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How the shipping firms have used the funds they raised from IPOs, in parallel with their short-run and long-run performance

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A handwritten signature in blue ink, consisting of several overlapping loops and a long horizontal stroke at the bottom.

I hereby declare that the work submitted is mine and that where I have made use of another's work, I have attributed the source(s) according to the Regulations set in the Student's Handbook.

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Abstract

This dissertation was written as part of the MSc in Management at the International Hellenic University.

The aim of this dissertation study is to examine the purpose of going public for a number of shipping companies along with their short-run and long-run performance during the period 2000-2014 in 7 major Stock exchanges. On the first listing day the sample is underpriced at 0,19%. In order to measure the long-run performance, buy-and-hold abnormal returns method (BHAR) is calculated. The empirical results indicate that the sample underperform after 6 months of listing. A number of factors are also tested about their level of significance for both short- and long-run performance. A multivariable regression is constructed for each case in order to check these factors' influence in underpricing and abnormal returns respectively. The results illustrate that in the long-term, the initial underpricing at the first trading day and the gross proceeds are statistically significant.

Keywords: shipping, initial public offering, underpricing, long-run performance

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1 Introduction

The purpose of this dissertation study is to analyze the reason behind Initial Public Offerings of global shipping companies and examine their performance in the short-run but also in the long-run period. The sample consists of 48 IPOs which are listed in 6 different global Stock Exchanges for the period 2000-2014. For the purposes of the study, buy-and-hold abnormal returns are computed for the number of the companies mentioned before. Furthermore, a multivariable regression is constructed in order to test some factors impact on IPOs' underpricing and companies' abnormal returns. More specifically the factors are:

- the gross proceeds of the company (size)
- the age of the company
- the gearing level
- the reputation of the stock exchange
- the oil prices
- the initial underpricing (only for the long-run performance)

MS office products and EViews were used in order to analyze the data.

During the first decade of 2000s an extraordinary movement was observed in the shipping sector including a super cycle and a deep financial economic crisis which normally affected shipping firms. This phenomenon along with the fact that a only a few researches have been made for shipping IPOs during this period are the main reasons for choosing this period for analysis. The aim of this study is to record the motives of ship owners to enter stock exchanges around the world and the progress of their effort in time. Although the techniques tested in this study have been already used during past papers, I found it useful and interesting to try a new combination using various factors that have been already examined according to the literature.

The sections of this dissertation study are organized as follows: in the second section general information is given about the shipping industry, facts & figures and details about the terminology and the definitions that are used in this study. The Section 3 is a review of the relevant literature of the IPO underpricing, the shipping IPOs underpricing and other researches about the shipping sector. In the section 4 there are details about the data and the sources that they were retrieved.

The methodology, details about the regression model and the determinants of the short-term and long-run performance are recorded in the Section 5. The empirical results of short-run and long-run results are analyzed in the Section 6. Finally, the Section 7 is the conclusion of this dissertation study.

2 General Information, Terminology and Definitions

Shipping is one of the most capital intensive industries. It is also a dynamic and rapidly changing environment, so it is a challenge for each firm to survive and grow. At the fourth quarter of 2008 the markets collapsed. The companies turned to alternative sources to finance their operations and investments. It is a crucial decision for the company to choose the most appropriate source so to run a successful project. There are three most common categories of capital sources: a) equity finance b) debt finance and c) mezzanine finance Grammenos and Papapostolou (2012)¹. There are distinct types for every category. When a company decides to raise funds through equity finance then must adopt private equity of the owners; the company's retained earnings and public or private equity offerings. In the case of debt financing, the companies mostly use bank loans; bond issues and leasing. Finally, mezzanine finance is about preference shares, warrants and convertibles.

The raising of external finance can be explained by the level of economic and shipping cycles along with the fact of whether cost of equity/debt is more suitable for each company at current time. The capital markets played the role of intermediaries to fill the gap of funds that was created due to a series of events, with highlight the crisis in mid-2008. The banks eliminate the providing of loans due to lack of trust among them and the shipping firms. Even though banks appeared to be the victim of crisis, in fact the extended involvement of international banking system caused the problem. Another important factor which led shipping firms to search funds in capital markets is the demanding and strict framework of Basel II. According to statistics, 2003-2010 appears to be the most applicable period for shipping firms to finance their needs externally through equity or

¹ Grammenos C. and Papapostolou N. (2012), Ship Finance: US Public Equity Markets, The Blackwell Companion to Maritime Economics, 1 edited by W.K.Talley, 10/2012: chapter 20: pages 392-416

debt. Shipping firms turned from private, family owned/managed, to public listed, extrovert and multishareholder (Syriopoulos, Theotokas 2007).

2.1 Initial Public Offering (IPO)

When funds are channeled to firms through the issuance of securities for the first time is called Initial Public Offering. In this procedure a private or new-born company turns from private to public. In this case, the company-issuer hires an underwriting firm –usually an investment bank– which is responsible to distribute the securities to the public. The role of an underwriter is to work together with the issuer so to determine the pricing, the type of security to issue and the time to enter the market.

When a company chooses to enter exchange markets, it raises funds in order to finance investments like expansions, research and development or to pay off debt. Apart from capital purposes, the company also introduces to the public and potential new investors but also enhances its prestige, Bancel and Mitoo (2001).

The companies evaluate the possible advantages and disadvantages that will rise by deciding to go public. The main advantage of this procedure is the reduction of financial risk by obtaining the finance required without the use of debt finance and the corresponding obligation it entails. The company is not obliged to pay dividends to shareholders (very common in shipping firms) as interest and principal repayments for loans to banks. It is also a great chance to enlarge its equity base. Larger equity base leads to better debt/equity ratio figures, meaning that the company reduces its current cost of borrowing if this is necessary. Huyghbaert and Hulle (2005) argue that once companies achieve a successful listing they can negotiate and raise additional capital if needed in more favorable terms. Mourdoukoutas and Stefanidis (2009) according to their research found that “The listing of Greek companies to major US markets has met and even exceeded ship owners expectations: Broadened their capital structure, improved image and prestige, strengthened bargaining power with creditors, and enhanced entrepreneurial opportunities.”

A public listing also has an impact on the control and auditing of the firm, because financial information is disclosed and this fact eliminates fraud against law. The publicity of a company could

also increase and lead to higher reliability and valuation. Another important advantage for a firm to go public is the fact that it can enhance its employers' motivation and loyalty by rewarding them with a wide spectrum of share benefits as a part of their basic fee. Finally, public firms have the opportunity to use their shares in order to acquire other companies.

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On the contrary, the main disadvantage when a firm goes public is that current shareholders may lose managerial control of the company. Management turns less flexible and very challenging because of CEO's commitment for meetings, presentations and other social responsibilities so the creation and development of an effective and capable management team is needed. In addition, the market price of the company is influenced by external factors which cannot be controlled by management.

The first thing that a company has to do when it decides to enter the capital markets is to hire an investment bank to underwrite, price and distribute the issues to public investors. The underwriters cover the risk of selling the issues to the public to guaranteed price. The risk for them is to whether or not they can sell the securities above the guaranteed price. If they do not find purchasers to buy these shares above this price, they must hold them in their books or worst sell them at lower price and suffer losses. On the contrary, if the underwriters sell the shares above the guaranteed price they make a profit. The reputation of the investment banks is high of importance for both of the investment banks and the issuers. Fees are higher for the services of a reputable underwriter. In parallel, good reputation of underwriters for issuers means they are willing to pay these high fees so they may benefit from more efficient premarket activities (Chang, Chung and Lin 2010). Another important obligation for the company is the composition of the prospectus. The Security and Exchange Commission (SEC) requires that any company raising funds through potential investors through the sale of securities must file a prospectus with the SEC and provide it to anyone who is interested in. The prospectus is a legal document and contains facts and details about the company and the public offering. It consists of information about the history of the company, the

management biographies, financial statements, best/worst case scenario of company's performance and other relevant data that will help investors to make decisions about investments.

2.2 Shipping Initial Public Offerings

Shipping firms were traditionally family-owned and preferred to finance their activities through shareholders equity. There was reluctance to lose control and share information to the public but also the shipping industry was not attractive to the investment community. Shipping stocks were not preferable to investors until 1990s were many shipping defaults were observed. The increasing freight rates and other events such as steady growth rates in US and Chinese economy, oil market volatility by Middle East political tensions² changed investors' sentiment and along with shipping IPO wave after 2000 lead the shipping sector to the super-cycle (2002-2008). The wave can be explained by a number of events. (1) The banking system faced difficulties in providing funds to shipping firms. This happened during the banking crisis of 1982 and the world financial crisis of 2008. (2) High vessel prices at late 1990s and early 2000s (3) the entrance of new generation of ship-owners (4) the need to increase the size of shipping companies.

Downwards in shipping cycles during 1970s, 1980s and 2000s is a result of the disproportion between the demand and supply of seaborne trade and vessels respectively.

Grammenos (1985) was the first who mentioned the need of capital markets for shipping companies. Capital markets emerged as an alternative way of financing. Back in the days, London's stock exchange was the principal market in 1980s. Oslo took top position in 1990s but during 2003-2008 a wave of shipping IPOs is observed mostly in US markets. New York Stock Exchange and NASDAQ are currently the markets with the most listed shipping companies. Stock exchanges in Hong Kong, Singapore and Kuala Lumpur are some of those that many shipping companies appear to prefer to list the last years. According to the IPOs prospectuses I conclude that shipping firms enter stock exchange markets for a number of reasons. The overwhelming majority of the companies tend to use the raised funds in order to acquire extra vessels (new or second-hand) or expand their facilities in general. A high percentage of them declare that the aim of initial public

²Syriopoulos, T. (2007). Chapter 6 Financing Greek Shipping: Modern Instruments, Methods and Markets. *Research in Transportation Economics*, 21, pp.171-219.

offering is to repay their debt. In addition, a number of firms do not clarify with details the final destination of the funds raised through this procedure and content oneself to working capital purposes. As seen at the table below, after the 2008 crisis the initial public offerings were not as much as during the period 2000-2008.

Table 1: The distribution of the IPOs in terms of period

| Year | Percentage of companies | Amount raised (\$ millions) | No. of issues |
|-------------|--------------------------------|------------------------------------|----------------------|
| 2000-2008 | 65% | 6.947.976.667,13 | 2.317.054.632 |
| 2008-2014 | 35% | 3.103.346.771,35 | 1.143.149.489 |

The main purpose of the initial public offerings of the shipping companies was to raise funds in order to expand their fleet. Many companies entered also stock exchanges for working capital reasons, increase their fame or create reserves for future investments. Another important reason according to the research was to raise funds in order to repay debt to banks or other liabilities such as bonds etc.

Table 2: The purpose of the IPO

| Issue Purpose | Number of offers | Average Gross Proceeds |
|--|-------------------------|-------------------------------|
| Debt Repayment | 15% | 337.114.525,48 |
| Debt Repayment/Fleet Expansion | 8% | 177.424.993,08 |
| Fleet Expansion | 38% | 235.010.849,70 |
| Fleet Expansion/Working Capital | 10% | 136.452.310,66 |
| Working Capital/ Future Investments/Fame | 29% | 142.090.746,81 |

Grammenos and Marcoulis (1996) find that the main reasons of an IPO are (a) vessel acquisition (b) asset play (c) repayment of debt and (d) general trading activities. If the asset play reason is excluded which is not recorded for none of these companies, we could say that the shipping firms follow the same pattern after 2000 as some years before concerning initial public offering purposes. The market value of a shipping company is often closely associated to the underlying value if the physical assets (vessels), Syriopoulos (2007) thus, regardless the direct purpose of the initial public offering, the long term aim is fleet expansion so to increase market value.

3 Literature Review

3.1 Underpricing

Initial Public Offerings have historically experienced large initial first day gains compared to the overall performance of the market. The investors that take place in an IPO earn high abnormal returns in the short-run period. This phenomenon is called underpricing and can be explained by the fact that the securities are offered at a lower price than the first equilibrium price. Even though underpricing is very usual in every financial market, the level differs between companies depend on the sector, the size of the company, the markets' conditions and the reputation of the underwriters.

A plethora of studies in the finance literature dealing with underpricing has been reported through the years over a wide range of countries. It is the most researched topic in parallel with the public offerings. More specifically, Ibbotson (1975) records that the results on newly issued common stocks which were offered to the public during the 1960s confirm that average initial performance are positive, 11.4 percent. Ritter and Welch (2002) argue that during the period 1980-2001, the number of companies listed in the United States markets exceeded one per business day. These IPOs raised \$488 billion (in 2001 dollars) in gross proceeds and their shares traded on average at 18.8 percent above the price at which the company sold them. In 1980s average first-day returns were 7.4 percent and increased to 11.2 in the early 1990s. In the mid-1990s the returns exceeded 18 percent, to reach the huge percent of 65.0 in 1999-2000 before falling back to 14.0 percent in

2001. Shunlin Song, JinSong Tan, Yang Yi (2014) using data on the IPOs of 948 Chinese companies during 2006-2011 find that average initial returns are 66% and that underpricing is between 14-22% depending on the method used to assess firms' intrinsic values.

Grammenos and Papapostolou (2012) argue that “different theories regarding underpricing usually arise from: (1) informational asymmetries between market participants – the issuer, the underwriter, the initial investors, and the secondary market investors – in the sense that one group of participants has superior information as to the true value of the issuing company; and (2) symmetric information theories (Ritter and Welch, 2002). Theories based on asymmetric information include: (1) the winner's curse theory (Rock, 1986), (2) the information disclosure theory (Benveniste and Spindt, 1989), (3) the principal – agent theory (Baron, 1982), and (4) the signaling theory (Allen and Faulhaber, 1989). On the other hand, theories that rely on the symmetric assumption include: (1) the legal liability theory (Tinic, 1988), and (2) the prospect theory (Loughran and Ritter, 2002).”³

Ibbotson and Jaffe (1975), Ritter (1984), Allen and Faulhaber (1988), claim that underpricing occurs at particular times and industries. Many researchers investigated also the impact that financial and other information recorded on prospectus have on the IPO offer price. Kim, Krinsky and Lee (1995) investigate the role of information recorded on the prospectus in the new issues market and find that the price is significantly affected by offer size, offer type and financial ratios such as earnings per share. Bhabra and Pettway (2003) using a random sample of IPOs from 1987 through 1991 find that prospectus information is more useful to predict survival/failure compared to subsequent equity offerings or acquisitions.

3.2 Shipping IPO underpricing

Underpricing is a phenomenon that is frequently observed in an initial public offering. Although many academic papers have been published about IPOs and underpricing, only a few of them were related to the shipping industry.

³ Grammenos C. and Papapostolou N. (2012), *Ship Finance: US Public Equity Markets*, The Blackwell Companion to Maritime Economics, 1 edited by W.K.Talley, 10/2012: chapter 20: pages 392-416

Grammenos and Marcoulis (1996) claim that share price performance can be explained by factors that can be separated into exogenous and endogenous. Exogenous factors are those which affect a company at a macroeconomic level, e.g. the stock market index, while endogenous are characterized those which affect company's performance at a microeconomic level, e.g. dividends, leverage.

Merikas, Gounopoulos and Nounis (2009) use a large sample of 143 companies to test the performance of Global Shipping IPOs for the period 1984-2007. The result is that the average adjusted first day returns (underpricing) is 17.69%. In this paper there is evidence about how some factors related to global shipping environment affect short-run and long-run performance of the shipping IPOs. The factors are: (a) the history of a firm (the age) (b) the market that the firm is listed (c) the underwriter's reputation (d) the size of the firm (e) the market conditions (hot/cold) (f) the reputation of the stock exchange market where the IPOs are listed. The regression model to examine their significance level is specified as follows:

$$P_t = a + \beta_1 \text{Log}(1+\text{AGE}) + \beta_2 (\text{MRK}) + \beta_3 (\text{UND}) + \beta_4 \text{Log}(\text{SIZE}) + \beta_5 (\text{H/C}) + \beta_6 (\text{EXC}) + \epsilon_i$$

Cross sectional regressions show that Age variable is statistically significant and smaller firms face bigger levels of underpricing. No significance for Market listing variable to underpricing is observed. They find also that "the shipping firms listed with non reputable underwriters experienced severe level of underpricing", whereas the company's size does not affect underpricing. Hot Market IPOs have greater average abnormal returns than Cold Market IPOs. Finally, they claim that Shipping IPOs listed in the main Markets experience high level of underpricing. On a similar pattern, Merikas, Gounopoulos and Karli (2010), in a sample of 61 US Shipping IPOs listed from 1987 until 2007, find that are underpriced on the first trading day on average by 4.5%. Also, they argue that the result is a positive signal of maturity for the shipping industry.

3.3 Long Run Performance

The Long Run performance measurement is the evidence whether a company records underperformance or not in the long-term. The long-run underperformance describes the fact that IPO companies tend to underperform compare to a benchmark, meaning the market or other IPOs

with similar characteristics. The returns are calculated over 1 to 3 year period or more after the listing date. The phenomenon of long-run underperformance is one of great interest and various analysts investigated IPOs performance over the years. Ritter (1991), use cumulative abnormal returns (CAR) and 3 year buy-and-hold returns along with Wealth Relative factor (WR). In a sample of 1,526 IPOs during 1975-1984 arise those IPOs stocks significantly underperform against relevant benchmarks (about -34.5%). Subsequently is recorded that there are three possible reasons for underperformance: (1) risk measurement (2) bad luck or (3) fads and over optimism. Loughran and Ritter (1995) find that companies enter stock exchanges during 1970-1990 underperform relative to no issuing firms for five years after the offering date. Ritter and Welch (2002) examine the IPOs during the period 1980-2001 and find that (a) if an investor buys at the first day of trading shares and hold them for three years, the IPOs returned 22.6 percent and (b) over three years the average number of the firms underperformed the CRSP value-weighted market index by 23.4 percent. Drobetz, Kammermann and Walchli (2005) investigate along with underpricing, the long-run performance of Swiss IPOs for the period 1983-2000. For the purposes of the study buy-and-hold abnormal returns (BHARs), skewness-adjusted wealth ratios and cumulative abnormal returns (CARs) are calculated. They find that long-run underperformance arises from the fact that IPO firms are usually small firms. Another academic paper published by Alvarez and Gonzalez (2001) examine 56 Spanish IPOs during the period 187-1997 and focus on initial underpricing and long-run underperformance. In order to test long-run performance results different methods to conclude in safe results are used: (a) buy and hold returns (BHARs), (b) calendar-time portfolios and (c) the Fama and French three factor model. They argue that for their sample the long-run performance depends on the methodology used. Furthermore, they investigate and find that IPO prospectus information do not have any statistically significant relationship to stock returns of the firm, three or five years after IPO.

Grammenos and Marcoulis (1996) is the first study which analyses if the cross-sectional returns performance, of a sample of 19 shipping companies listed at various stock exchange markets around the world, is related to a number of factors. The company's beta with the stock exchange, the financial leverage of the company, the average age of the company's fleet and the dividend yield are the factors that they examine. They also add a factor which is straight related to the shipping industry, the average age of the fleet. Fama-MacBeth methodology is used to research the significance of the effect that the five factors have upon shipping stock's performance. They find

that the average age of the fleet and the financial leverage are significant, while the stock market beta and the dividend yield are less significant to explain shipping stock's performance.

Grammenos and Arkoulis (2002) examine in their study the significance of specific global macroeconomic factors which are related to the international shipping stock's performance during the period 1989-1998, using a sample of 36 firms listed in 10 stock exchanges worldwide. A multi factor mode is used, with the return on the MSCI World Equity Index taken as a proxy for the world market. The macro variables are (a) industrial production; (b) inflation; (c) oil prices; (d) fluctuations in exchange rates against the US dollar; and (e) laid up tonnage. The findings prove that the exchange rates are positively related to the returns of the shipping stocks, whereas oil prices and laid up tonnage are negatively related to stock returns. Inflation and Industrial production appear no significant relationship to stock returns.

Merikas, Gounopoulos and Karli (2010) in their study investigate the market performance of 61 Shipping IPOs listed during the period 1987-2007 at the main US stock exchange markets. The main aim of the paper is to prove evidence about the long run performance of IPOs. Buy and hold abnormal returns (BHARs) and cumulative abnormal returns (CARs) is the methodology used. Long run performance measurements indicate that the IPOs offer returns for the first year 7.50%, the second 7.73% and the third 3.26% (BHAR). A number of factors are also examined for their level of significance in short and long run underperformance of the IPOs. The multivariate regression model is described as follows:

$$P_t = a + \beta_1 \text{Size} + \beta_2 \ln(1 + \text{AGE}) + \beta_3 \text{UND} + \beta_4 (\text{MRK}) + \beta_5 (\text{GO}) + \beta_6 (\text{H/C}) + \beta_7 (\text{EXC}) + \beta_8 (\text{COUN}) + \epsilon_i \quad (9)$$

Where (a) Size is the logarithm of the market capitalization (b) AGE is the history of the firm (c) UND is the reputation of the underwriters (d) MRK is the listed Market of the IPO (e) GO is the proportion of shareholders equity (f) H/C is the period of listing (hot/cold) (g) EXC refers to the stock exchange's reputation and (h) COUN is the base country of the IPO. They claim that long-term performance is a complex issue and differs over time and through various determinants, so they examine four different periods to test these effects. They conclude that US Listed shipping IPOs with bigger size and long-run returns have a positive relationship in six months period

but negative in one year. Results also indicate a positive relationship among long operation history and long-run returns up to six months period. Underwriters' fame and long-term returns have not a strong relationship but listing in one of the major stock exchange affects positively the returns in a three year period. Although the level of significance, they claim that all the six variables are statistically significant variables.

4 Data

The sample consists of 48 shipping firms that were listed during the period 2000-2014 in different global stock exchanges. NYSE , NASDAQ , OSLO Bors , LSE, HKEx, KLESE, SGX and SSE⁴.

Table 3: The allocation of the IPOs in terms of the market

| Stock Exchange | NYSE | NASDAQ | LSE | OSLO Børs | HKEx | KLSE | SGX | SSE |
|----------------|------|--------|-----|--------------|------|------|-----|-----|
| Number of IPOs | 16 | 7 | 4 | 4 | 4 | 3 | 6 | 2 |

The sample of the IPOs extracted from ThomsonOne database. Other financial and general information were retrieved from Bloomberg Database, IPO prospectuses, Annual Reports, Official Sites and in many cases through direct communication with the shipping firms.

Bloomberg was useful to extract companies' historical prices, market indices and historical currencies. IPO prospectuses proved useful to collect information such as the number of shares, the price per share, the expected proceeds and the final amount raised, the purpose of the Initial Public Offering (planned use of proceeds) and the date of issue. Financial information such as Total Assets and Total Liabilities the year before IPO found on Financial Statements. General Information such as the type of fleet and the year of foundation gained from the official sites of each company.

Finally, the oil historical prices used were retrieved from the Bloomberg Database.

⁴ NYSE: American stock exchange located in New York, NASDAQ: American/Canadian stock exchange located in New York, LSE :London Stock Exchange, HKEx: Hong Kong Stock Exchange, KLSE: Bursa Malaysia Stock Exchange, SGX: Singapore Stock Exchange, SSE: Shanghai Stock Exchange

5 Methodology

As most researchers do, I measure underpricing of shipping initial public offerings as the return on the first trading day to the offering price.

$$Ret_0 = \frac{1}{n} \sum_{i=1}^n \left(\frac{P_{io}}{P_{I1}} - 1 \right)$$

Where

Ret_0 : average return (underpricing) of the IPO on the first trading day

P_{I1} : the closing price of stock I on day 0

Pit: the offering price of stock i

5.1 Buy and Hold Abnormal Returns

Many authors proved that the measure of performance strongly depends on the selected methodology (Drobetz, Kammerman and Walchli (2005), Alvarez and Gonzalez(2005)). In order to gain understanding of the long-run performance of the Shipping IPOs, I calculate buy and hold returns (BHARS). This method is defined as the raw return minus the market return (the market where each company is listed). The daily stocks' and markets' last prices were downloaded from Bloomberg Database in order to calculate raw returns for each case. BHARs are calculated for 6, 12, 18, 24, 30, 36 months. The formula to calculate BHAR is described as:

$$BHAR_I = \prod_{t=1}^{36} (1 + R_{i,t}) - \prod_{t=1}^{36} (1 + R_{m,t})$$

Where,

$R_{i,t}$: The monthly return of an event company i in the month t

$R_{m,t}$: The monthly return of benchmark firm or portfolio

For the period T, the mean BHAR is calculated as:

$$\overline{BHAR}_{sT} = \frac{1}{n} \sum_{s=1}^n BHAR_{sT}$$

Barber and Lyon (1997) and Loughran and Ritter (2000) argue that BHAR is an advanced methodology compared to CAR (cumulative abnormal returns) and Fama and French three-factor model to measure long run performance. Moreover, Ritter (1991) argues that BHAR is the most simple and effective measure for raw returns, while Barber, Lyon and Tsai (1999) encourage the use of BHAR because it "precisely measures investor experience." In addition, one more advantage of using BHAR is that the values of both IPO and benchmark (stock exchanges in this case) are compared.

5.2 Short Run Performance Regression

The next step is the implementation of the following regression which consists of a number of potential variables. The independent variables will be examined about their significance levels upon underpricing (short-run). The independent variables are the age of the company, the gross proceeds of the initial public offering, the exchange market of listing, the gearing level and the oil prices. The regression model is described as follows:

$$R = a + b_1 \text{Log}(1+\text{AGE}) + b_2 \text{Log}(\text{GP}) + b_3(\text{EXC}) + b_4(\text{D/A}) + b_5(\text{OIL}) + \varepsilon_i$$

Where R are the returns, AGE is the age of the company, GP are the gross proceeds, EXC is the stock Exchange, D/A is the gearing level and OIL are the oil prices.

The age of a company is the aggregate number of years that each firm was active in the market before the year of listing in global stock exchange markets. Gross Proceeds is the total number of issued shares multiplied with the offer price. The exchange is the corresponding stock exchange market of listing and is introduced as a dummy variable. The value '1' is given for reputable markets (I selected NASDAQ, NYSE, LSE) and the value '0' for the rest markets of the sample. The gearing level is calculated by the ratio total debt to total assets (D/A) at the moment of the initial public offering. The last variable of the model is a macroeconomic variable about the global oil prices at the time of the initial public offering.

5.3 Long-run Performance Regression

For the purposes of the study and following the same pattern, a multivariable regression is also constructed in order to test the influence of some specific variables to the long-run underperformance. In this case, the dependent variable is the long-run returns as expressed by BHARs. The BHARs are calculated on a 6-month basis for 3 years after the initial public offering. So as to reach in some conclusion about the effect of these factors in the long-run performance, cross sectional regressions are used. The same factors with underpricing are used also in this case plus one more. The additional variable used here is the initial underpricing and is introduced to the regression model as a dummy variable. The value '1' is given to the shipping firms that they suffered underpricing at the first day of trading, while the value '0' is given to those did not. The regression model is described as follows:

$$\text{BHAR} = a + b_1 \text{Log}(1+\text{AGE}) + b_2 \text{Log}(\text{GP}) + b_3(\text{EXC}) + b_4(\text{D/A}) + b_5(\text{OIL}) + b_6(\text{UND}) + \varepsilon_i$$

Where 'BHAR' are the buy-and-hold abnormal returns, 'AGE' is the age of the shipping company, 'GP' are the gross proceeds, 'EXC' is the corresponding stock exchange, 'D/A' is the gearing level expressed as total debt to total assets ratio, 'OIL' are the historical prices of crude oil and 'UND' is the initial underpricing.

5.4 Determinants of Shipping IPO underpricing and long-run performance

5.4.1 Age of the firm

One factor that will be examined about its impact is the age of the firm at the time of the IPO. Almost the half, 48%, was active in the shipping industry from 1 to 10 years before the issuing date, meaning that they were new-established companies. One out of four of them had less than a year of operation while the 17% were well known in the shipping society with over 25 years active. The average age of the shipping companies is 12.42 years. Furthermore, the 23% entered Stock

Exchanges in less than a year of operation while the 56% of the shipping firms of the sample entered Stock Exchanges during their first 5 years of operation. Additionally, 17% of shipping companies had a long history in the shipping industry (over 25 years).

5.4.2 *Gross Proceeds*

Another factor and its effect on IPO performance is examined is the gross proceeds of the shipping firm. The gross proceeds are calculated as the number of the shares offered by the initial public offering multiplied by the offer price. The total amount of the sample is \$ 9.708.299.831 with an average of \$ 202.256.246 per company.

If the gross proceeds are categorized by the country of domicile, companies located in United States seem to record the highest amount of \$ 2.056.989.999. It is worth to notice also that the shipping company Ultrapetrol Bahamas Ltd listed in NASDAQ records the highest amount of \$1.375.000.000, the highest of all the companies of the sample and over the half offered from US companies. Almost 30% of the companies of the sample are located in Greece and raised the amount of \$1.963.424.996. Globus Maritime records the lowest amount of \$25.269.999 while DryShips Inc. has the highest amount of gross proceeds of Greek companies with \$234.000.000 listed in NYSE. The highest average gross proceeds is observed during the period 2006-2007 while 2001-2004 was the year with the lowest average gross proceeds.

5.4.3 *Stock Exchange Reputation*

Another factor is the reputation of the corresponding Stock Exchange and how this could affect the performance of the company in the short and long-run period. Reputable Stock Exchanges are the NYSE, NASDAQ and London's. In this sample, 54% of the shipping firms are listed in one of these three famous stock exchanges. The rest of them are listed in the Stock Exchanges of Oslo, Hong Kong, Malaysia, Singapore and Shanghai.

Companies with Greece as a country of domicile are all listed in reputable stock exchanges. NYSE appears as the most attractive market for Greek Companies with NASDAQ and London's to follow. The vast majority of US, Chinese, Malaysian and Singaporean shipping companies prefer to list at their country's Stock Exchanges. Finally, it should be mentioned that NYSE is the market with the most listed shipping companies during this period (16).

5.4.4 *Gearing Level*

The importance of gearing level is also examined in this study. It is calculated as a ratio by dividing the total debt to total assets. The average level of gearing of the sample is 0.59. Perisai Petroleum Teknologi BUD is the only company with a gearing level over 1 meaning that the company was exposed in great danger at that time. It is also important to mention that 4 companies had very low levels of gearing (<0.1) and one of the sample had no long term debt at the time of the initial public offering.

5.4.5 *Oil Prices*

Oil prices are also considered a systematic factor that is supposed to influence stock returns. The shipping industry is affected by oil trade and oil prices due to the influence on the demand and supply for seaborne trade and the impact on the world economic growth in general. At this point is important to mention that almost the half of voyage costs is the fuel.

5.4.6 *Initial Underpricing*

Initial Underpricing is another factor that will be also tested for its impact on stock returns. It is a variable which have not been tested in the past for shipping IPOs and since it is a usual phenomenon I find it interesting to include it to the multivariable regression.

6 Empirical Results

6.1 Short-run Performance

6.1.1 *Undepricing*

The sample is undepriced by 0.3%, one of the lowest percentages ever recorded in IPO studies, especially in shipping sector. Actually it is much lower than the 18.2% that Ritter reported (2008) and the average underpricing of 17.69% for global shipping IPOs that find Merikas et al. (2009). It is also lower than the average underpricing of 4.44% for U.S. listed shipping IPOs that find Merikas, Gounopoulos and Karli (2010). The researchers claim that the decreasing trend of underpricing illustrates a level of maturity for the shipping sector.

6.1.2 *Regression Results*

An important thing when regression analysis is used is to avoid multicollinearity so I test if there is correlation between the variables. When this phenomenon exists, it means that two or more variables of the regression are correlated and this could lead to wrong results. There are two ways to test to test the correlation between the variables: a) the construction of correlation matrix or b) the Durbin-Watson value. The matrix includes both the dependent and the independent variables. Two variables are highly correlated in cases where the value is bigger than 0.8. Alternative, a Durbin-Watson value close to 0 is a sign of serial correlation. A value close to 2 confirms the absence of serial correlation.

Table 4 : Correlation Matrix for Underpricing

| | UNDEPRICING | LOG_AGE | LOG_GP | EXCHANGE | D_A | OIL |
|-------------|-------------|-----------|----------|-----------|-----------|-----------|
| UNDEPRICING | 1.000000 | -0.025757 | 0.189849 | 0.008741 | -0.097478 | 0.239137 |
| LOG_AGE | -0.025757 | 1.000000 | 0.151973 | -0.096005 | -0.008171 | -0.196127 |
| LOG_GP | 0.189849 | 0.151973 | 1.000000 | 0.115223 | 0.148873 | 0.169293 |
| EXCHANGE | 0.008741 | -0.096005 | 0.115223 | 1.000000 | 0.138684 | 0.136381 |
| D_A | -0.097478 | -0.008171 | 0.148873 | 0.138684 | 1.000000 | -0.045132 |
| OIL | 0.239137 | -0.196127 | 0.169293 | 0.136381 | -0.045132 | 1.000000 |

The results of the correlation matrix and the Durbin-Watson value of 1.66 point out that there is no existence of high correlation between the variables of the regression.

Table 5 : Estimation output for Underpricing

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|--------------------|-------------|-----------------------|-------------|-----------|
| LOG_AGE | -0.000782 | 0.007518 | -0.103955 | 0.9177 |
| LOG_GP | 0.011512 | 0.010046 | 1.145956 | 0.2583 |
| EXCHANGE | -0.003596 | 0.021130 | -0.170169 | 0.8657 |
| D_A | -0.026559 | 0.035925 | -0.739288 | 0.4638 |
| OIL | 0.000577 | 0.000436 | 1.323758 | 0.1927 |
| C | -0.242992 | 0.179445 | -1.354126 | 0.1829 |
| R-squared | 0.093563 | Mean dependent var | | -0.005390 |
| Adjusted R-squared | -0.014346 | S.D. dependent var | | 0.069783 |
| S.E. of regression | 0.070281 | Akaike info criterion | | -2.356152 |
| Sum squared resid | 0.207458 | Schwarz criterion | | -2.122252 |
| Log likelihood | 62.54766 | Hannan-Quinn criter. | | -2.267761 |
| F-statistic | 0.867053 | Durbin-Watson stat | | 1.668217 |
| Prob(F-statistic) | 0.511235 | | | |

Information about the statistical significance of the variables is given by the t-Statistic values. The t-statistic value is calculated by dividing the estimated coefficient with the standard error. The value of the F-statistic is examined in order to test the joint significance of the independent variables. If the p-value of F-statistic is lower than the 0.05 (level of significance) then I reject the null hypothesis ($b_1=0, b_2=0, b_3=0, b_4=0, b_5=0$). This means that the selected independent variables can jointly influence the dependent variable. If not, then I fail to reject the null hypothesis. In this case, none of the variables seems to be statistically significant. The results of the regression show that the age of the company and the IPO underpricing are negatively related although the t-Statistic lead to the fact that the variable is not statistically significant. Negative impact also consists between the reputation of stock exchange and the gearing level of the shipping company with the first trading day underpricing. On the contrary, positive relation is observed between the undepricing and the gross proceeds such as also with the oil prices.

The R^2 is a measurement of how close the data are to the fitted regression line. In this case, 9.3% variation in underpricing can be jointly explained by the current five variables. The rest 90.7% can be expressed by residuals or other variables.

6.2 Long-run Performance

6.2.1 BHAR Empirical Results

The buy-and-hold abnormal returns (BHAR) method is used in order to test the long-run performance of shipping IPOs. The current study's BHARs are calculated using daily data for 6, 12, 18, 24, 30 and 36 months as the difference between the log returns of the firm and the log returns of the corresponding market. The average BHAR for every 6 months are presented in the table below.

Table 6 : Average BHAR results per period

| Period of Time | Mean BHAR | Percentage |
|-----------------------|------------------|-------------------|
| 6-month | 0,023 | 2,346% |
| 12-month | -0,077 | -7,654% |
| 18-month | -0,132 | -13,228% |
| 24-month | -0,305 | -30,463% |
| 30-month | -0,300 | -30,035% |
| 36-month | -0,262 | -26,172% |

The portfolio of Shipping IPOs of this study overperforms the corresponding stock market indices the first 6-months period and then underperforms the following five periods. An investor who chose to invest money in a portfolio with the current shipping stocks has positive returns of 2.346% after 6 months using the buy-and-hold abnormal returns method. The underperformance begins actually in the first year after listing at the stock exchanges by 7.654%. The sample follows the same decreasing trend reaching a significant negative high value of 30.463% after 24-month of listing. Shipping IPOs still underperform after 3 years of listing but records a small but notable increase to 29.78%. The results of this study is a proof that shipping IPOs shares give to investors negative returns for at least the first three years after listing. Grammenos and Arkoulis (1999) and Merikas et al (2009) find that global shipping firms which are included in their portfolio underperform too at the end of the third year after listing.

More specifically, Grammenos and Arkoulis (1999) find that a sample of shipping IPOs across stock exchanges of seven different countries underperforms by 36.79% after the second year of public listing. Merikas, Gounopoulos and Nounis (2009) find that Global Shipping IPOs underperform after a 5-month holding period. The researchers conclude that an investor, who buys a shipping company's shares at the first date of trading and hold them for three years, will suffer losses of 15.72%.

It is also worthy to mention that Merikas, Gounopoulos and Karli (2010) on their research upon exclusively US-listed shipping IPOs find that the shares offer investors positive returns of 7.50, 7.73 and 3.26 percent after one, two and three years respectively.

6.2.2 Regression Results

Six cross sectional regressions are used in order to examine the relationship between the dependent and the independent variables. More specifically I examine the effect of a number of factors to the long-run performance of the shipping IPOs expressed here as BHAR (buy-and-hold abnormal returns) for six 6-months periods for three years. The lack of relation between dependent and independent variables is the regression's null hypothesis.

6.2.2.1 BHAR 6

As in the case of underpricing so now a correlation matrix has to be constructed so to check for multicollinearity.

Table 7: Correlation Matrix for the first 6-month period

| | BHAR_6 | LOG_AGE | LOG_GP | EXCHANGE | D_A | OIL | INITIAL_UNDE RPCING |
|------------------------|-----------|-----------|-----------|-----------|-----------|-----------|------------------------|
| BHAR_6 | 1.000000 | -0.222024 | -0.182787 | 0.244310 | -0.074553 | 0.038112 | 0.266334 |
| LOG_AGE | -0.222024 | 1.000000 | 0.151973 | -0.096005 | -0.008171 | -0.196127 | 0.216248 |
| LOG_GP | -0.182787 | 0.151973 | 1.000000 | 0.115223 | 0.148873 | 0.169293 | -0.149570 |
| EXCHANGE | 0.244310 | -0.096005 | 0.115223 | 1.000000 | 0.138684 | 0.136381 | 0.133932 |
| D_A | -0.074553 | -0.008171 | 0.148873 | 0.138684 | 1.000000 | -0.045132 | 0.120268 |
| OIL | 0.038112 | -0.196127 | 0.169293 | 0.136381 | -0.045132 | 1.000000 | -0.128402 |
| INITIAL_UNDE RPCING | 0.266334 | 0.216248 | -0.149570 | 0.133932 | 0.120268 | -0.128402 | 1.000000 |

The absence of correlation is confirmed by the matrix above along with the value of 1.65 of the Durbin Watson.

Table 8: Estimation output for the first 6-month period

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|--------------------|-------------|-----------------------|-------------|----------|
| LOG_AGE | -0.064927 | 0.039283 | -1.652794 | 0.1060 |
| LOG_GP | -0.038048 | 0.052006 | -0.731601 | 0.4686 |
| EXCHANGE | 0.157463 | 0.108538 | 1.450759 | 0.1545 |
| D_A | -0.158716 | 0.183181 | -0.866441 | 0.3913 |
| OIL | 0.000172 | 0.002206 | 0.078061 | 0.9382 |
| INITIAL_UNDERPCING | 0.216142 | 0.110278 | 1.959972 | 0.0568 |
| C | 0.738449 | 0.935897 | 0.789027 | 0.4346 |
| R-squared | 0.213453 | Mean dependent var | | 0.040858 |
| Adjusted R-squared | 0.098348 | S.D. dependent var | | 0.374051 |
| S.E. of regression | 0.355182 | Akaike info criterion | | 0.901663 |
| Sum squared resid | 5.172312 | Schwarz criterion | | 1.174546 |
| Log likelihood | -14.63990 | Hannan-Quinn criter. | | 1.004786 |
| F-statistic | 1.854428 | Durbin-Watson stat | | 1.655740 |
| Prob(F-statistic) | 0.112291 | | | |

According to the t-Statistic values, the vast majority of the variables are not statistically significant. The only one that records a slight significance is the initial undepricing which seems to influence the first 6 months BHARs. However, it is worthy to mention the relationship between the independent variables and the BHARs. The stock exchange, the oil prices and the initial undepricing are positively related to BHARs. This means that the choice of reputable stock exchange, the higher the oil prices and the existence of underpricing will lead to a better 6 months performance.

The gross proceeds, the gearing level and the age of the company are not found to have statistically significance with the dependent variable, although they are negatively related to 6 months BHARs. The higher the gross proceeds, the higher the level of gearing and the longer the history of the company before the date of initial public offering will possibly push the shipping company in underperformance after 6 months.

The R^2 for this regression is 0.213453 meaning that 21.34% variation in 6-month BHAR can be jointly explained by the six independent variables. The rest 78.66% can be explained by residuals. I also reject the null hypothesis according to the p-value of the F-statistic.

6.2.2.2 BHAR 12

Table 9: Correlation Matrix for the second 6-month period

| | BHAR_12 | LOG_AGE | LOG_GP | EXCHANGE | D_A | OIL | INITIAL_UND ERPCING |
|------------------------|-----------|-----------|-----------|-----------|-----------|-----------|------------------------|
| BHAR_12 | 1.000000 | -0.072843 | -0.266958 | 0.267582 | 0.091373 | -0.113308 | 0.229847 |
| LOG_AGE | -0.072843 | 1.000000 | 0.151973 | -0.096005 | -0.008171 | -0.196127 | 0.216248 |
| LOG_GP | -0.266958 | 0.151973 | 1.000000 | 0.115223 | 0.148873 | 0.169293 | -0.149570 |
| EXCHANGE | 0.267582 | -0.096005 | 0.115223 | 1.000000 | 0.138684 | 0.136381 | 0.133932 |
| D_A | 0.091373 | -0.008171 | 0.148873 | 0.138684 | 1.000000 | -0.045132 | 0.120268 |
| OIL | -0.113308 | -0.196127 | 0.169293 | 0.136381 | -0.045132 | 1.000000 | -0.128402 |
| INITIAL_UND ERPCING | 0.229847 | 0.216248 | -0.149570 | 0.133932 | 0.120268 | -0.128402 | 1.000000 |

The correlation matrix indicates the absence of correlation between the variables, something that confirms the 1.68 value of the Durbin-Watson.

Table 10: Estimation output for the second 6-month period

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|--------------------|-------------|-----------------------|-------------|-----------|
| LOG_AGE | -0.018637 | 0.050333 | -0.370282 | 0.7131 |
| LOG_GP | -0.116232 | 0.066635 | -1.744321 | 0.0886 |
| EXCHANGE | 0.263479 | 0.139068 | 1.894602 | 0.0652 |
| D_A | 0.113715 | 0.234707 | 0.484496 | 0.6306 |
| OIL | -0.001836 | 0.002826 | -0.649865 | 0.5194 |
| INITIAL_UNDERPCING | 0.136276 | 0.141297 | 0.964463 | 0.3405 |
| C | 1.986651 | 1.199148 | 1.656719 | 0.1052 |
| R-squared | 0.198756 | Mean dependent var | | -0.057872 |
| Adjusted R-squared | 0.081500 | S.D. dependent var | | 0.474849 |
| S.E. of regression | 0.455087 | Akaike info criterion | | 1.397384 |
| Sum squared resid | 8.491290 | Schwarz criterion | | 1.670267 |
| Log likelihood | -26.53721 | Hannan-Quinn criter. | | 1.500507 |
| F-statistic | 1.695069 | Durbin-Watson stat | | 1.681122 |
| Prob(F-statistic) | 0.146702 | | | |

The t-Statistic values indicate that none of the independent variables is statistically significant. The remarkable fact here is the relationship between the dependent and the independent variables. The stock exchange, the gearing level and the initial underpricing are positively related to the first year's BHARs. In contrast, the age of the shipping firm, the gross proceeds and the oil prices are negatively related to the BHARs of the first year.

According to the R^2 , 19.9% variation in one year's BHAR can be jointly explained by the six chosen independent variables. The p-value of F-statistic is bigger than 0.05 so I fail to reject the null hypothesis ($b_1=0, b_2=0, b_3=0, b_4=0, b_5=0$).

6.2.2.3 BHAR 18

Table 11: Correlation Matrix for the third 6-month period

| | BHAR_18 | LOG_AGE | LOG_GP | EXCHANGE | D_A | OIL | INITIAL_UNDE RPCING |
|-------------------------|-----------|-----------|-----------|-----------|-----------|-----------|------------------------|
| BHAR_18 | 1.000000 | -0.018975 | -0.324006 | 0.186957 | 0.095682 | -0.081813 | 0.240996 |
| LOG_AGE | -0.018975 | 1.000000 | 0.151973 | -0.096005 | -0.008171 | -0.196127 | 0.216248 |
| LOG_GP | -0.324006 | 0.151973 | 1.000000 | 0.115223 | 0.148873 | 0.169293 | -0.149570 |
| EXCHANGE | 0.186957 | -0.096005 | 0.115223 | 1.000000 | 0.138684 | 0.136381 | 0.133932 |
| D_A | 0.095682 | -0.008171 | 0.148873 | 0.138684 | 1.000000 | -0.045132 | 0.120268 |
| OIL | -0.081813 | -0.196127 | 0.169293 | 0.136381 | -0.045132 | 1.000000 | -0.128402 |
| INITIAL_UNDE ERPCING | 0.240996 | 0.216248 | -0.149570 | 0.133932 | 0.120268 | -0.128402 | 1.000000 |

As seen in the correlation matrix above there is no existence of multicollinearity among the variables. The Durbin-Watson value of 1.67 confirms that fact too.

Table 12: Estimation output for the third 6-month period

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|--------------------|-------------|-----------------------|-------------|-----------|
| LOG_AGE | 0.005616 | 0.053770 | 0.104440 | 0.9173 |
| LOG_GP | -0.159113 | 0.071186 | -2.235187 | 0.0309 |
| EXCHANGE | 0.200379 | 0.148566 | 1.348753 | 0.1848 |
| D_A | 0.173229 | 0.250737 | 0.690881 | 0.4935 |
| OIL | -0.000516 | 0.003019 | -0.170774 | 0.8652 |
| INITIAL_UNDERPCING | 0.145429 | 0.150947 | 0.963445 | 0.3410 |
| C | 2.574413 | 1.281045 | 2.009619 | 0.0511 |
| R-squared | 0.192824 | Mean dependent var | | -0.133058 |
| Adjusted R-squared | 0.074700 | S.D. dependent var | | 0.505412 |
| S.E. of regression | 0.486168 | Akaike info criterion | | 1.529514 |
| Sum squared resid | 9.690748 | Schwarz criterion | | 1.802398 |
| Log likelihood | -29.70835 | Hannan-Quinn criter. | | 1.632637 |
| F-statistic | 1.632393 | Durbin-Watson stat | | 1.677323 |
| Prob(F-statistic) | 0.162805 | | | |

Consistent with the t-Statistic, the vast majority of the independent variables are not statistically significant except the one of Gross Proceeds. The regression analysis illustrates that the gross proceeds are found to be statistically significant to explain the BHARs after 18 months. Furthermore, the current variable is negatively related to the 18-month BHARs, meaning that the higher the gross proceeds, the lower the performance of the shipping IPO. Negative impact on BHARs has also the oil prices. Contrariwise, the longer the history of the company, a reputable stock exchange and the initial undepreciating of the first trading day are positively related to the 18-month BHARs.

The R^2 value of 0.192824 indicates that 19.28% variation in 18-month BHAR is jointly explained by the six independent variables. So as to test for the joint significance of the independent variables, the p-value of the F-statistic is bigger than the threshold of 0.05 so I fail to reject the null hypothesis ($b_1=0, b_2=0, b_3=0, b_4=0, b_5=0$).

6.2.2.4 BHAR 24

Table 13: Correlation Matrix for the fourth 6-month period

| | BHAR_24 | LOG_AGE | LOG_GP | EXCHANGE | D_A | OIL | INITIAL_UNDE RPCING |
|------------------------|-----------|-----------|-----------|-----------|-----------|-----------|------------------------|
| BHAR_24 | 1.000000 | -0.204494 | -0.225885 | 0.204069 | 0.176640 | -0.114282 | 0.208271 |
| LOG_AGE | -0.204494 | 1.000000 | 0.151973 | -0.096005 | -0.008171 | -0.196127 | 0.216248 |
| LOG_GP | -0.225885 | 0.151973 | 1.000000 | 0.115223 | 0.148873 | 0.169293 | -0.149570 |
| EXCHANGE | 0.204069 | -0.096005 | 0.115223 | 1.000000 | 0.138684 | 0.136381 | 0.133932 |
| D_A | 0.176640 | -0.008171 | 0.148873 | 0.138684 | 1.000000 | -0.045132 | 0.120268 |
| OIL | -0.114282 | -0.196127 | 0.169293 | 0.136381 | -0.045132 | 1.000000 | -0.128402 |
| INITIAL_UNDE RPCING | 0.208271 | 0.216248 | -0.149570 | 0.133932 | 0.120268 | -0.128402 | 1.000000 |

As the previous analysis, so here Durbin-Watson 1.49 and the correlation matrix establish the lack of multicollinearity.

Table 14: Estimation output for the fourth 6-month period

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|--------------------|-------------|-----------------------|-------------|-----------|
| LOG_AGE | -0.152896 | 0.106065 | -1.441535 | 0.1570 |
| LOG_GP | -0.177507 | 0.140417 | -1.264136 | 0.2133 |
| EXCHANGE | 0.357085 | 0.293055 | 1.218491 | 0.2300 |
| D_A | 0.523593 | 0.494592 | 1.058637 | 0.2960 |
| OIL | -0.004868 | 0.005955 | -0.817386 | 0.4184 |
| INITIAL_UNDERPCING | 0.335548 | 0.297752 | 1.126940 | 0.2663 |
| C | 2.901701 | 2.526934 | 1.148309 | 0.2575 |
| R-squared | 0.199706 | Mean dependent var | | -0.326122 |
| Adjusted R-squared | 0.082590 | S.D. dependent var | | 1.001231 |
| S.E. of regression | 0.958994 | Akaike info criterion | | 2.888175 |
| Sum squared resid | 37.70648 | Schwarz criterion | | 3.161058 |
| Log likelihood | -62.31619 | Hannan-Quinn criter. | | 2.991298 |
| F-statistic | 1.705197 | Durbin-Watson stat | | 1.495937 |
| Prob(F-statistic) | 0.144245 | | | |

Concerning the 2 years BHARs, none of the chosen variables record statistical significance. The variables are equally divided respecting their relationship on the two years BHARs. The choice of a reputable stock exchange market, the gearing level and the initial undepreciating have a positive impact on BHARs, meaning for example that a listing on NYSE or NASDAQ would lead to an over performance to the returns two years after the initial public offering. Older shipping companies, higher gross proceeds and higher oil prices would lead to a long-run underperformance.

The independent variables can explain almost the 20% of the variability of the dependent variable according to the R^2 . The p-value of the F-statistic is lower than 0.05 so I fail to reject the null hypothesis.

6.2.2.5 BHAR 30

Table 15: Correlation Matrix for the fifth 6-month period

| | BHAR_30 | LOG_AGE | LOG_GP | EXCHANGE | D_A | OIL | INITIAL_UNDE RPCING |
|------------------------|-----------|-----------|-----------|-----------|-----------|-----------|------------------------|
| BHAR_30 | 1.000000 | -0.220983 | -0.178677 | 0.106327 | 0.237053 | -0.119438 | 0.245296 |
| LOG_AGE | -0.220983 | 1.000000 | 0.151973 | -0.096005 | -0.008171 | -0.196127 | 0.216248 |
| LOG_GP | -0.178677 | 0.151973 | 1.000000 | 0.115223 | 0.148873 | 0.169293 | -0.149570 |
| EXCHANGE | 0.106327 | -0.096005 | 0.115223 | 1.000000 | 0.138684 | 0.136381 | 0.133932 |
| D_A | 0.237053 | -0.008171 | 0.148873 | 0.138684 | 1.000000 | -0.045132 | 0.120268 |
| OIL | -0.119438 | -0.196127 | 0.169293 | 0.136381 | -0.045132 | 1.000000 | -0.128402 |
| INITIAL_UNDE RPCING | 0.245296 | 0.216248 | -0.149570 | 0.133932 | 0.120268 | -0.128402 | 1.000000 |

According to the correlation matrix, there is not a value even close the minimum limit of 0.8 among the variables, and the Durbin-Watson value also confirms the fact that there is no correlation between the variables.

Table 16: Estimation output for the fifth 6-month period

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|--------------------|-------------|-----------------------|-------------|-----------|
| LOG_AGE | -0.192347 | 0.106185 | -1.811437 | 0.0774 |
| LOG_GP | -0.111409 | 0.140576 | -0.792515 | 0.4326 |
| EXCHANGE | 0.098780 | 0.293387 | 0.336690 | 0.7381 |
| D_A | 0.730444 | 0.495152 | 1.475192 | 0.1478 |
| OIL | -0.004851 | 0.005962 | -0.813660 | 0.4205 |
| INITIAL_UNDERPCING | 0.477446 | 0.298089 | 1.601691 | 0.1169 |
| C | 1.692893 | 2.529794 | 0.669182 | 0.5071 |
| R-squared | 0.209406 | Mean dependent var | | -0.324153 |
| Adjusted R-squared | 0.093709 | S.D. dependent var | | 1.008495 |
| S.E. of regression | 0.960080 | Akaike info criterion | | 2.890437 |
| Sum squared resid | 37.79190 | Schwarz criterion | | 3.163321 |
| Log likelihood | -62.37050 | Hannan-Quinn criter. | | 2.993561 |
| F-statistic | 1.809956 | Durbin-Watson stat | | 1.429419 |
| Prob(F-statistic) | 0.121025 | | | |

There is no evidence of statistical significance for none of the variables concerning the BHARs after a 30-months period of time. The variables have the same pattern of relationship with the returns as in the case of 24-month returns.

Furthermore, the value of the R^2 is 0.209406 means that almost the 21% of variation in 30-month BHAR can jointly be explained by the six independent variables. I fail to reject the null hypothesis according to the p-value of the F-statistic.

6.2.2.6 BHAR 36

The last regression analysis regards the 3-year BHARs after public listing at the stock exchanges and the results are of great interest.

Table 17: Correlation Matrix for the sixth 6-month period

| | BHAR_36 | LOG_AGE | LOG_GP | EXCHANGE | D_A | OIL | INITIAL_UNDE RPCING |
|------------------------|-----------|-----------|-----------|-----------|-----------|-----------|------------------------|
| BHAR_36 | 1.000000 | -0.099247 | -0.357232 | 0.013261 | 0.242182 | -0.209233 | 0.311421 |
| LOG_AGE | -0.099247 | 1.000000 | 0.151973 | -0.096005 | -0.008171 | -0.196127 | 0.216248 |
| LOG_GP | -0.357232 | 0.151973 | 1.000000 | 0.115223 | 0.148873 | 0.169293 | -0.149570 |
| EXCHANGE | 0.013261 | -0.096005 | 0.115223 | 1.000000 | 0.138684 | 0.136381 | 0.133932 |
| D_A | 0.242182 | -0.008171 | 0.148873 | 0.138684 | 1.000000 | -0.045132 | 0.120268 |
| OIL | -0.209233 | -0.196127 | 0.169293 | 0.136381 | -0.045132 | 1.000000 | -0.128402 |
| INITIAL_UNDE RPCING | 0.311421 | 0.216248 | -0.149570 | 0.133932 | 0.120268 | -0.128402 | 1.000000 |

There is no existence of multicollinearity. Both the correlation matrix and the Durbin-Watson value of 1.30 prove this fact.

Table 18: Estimation output for the sixth 6-month period

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|--------------------|-------------|-----------------------|-------------|--------|
| LOG_AGE | -0.078652 | 0.085273 | -0.922349 | 0.3617 |
| LOG_GP | -0.249877 | 0.112892 | -2.213420 | 0.0325 |
| EXCHANGE | -0.021775 | 0.235608 | -0.092419 | 0.9268 |
| D_A | 0.743125 | 0.397639 | 1.868845 | 0.0688 |
| OIL | -0.004737 | 0.004788 | -0.989321 | 0.3283 |
| INITIAL_UNDERPCING | 0.417624 | 0.239384 | 1.744576 | 0.0886 |
| C | 4.232000 | 2.031587 | 2.083101 | 0.0435 |
| R-squared | 0.291704 | Mean dependent var | -0.271272 | |
| Adjusted R-squared | 0.188051 | S.D. dependent var | 0.855644 | |
| S.E. of regression | 0.771006 | Akaike info criterion | 2.451796 | |
| Sum squared resid | 24.37245 | Schwarz criterion | 2.724680 | |
| Log likelihood | -51.84310 | Hannan-Quinn criter. | 2.554919 | |
| F-statistic | 2.814238 | Durbin-Watson stat | 1.308956 | |
| Prob(F-statistic) | 0.021871 | | | |

In addition, there is one out of the six variables that records statistical significance. Gross proceeds are found to be statistically significant in order to explain the 3-year BHARs. The existing independent variable is also negatively related to the dependent variable meaning that the higher the gross proceeds of a shipping IPO, the lower the performance after three years. Negative relationship with the BHARs records the age of the company, the choice of the stock exchange and the oil prices even though there is no evidence of statistical significance. The other two variables - the gearing level and the initial underpricing- affect in a positive way the long-run returns. This means that if for example a company records underpricing on the first trading day, this fact will lead to an increasing long term performance.

Additionally, according to the R^2 value of 0.291704, the chosen independent variables explain quite well the dependent's variation. The p-value of F-statistic is lower than the 0.05, so I reject the null hypothesis ($b_1=0, b_2=0, b_3=0, b_4=0, b_5=0$). The independent variables jointly can influence the dependent variable.

6.3 Summary of Results

In order to detect the short-run and the long-run phenomenon of shipping IPOs I considered five and six variables respectively in order to examine for those effects. The results of the regression analysis in the short-run period illustrate that none of the five are statistically significant variables. The results differ from those of Merikas et al 2009 who find statistical significance and positive relationship between the age and the reputation stock exchange compared with the short-run performance.

Furthermore, the multivariable regression analysis for the long-run performance record two statistically significant variables. According to the results, the initial underpricing of the first trading day has a positive relationship with the long-run performance up to a six months period. High levels of underpricing could lead to an over-performance up to six months period. The other statistically significant variable is the gross proceeds. Long-term returns become negative if the gross proceeds are bigger for a shipping IPO. This under-performance is recorded up to 18-month and 3 years (36-month) period. A negative relationship between gross proceeds (size) and the long-run

performance is also recorded in Merikas et al. (2009) who record that overperformance is stronger for smaller firms. In addition, they find statistical significance for the age of the company and the reputation of the stock exchange, something that does not happen in this study. In contrast, Merikas et al. (2010) find that a positive relationship exists between size (gross proceeds) and long-term returns, but the research refers exclusively to US listed shipping IPOs. They also find a positive impact of the long history and the choice of reputable stock exchange with the long-run performance.

7 Conclusion

This dissertation study aims to record the purpose behind a shipping company's decision to enter stock exchanges and the final destination of the funds they raised from this procedure. It is also an update to already existing literature dealing with the short-run and long-run performance of shipping initial public offerings. For this purpose recent data are used and more specifically during the period 2000-2014 in order to reach in some conclusions. The sample consists of 48 shipping IPOs that were issued in 7 well known global stock exchanges.

The first finding of the study is the low level of underpricing. The results are quite lower than of Merikas et al. 2009 of 17.69% and those of Merikas et al. (2010) for US shipping IPOs of 4.44%. Subsequently, a multivariable regression is constructed so as to check how a number of factors affect this phenomenon on the sample. Five variables that were tested previously on various papers regarding the phenomenon of underpricing are also examined in this study. The difference in this case is that for the global shipping IPOs, none of the explanatory variables proved statistically significant, in contrast with those of Merikas et al. (2009).

The next step involves the analysis of the performance of shipping IPOs in the long-run period. For this purpose the buy-and-hold abnormal return (BHAR) method is used for three years in separate 6-months period. The results illustrate that the sample records a slight overperformance of 2,346% for the first six-month period. Subsequently, the sample underperforms and reaches the high of 30,463% at the 24-month period.

The last part of this dissertation study deals with the level of affection that some factors have on the long-run performance. BHARs are used as dependent variable and the gross proceeds, the age of the company, the stock exchange, the gearing level (measured as total debt to total assets ratio), the oil prices and the initial underpricing of the first trading day as independent variables. The initial underpricing and the gross proceeds record statistical significance in different periods of long-run performance in a positive and negative way respectively. Merikas et al. find that the age and the reputation of the stock exchange are the factors who significantly affect the long run performance.

Future researches can measure the short-run and the most important the long-run IPO puzzle by using a larger sample and categorize the companies into smaller groups depends on the type of vessel, the country of domicile or the history of each company. The shipping stock performance remains still a subject of great interest due to the high freight market volatility (Syriopoulos 2007) and the cyclicity of the business.

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