry’. In periods of depression, vessels are laid up, because no remunerative employment can be found and market conditions make it uneconomical to trade. Conversely, in periods of prosperity, there is little or no laid up tonnage and freight rates are sustained at high levels.

Zannetos (1966) has shown that the greater the capacity of laid up (tanker) vessels, the lower freight rates will be. Grammenos and Arkoulis (1999) find that laid up tonnage

negatively influences stock returns of shipping companies. They attribute this to the fact that an increase in the number of vessels being laid up indicates a worsening state of the shipping market. In view of these findings, we expect this variable to be associated with larger new issue spreads, to reflect deteriorating conditions in the industry.

### *Fleet Age*

The age of the fleet of shipping companies is closely linked to vessel value. New vessels are more expensive, however, it is not clear whether they are favoured by the existence of a two tier market. Tamvakis (1994) and Tamvakis and Thanopoulou (2000) do not find sufficient evidence to support a two tier market hypothesis in the tanker or the dry bulk markets, respectively. As a result, it is possible that in a prosperous market vessels may earn the same freight irrespective of their age; while, provided they were bought when the market was low, they may survive a bad market less painfully than new ships, since new ones have the additional burden of high capital outlay and debt repayment.

Grammenos and Arkoulis (1999) find that IPOs of companies with a younger fleet perform better in the aftermarket than those companies who operate with an older fleet. This is because the operation of older vessels usually entails higher running costs in terms of maintenance and repairs, insurance, and oil consumption. In addition, regulatory changes in the industry<sup>8</sup> – such as the US Oil Pollution Act of 1990 – and

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<sup>8</sup> OPA 90 is designed to protect US waters from oil pollution; it requires vessels to have double hulls therefore increasing newbuilding costs; it also imposes unlimited liability for damage resulting from oil



often the reluctance of first class charterers and major oil companies to employ older vessels may result in the creation of a two tier market in terms of preference for employment.

Following this intuition, we hypothesised that new offerings of shipping high yield bonds must carry higher risk premia in cases where the issuer operates with older vessels, implying a negative relationship between primary pricing and company fleet age.

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spills therefore increasing insurance costs. Furthermore, OPA 90 provides for the gradual phasing out of older single hull vessels.

### 4.3 Initial Discussion

Table 3 displays several characteristics of the 30 high yield debt offerings by shipping companies in the sample by year of issuance. A total of \$4.674 billion was raised by shipping companies in the non investment grade sector during the period 1993-1998, with the average issue size being \$155.8 million. The average spread over Treasury stands at 428 basis points being highest in 1997 and 1998 at 464 and 466 basis points, respectively. The lowest spread in high yield debt issuance by shipping companies is observed in 1996 (337 basis points).

There are no major differences for coupon and maturity throughout the period under examination. The average coupon is 9.94% and the average term to maturity 9.57 years. The average debt to equity ratio for the issues stands at 2.19. With the exception of the one company that issued high yield debt in 1994 with a debt to equity ratio of 2.86, gearing is highest in 1997 (2.45) and 1998 (2.62). The same pattern is observed for fleet age. Companies issuing debt during these two years operated fleets with an average fleet age of 15.55 and 16.12 years, respectively, while the average figure for the whole period is 14.31 years.

It is evident that most of the issuing activity is concentrated in 1993 when 7 debt issues take place, and in the years 1997 and 1998 when 19 offerings are issued.

The first cluster, in fact, observed in 1993 coincides with low interest rates – a prerequisite for high yield bond issues – and high IPO issuing activity, as documented in Grammenos and Marcoulis (1996). The authors suggest that the boom was mainly due to tanker companies entering the market in anticipation of an upturn in tanker freight rates. These expectations were mainly due to increased scrapping and the replacement of the fleet by newbuildings that were expected to reduce supply and boost demand. In addition, several companies that entered the IPO market at that time operated in the developing economies of China and the Pacific Rim and raised capital assuming high rates of growth in these geographical areas. This seems to be the case in the high yield debt market as well. Out of the six companies that issue a total of seven offerings in 1993, three are pure tanker companies, whereas the remaining three operate partly in the tanker sector. Moreover, all six companies base part or all their operations in the Pacific Rim and/or China.

Regarding the second boom of high yield debt issuance in 1997 and 1998, it can be seen that shipping companies seeking finance in this market had high gearing levels and old fleets compared to previous years. It seems, therefore, that companies at the time were raising funds for the purpose of replacing and/or restructuring their debt levels by the more attractive amortisation schedule offered by high yield debt; and/or to provide funds for the renewal of their fleets. In fact, out of a total of nineteen offerings that took place during this period, in eighteen cases it is stated in the prospectuses that a percentage of the proceeds is to be used for debt repayment

purposes, whereas in fourteen occasions a proportion of the proceeds is to go towards acquisitions.

In table 4, the 30 issues in our sample are classified according their credit rating category, from Ba1 to Caa1. The number of issues is spread across different credit quality classes. Most of the offerings fall under the ratings of Ba2 (\$1200 million), Ba3 (\$935 million), B1 (\$1240 million) and B3 (\$883 million). Ratings of Ba1, B2 and Caa1 are assigned to only one issue, respectively. As far as float is concerned, there is a tendency for smaller issues to be associated with lower ratings. In fact, the average issue size for offerings in the Ba band (14 issues - \$2.275 billion) is \$162.50 million compared to \$149.94 million for all lower rated issues.

A clear pattern emerges between rating and new issue spread. Higher rated issues have smaller spreads at issue, in relation to issues of a lower rating class. The average spread for issues rated Ba1 to Ba3 is 337.57 basis points, whereas that for offerings with an assigned rating of B1 to Caa1 is considerably higher and stands at 507.33 basis points. This is not surprising, since issues of a lower credit quality are associated with a higher probability of default.

In Table 5 issues are categorised according to amount issued (float), term to maturity, security, 144a status, and callability. Regarding float, it can be said that there is a tendency for smaller offerings to be associated with higher new issue spreads. This is expected, because of the lower marketability these issues have compared to larger

issues. However, only a small portion of the total amount issued (12.84% or \$600 million) has an average float of \$100 million, the category with the smaller size.

In panel B of the table, it is shown that secured offerings have a larger new issue spread than unsecured issues. This is rather surprising at first glance, because unsecured issues rank lower than secured issues in the event of default. A closer examination, however, indicated that the secured issues tend to be associated with lower ratings. In fact, 47.60% of the secured issuance volume (in \$ terms) is lower rated, B3 or less by Moody's, whereas only 5.94% of total unsecured issue volume in our sample has the same assigned rating. This higher uncertainty regarding the payment of interest and capital – represented by these low assigned ratings – might account for the unexpected difference in spreads between the two issue types. Due to this uncertainty, the bondholders take the security of first preferred mortgages on vessels; this enables them to sell the vessels in the international sale and purchase market, in the event of default of the company. The uncertainty, however, is not decreased by the assignment of mortgage.

Issues with smaller term to maturity display wider spreads, as shown in panel C of the table. This difference in spreads, however, is also largely explained by the low credit quality of the issues with shorter maturity. By examining the Moody's ratings of such issues we find that 66.24% of their issuance is rated B3 or less. The comparative figure for offerings with a term to maturity greater than 10 years is 13.40%.

Offerings issued through rule 144a and those with a call option display wider spreads than public and non callable bonds, respectively. This is not surprising, since, in the case of 144a deals a larger premium is expected, because, until registration secondary market trading takes place in a less liquid market. Callable bonds are also expected to carry wider spreads, to compensate investors for taking the risk of being forced to reinvest at a lower rate.

In table 6, offerings are also classified in order of the debt to equity ratio and the age of the fleet of the issuer, respectively. Regarding gearing it can be seen in panel A of the table, that new issue spread increases for issues with higher debt to equity ratios. This is not surprising, because of the risk entailed for shipping companies with high gearing, as explained earlier.

No specific pattern emerges between spread and different groupings of fleet age. However, issues from companies in the sample that operate the oldest fleet, exhibit the highest new issue spread. This higher risk premium is expected, since charterers may be reluctant to employ older vessels. Furthermore, old vessels often require higher costs in terms of maintenance, insurance and repairs.

## 4.4 Regression Analysis<sup>9</sup>

### *Univariate Regressions*

Table 7 displays univariate regression results. For each regression the dependent variable is new issue spread and the explanatory variables are the factors deemed to cause variations in this spread. Results from this set of regressions give us an indication as to which factors to consider in assessing the final model.

Five factors emerge as significant and in order of the absolute value of t-statistic they are gearing, rating, laid up tonnage, security status, and term. Regarding the signs of the coefficients, all are consistent with our hypotheses, with the exception of the coefficient of the security variable. The negative sign indicates that, all other things being equal, unsecured issues carry lower spreads than secured issues. Given that unsecured bonds are subordinated to secured issues in the event of default, this finding is puzzling. However, as discussed above, this is due to the fact that a substantial amount of secured issuance is of lower credit quality and this is translated into higher new issue spreads for these issues. The same holds for the significantly negative coefficient of the term variable. This creates serious doubts as to whether these two factors are to emerge as significant when estimating the final model.

Table 7 also displays  $R^2$  values for univariate regression models. Consistent with Fridson and Garman (1998), credit rating exhibits the strongest correlation with new

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<sup>9</sup> All regressions were performed by the Ordinary Least Squares method. Standard errors are adjusted for heteroskedasticity.

issue spread ( $R^2=0.59$ ). Other variables that display correlations higher than 0.10 as indicated by  $R^2$  are gearing ( $R^2=0.38$ ), laid up tonnage ( $R^2=0.37$ ), term ( $R^2=0.29$ ), security status ( $R^2=0.27$ ) and 144a status ( $R^2=0.11$ ).

#### *Multivariate Regression: The Final Model*

In order to select the 'best' model, the general to specific modelling approach is adopted<sup>10</sup>. It involves starting from the most general model with all the variables included and allowing the data to determine which variables are significant. The approach avoids the possible omitted variables bias problems that may arise otherwise (Spanos, 1986).

Results from this estimation procedure are reported in Table 8. The percentage of variance explained, as measured by  $R^2$ , is considerable and stands at 71.01%. The three variables that emerge as statistically significant are (by absolute value of t-statistic) gearing, rating, and laid up tonnage. All coefficients of these variables are significant at a confidence level of 95%, as indicated by their P-values.

One can observe from the table that the coefficients for the gearing and the laid up tonnage variables are statistically significant, when rating is present in the model. Given that assigned credit ratings incorporate the effects of company leverage and the state of the shipping markets in assessing the credit risk of a high yield bond issue (Moody's, 1999), this finding is surprising. The serious implication for rating agencies



is that they have not taken fully into account the potential effects of gearing and market conditions on the issue, as credit risk factors.

The increase of 12% in  $R^2$  arising from the inclusion of gearing and laid up tonnage in the estimation is statistically significant, as suggested by the F-Statistic reported in the table. The statistic rejects the hypothesis that the coefficients of these two variables are jointly equal to zero. Consequently, gearing and laid up tonnage – proxy for market conditions – are important pricing factors that merit attention that may lead to a more objective credit rating assessment.

In addition, the three significant coefficients in the final model shown in Table 8 display the expected signs, as discussed earlier in the text. Other things being equal, we find that high yield bonds issued by shipping companies carry wider spreads, the lower the credit rating of the issue, the higher their gearing levels, and the higher the laid up tonnage in the shipping industry for the two months preceding the issue.

In addition, the fact that the two industry specific factors – gearing and laid up tonnage – emerge as significant in the estimation of our final model highlights the importance of the issuer's industry classification, as noted by Fridson and Garman (1998). Given the trend towards an industry oriented investor approach, high yield portfolio managers can diversify their funds by considering holding stakes in shipping bond issues, provided they undertake sound credit analysis.

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<sup>10</sup> To check the robustness of our results and to avoid any statistical distortions that might arise from effects such as multicollinearity, we also adopted stepwise regression as a tool in the estimation. Results, available

The coefficients of the security and term variables do not ‘make the cut’ in the final model, despite being correlated with new issue spread in a univariate context. As suspected above, secured issues and those with shorter maturity in our sample, do not create statistically significant price discrimination, but have comparatively higher yields, because they tend to be lower rated issues.

The absence of the fleet age variable from the final model is rather surprising. At first glance, one would expect that any effects the age of vessels may have on pricing are incorporated in assigned ratings. However, a closer examination into the amount of B3 or lower rated issuance (in \$ terms) based on different fleet age groupings does not point to this direction. Although the group with the oldest fleet exhibits the highest percentage of low rated issues (36.95%), the corresponding figure for the youngest fleet age group is also high and stands at 25.06% with just 6.61% for the intermediary age group.

The list of factors examined in this study is not exhaustive. Based on the views of market participants in the shipping community, we believe that the company’s adopted chartering policy may play a major role in the pricing of high yield bond issues in the shipping industry. We attempted to quantify and include a chartering variable in the analysis, however, the information supplied in company prospecti related to the companies’ chartering preferences proved insufficient in several cases. We are

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from the authors, are essentially the same.

confident, though, that future research might devise a workable approach in this respect and add to the explanatory power of the model presented.

Another potentially important factor in the pricing of shipping bonds in the high yield sector is the quality of management and its ability and stamina to deal with adverse market conditions. These attributes, coupled with sound investment, chartering, and vessel sale and purchase policies, may earn a narrower spread for an issue, especially when they are effectively communicated to investors by the company's managers, during the roadshow presentation.

## 4.5 Conclusions

This study presents evidence for the first time on the pricing of shipping high yield bonds. Our sample includes 30 high yield bond offerings in the shipping industry that came into market during the period 1993-1998.

The increased popularity of this market in the 1990s has been due to low prevailing interest rates, the need for funds required for replacement and expansion purposes, the globalisation of capital markets internationally and the search for new financial products by shipping companies since the crisis of the 1980s.

The majority of shipping companies in our sample raised funds to replace and/or restructure their debt with the more attractive amortisation schedule offered by high yield bonds. Since only interest is paid during the life of the bond, substantial amounts are made available for fleet renewal and alternative investments. In addition, the longer maturity offered by bonds compared to traditional bank debt matches more closely the duration of vessel operating life.

Most of the issuing activity in the industry is concentrated in 1993 (7 issues) and in the years 1997 and 1998 (19 issues). This clustering of non investment grade bond offerings during two distinct time periods demonstrates the cyclicity in the shipping industry.

The factors employed in the study are rating, callability, term (years to maturity), float (issue amount), default rate, security status, 144a status, gearing, laid up tonnage and fleet age. Three factors emerge as significant in our regression analysis. These are rating, gearing, and laid up tonnage. All coefficients are consistent with our hypotheses and shipping high yield bonds carry wider spreads, the lower the rating of their issue, the higher their gearing levels, and the higher the laid up tonnage in the shipping market for the two months preceding the issue. These factors explain as much as 71.07% of the variance in spread. Moreover, the inclusion of gearing and laid up tonnage in the estimation adds significant explanatory power in the model, suggesting that rating agencies have not fully incorporated these variables in their assigned ratings.

The established relationships between new issue spread and the factors under analysis are of interest to all major players of high yield bond issues of shipping companies: shipowners, rating agencies, investors, and financial underwriters.

Shipping managers can benefit as the important factors related to the pricing of shipping high yield bonds – rating, gearing and market conditions – convey useful information about the cost of raising finance in this sector. Rating agencies can use such factors to enhance their credit risk assessments of shipping companies. Investors in high yield bond offerings can improve their selection process by considering additional factors that are related to bond pricing. Underwriters can also use these

established relationships to price high yield bond issues more accurately and, thereby, enhance their reputation.

## 4.6 References

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**Table 4.1: Descriptions of Test Variables**

Short Title	Description	Source
Spread	Spread between an issue's offering yield and same day yield on a Treasury security with the same maturity	Securities Data Company
Rating	Moody's Rating Scale (Ba1=1, Ba2=2, ..., Caa1=7)	Securities Data Company
Callability	Dummy variable:0=noncallable, 1=callable	Securities Data Company
Term	Maturity(years)	Securities Data Company
Float	Principal Amount at Issue (\$million)	Securities Data Company
Default Rate	Moody's Trailing 12 month Issuer based Default rate	Merrill Lynch
Security Status	Dummy variable: 0=senior secured, 1=senior unsecured	Securities Data Company
144A Status	Dummy variable:0=public, 1=144A	Securities Data Company
Gearing	Long Term Debt / Total Shareholders' Equity	Company Prospecti
Fleet Age	Average Vessel Age (years)	Company Prospecti
Laid Up Tonnage	Two-Month Percentage Change in Laid Up Tonnage for tankers and dry cargo vessels in deadweight tons for vessels of 300 grt/gt and over	Shipping Statistics Yearbooks 1993 - 1998 by the Institute of Shipping Economics and Logistics

**Table 4.2: Comparison of Moody's and Standard and Poor's Rating Scales**

	Moody's	Standard & Poor's
Investment Grade	Aaa	AAA
	Aa1	AA+
	Aa2	AA
	Aa3	AA-
	A1	A+
	A2	A
	A3	A-
	Baa1	BBB+
	Baa2	BBB
	Baa3	BBB-
Non Investment Grade	Ba1	BB+
	Ba2	BB
	Ba3	BB-
	B1	B+
	B2	B
	B3	B-
	Caa1	CCC+
	Caa2	CCC
	Caa3	CCC-
	Ca	CC
C	C	
-	D	

**Table 4.3: Characteristics of Shipping High Yield Bond Offerings by Year of Issue (1993-1998)**

Year	Number of Issues	Total Float (\$ million)	Average Float (\$ million)	Spread (basis points)	Coupon (%)	Term (years)	Gearing	Fleet Age (years)
1993	7	1035	147.86	356.70	9.13	9.57	1.40	11.13
1994	1	175	175.00	344.70	11.25	10.00	2.86	13.29
1995	1	175	175.00	476.30	10.50	10.00	1.70	14.79
1996	2	425	212.50	336.55	9.16	11.00	1.29	9.91
1997	5	676	135.20	464.30	10.55	9.40	2.45	15.55
1998	14	2188	156.29	466.49	10.12	9.36	2.62	16.12
All Issues	30	4674	155.80	428.11	9.94	9.57	2.20	14.31

**Table 4.4: Shipping High Yield Bond Offerings by Rating Category (Moody's), 1993-1998**

Moody's Rating Category	Number of Issues	Total Float (\$ million)	Average Float (\$ million)	Spread (basis points)
Ba1	1	100	100.00	226.30
Ba2	7	1240	177.14	346.66
Ba3	6	935	155.83	345.52
B1	7	1240	177.14	429.84
B2	1	126	126.00	425.30
B3	7	883	126.14	572.43
Caa1	1	150	150.00	676.10
All Issues	30	4674	155.80	428.11



**Table 4.5: Shipping High Yield Bond Offerings categorised by Float, Term, Security, 144A Status and Callability, 1993-1998**

	Number of Issues	Total Float (\$ million)	Average Float (\$ million)	Spread (basis points)
<i><u>Panel A: Float</u></i>				
<i><u>(\$million)</u></i>				
≤100	6	600	100.00	479.20
101-150	11	1454	132.18	461.20
>150	13	2620	201.54	376.53
<i><u>Panel B: Security</u></i>				
Secured	13	1813	139.46	503.27
Unsecured	17	2861	168.29	370.64
<i><u>Panel C: Term (Years)</u></i>				
<10	6	770	128.33	540.97
≥10	24	3904	162.67	399.90
<i><u>Panel D: 144A Status</u></i>				
Public	14	2385	170.36	383.14
144A	16	2289	143.06	467.46
<i><u>Panel E: Callability</u></i>				
Non-Callable	6	920	153.33	366.60
Callable	24	3754	156.42	443.49
All Issues	30	4674	155.80	428.11

**Table 4.6: Shipping High Yield Bond Offerings categorised by Gearing and Fleet Age, 1993-1998**

	Number of Issues	Total Float (\$ million)	Average Float (\$ million)	Spread (basis points)
<i>Panel A: Gearing</i>				
<1.02	6	835	139.17	406.43
1.03-1.58	6	1175	195.83	344.12
1.59-1.93	6	760	126.67	416.62
1.94-2.62	6	1093	182.17	405.87
2.63+	6	811	135.17	567.52
<i>Panel B: Fleet Age</i>				
<10.68	6	890	148.33	407.15
10.69-13.29	6	973	162.17	403.05
13.30-14.79	6	980	163.33	406.35
14.80-17.14	6	1045	174.17	455.25
17.15+	6	786	131.00	468.75
All Issues	30	4674	155.80	428.11

**Table 4.7: Univariate Regression Models for New Issue Spread of Shipping High Yield Bonds, 1993-1998**

Variable	Coefficient	t-Statistic	P-Value	R <sup>2</sup>	R <sup>2</sup> - adjusted
Gearing	46.80	6.71	0.00	0.38	0.35
Rating	62.41	5.19	0.00	0.59	0.57
Laid Up Tonnage	573.10	4.20	0.00	0.37	0.34
Security Status	-137.31	-3.09	0.00	0.27	0.24
Term	-62.46	-2.90	0.01	0.29	0.26
144a Status	84.33	1.81	0.08	0.11	0.07
Callability	76.89	1.42	0.17	0.05	0.02
Float	-0.61	-1.18	0.25	0.06	0.02
Fleet Age	36.94	0.33	0.75	0.01	0.00
Default Rate	-26.20	-0.72	0.48	0.01	0.00

Note: 30 observations for each regression

**Table 4.8: Multivariate Regression Model for New Issue Spread of Shipping High Yield Bonds, 1993-1998**

Variable	Coefficient	t-Statistic	P-Value
Intercept	205.55	5.51	0.00
Rating	42.78	3.68	0.00
Gearing	25.50	4.30	0.00
Laid Up Tonnage	162.19	2.07	0.04
$R^2$	0.71		
$R^2$ - adjusted	0.68		
F (2,26)*	5.54		
Observations	30		

\* Note: The F-Statistic shown is for an F-Test employed to test whether the increase of 12% observed in the  $R^2$  is significant, when Gearing and Laid Up Tonnage are included as explanatory variables in addition to Rating.

**Appendix 4.1: Shipping High Yield Bond Issues, 1993-1998**

<b>DATE OF ISSUE</b>	<b>COMPANY NAME</b>
15/05/93	TRANSPORTACION MARITIMA MEXICANA, S.A. de C.V.
01/07/93	INTERNATIONAL SHIPHOLDING CORPORATION
08/07/93	TEEKAY SHIPPING CORPORATION
06/10/93	TRANSPORTACION MARITIMA MEXICANA, S.A. de C.V.
27/10/93	OMI CORP.
19/11/93	ELETSON HOLDINGS INC.
02/12/93	OVERSEAS SHIPHOLDING GROUP INC.
23/11/94	GEARBULK HOLDING LIMITED
13/12/95	STENA AB
19/01/96	TEEKAY SHIPPING CORPORATION
21/11/96	TRANSPORTACION MARITIMA MEXICANA, S.A. de C.V.
20/06/97	EQUIMAR SHIPHOLDINGS LTD.
15/07/97	GLOBAL OCEAN CARRIERS LIMITED
25/09/97	STENA AB
18/11/97	PEGASUS SHIPPING HELLAS LTD.
08/12/97	PANOCEANIC BULK CARRIERS LIMITED
14/01/98	INTERNATIONAL SHIPHOLDING CORPORATION
11/02/98	ALPHA SHIPPING PLC
19/02/98	HVIDE MARINE INCORPORATED
27/02/98	AMER REEFER CO. LIMITED
05/03/98	MC SHIPPING INC.
09/03/98	ERMIS MARITIME HOLDINGS LIMITED
24/03/98	ULTRAPETROL BAHAMAS LIMITED
22/04/98	ENTERPRISES CORPORATION CORPORATION
29/04/98	TBS SHIPPING INTERNATIONAL LIMITED
21/05/98	PACIFIC & ATLANTIC HOLDINGS INC.
28/05/98	STENA LINE AB
02/06/98	GULFMARK OFFSHORE INC.
12/06/98	CENARGO INTERNATIONAL PLC
20/07/98	MILLENIUUM SEACARRIERS INC.