Long-Run IPOs Performance

The case of Germany, UK and France

M.Sc. in Banking and Finance

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Abstract

The objective of this dissertation study is to examine whether German, United Kingdom and France markets show long-run performance of Initial Public Offering (IPO) or not, and what are the factors influence companies' long-run performance after their listing. For this purpose buy-and-hold abnormal returns *(BHAR)* method is computed for 485 firms that were listed during the period 2006-2009. The empirical results differ from international evidence for underperformance and reveal a strong positive performance that continues for a substantial interval after first listing. Later on, a multivariable regression is performed in order to check which factors influence firms' abnormal returns. The *BHARs* are used as independent variables, while the dependent variables are the following: 1) the company size, 2) the issue size, 3) the leverage and finally 4) the time lag. The results show that only two variables influence the long-run returns which are the number of shares issued (issue size) and the current market capital (company size). However the other variables (leverage and time lag) do not influence the long-run performance in the three countries. Finally the above results are tested for their significance by simple *t*-statistic tests.

***Keywords**: Initial Public Offering, Long-run Performance*

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1. Introduction

Initial Public Offering (IPO) is an important milestone in the life cycle of a private organization, since through this procedure a private company will become a public one. The reasons why a company decides to go public are different such as diversification, liquidity, raising expansion capital etc. The founders have to allocate a portion of their ownership in order to exchange equity that they use to grow the business.

There have been numerous studies associated with the performance of companies going public for first time in many different markets. A large volume of researchers concluded in two phenomena related to IPOs; either the "Underpricing" or the "Long-run underperformance". In this study the second one is going to be performed. Underpricing is the phenomenon when the investors, participating in an *IPO*, earn high positive abnormal returns in the early aftermarket period. This happens because new shares are usually sold to investors at a price lower than those prevailing on the first day of trading. Long-run underperformance is the phenomenon when the performance of an IPO declines from year to year and finally turns negative. So comparing the performance of IPOs in short-term with the long-term performance, the results will show a better short-term performance rather than a long-term one.

The performances of IPOs have received an elaborate amount of attention in the last years. Ritter (1991) through his research showed that US IPOs significantly underperformed in the three years after listing. Similar results reported for IPOs in Germany by Bessler and Thies (2007), in UK by Levis (1993) and Espenlaub (2000), in Australia by Lee, Taylor and Water (1994) and in Spain by Jaskiewicz, Gonzalez, Menendez and Sciereck (2005). On the other hand there were also some studies that did not find evidence of long-run underperformance such as Loughran, Ritter and Rydqvist (1994) for Sweden, Kim, Krinsky and Lee (1995) for Korea, Dawson (1987) for Malaysia and Kiymaz (1997) for Turkey.

The first objective of this paper is to evaluate the performance of firms listed in the stock exchange during the period of January 1, 2006 and December 31, 2009 in Germany, UK and France. The *BHAR* is defined as the raw return minus the corresponding market return (Thomadakis, 2007). In order to calculate raw returns, last stock prices in daily term for each company were excluded from Bloomberg Database. Raw return is the individual return for each company while market return is the average return from all listed companies in a Stock Exchange Market or in a country generally. In

this study *BHARs* are computed using daily data for 125, 250, 375, 500, 625 and 750 days (6, 12, 18, 24, 30 and 36 months) as the difference between the compounded actual return of the company and the compounded return of the market. The results reveal a pretty high overperformance in the first two years and an evidence of a lower mean *BHAR* in the third year.

Another field, which has been intensively investigated by several economic researchers, concerns the possible reasons why some companies show underperformance in the long run IPO, while some others do not and also which are the possible factors that contribute to such a condition. This would be the second objective of this study. In order to examine the relationship between each factor and the long-run performance of companies' IPOs, a multivariate regression will be performed. The factors including in the regression are the following: 1) the company size, 2) the issue size, 3) the leverage and finally 4) the time lag. The results show that only two variables influence the long-run performance of IPOs, the current market capital (company size) and the number of shares offered at the listing period (issue size).

The remainder of the paper is organized as follows. Section 2 reviews some basic terminology and definitions in the IPOs literature; such as the reasons for going public, the procedure and the costs are required for a company to get listing. In section 3 most usual long-run evaluation models are quoted. Section 4 reviews the literature regarding the long-term performance of countries with different backgrounds and the potential factors that influence the after listing performance. Objectives of the study and data sources are presented in Section 5 while research methodology is given in Section 6. All the empirical findings are quoted and analyzed in section 7 and finally section 8 summarizes the main results and concludes the paper by offering further recommendations for future research.

2. Terminology and Definitions in the IPOs Literature

2.1 What is an IPO, the procedure and the reasons for going Public

An initial public offering (IPO) or stock market launch is a type of public offering where shares of stock in a company are sold to the general public for the first time. This activity becomes the most important moment for a company because through this process, a private company transforms into a public one.

An increasing number of companies, especially small and medium-sized firms, are choosing to create initial public offerings as a way to survive in today's competitive and demanding marketplace. When an IPO is planned carefully and precisely executed could often provide an effective way to raise needed capital. Most common reasons why a company decides going public are the following; to access capital markets to raise money for the expansion of the operations, to provide liquidity for shareholders, to enhance the company's reputation, to diversify and reduce investors' holdings, to acquire other companies with publicly traded stock as the currency, to attract and retain talented employees etc.

Before deciding whether or not to go public, companies should evaluate all of the potential advantages and disadvantages that will arise. The primary and most important advantage a business stands to gain through an initial public stock offering is access to capital and therefore enlarging and diversifying its equity base. Additionally, the capital does not have to be repaid and simultaneously does not involve any kind of interest charges. The only reward that IPO investors are looking for is an appreciation of their investment and possibly future dividends. Building a broader equity base means that the company improves its debt-to-equity ratio; the company reduces its current cost of borrowing and make it easier to borrow additional funds as needed.

One additional financial gain is that when a company decides to make an initial public offering will also increase its public awareness and credibility. This may lead to new opportunities and new costumers. Public companies are more carefully and closely monitored than private companies. So many investors feel that that they make for more stable and reliable investments. As part of the IPO process, information is printed in newspapers and inundates the media leading in an increase of firm's publicity. This increased demand is reflected in a higher overall valuation of the company. Moreover, once a public market for its shares has been established, the company is more able to

attract and retain quality employees. When a company is going public can offer another form of compensation such as stock options, stock purchase plans and stock appreciation rights. This kind of compensation not only conserves cash and offers tax advantages but also increases employees' motivation and loyalty. (Richard P.Kleeburg, 2005)

Going public is a significant milestone for a company. A successful Initial Public Offering (IPO) constitutes a dramatic change in the company and shareholder position with many new opportunities and numerous benefits, as well as a lot of new risks. Before the companies go public there are some requirements that have to be fulfilled by the company. First and foremost priority for the company is to develop an impressive management team, a steering committee which will take responsibility for higher-level strategic and structural decisions. Once the team of the company has been put together, the next step is to start gathering the financial information required to make sure everything is legitimate. This includes identifying, selling or writing off unprofitable assets, and finding areas where cash flow can be beefed up. Some months before the IPO is scheduled, the company has to draft the prospectus; the prospectus is the legal document used to promote the IPO and includes a three-year history of financial statements, facts and figures associated with the company as well as the initial selling price of a share of the company's stock. The prospectus is filed with the Securities and Exchange Commission and labeled as a preliminary IPO which will be used to market to potential investors.[1] The next step is to record the potential investors and both the number of shares they plan to buy and their ideal purchasing price. By this procedure the company could determine and decide which price per share would be the most attractive for the public. When the company fulfilled all the steps were mentioned above it means that they are ready to submit the final draft of the IPO to the SEC and begin selling their shares of stock to new investors.

2.2 Costs of going Public

The costs of going public are of interest in the finance literature. When firms decide to go public, they incur costs associated with the initial public offering (IPO) process. According to the financial economic literature, costs are split-up into two categories, the direct costs which are fairly predictable and indirect costs, commonly known as IPO

[1] http://www.ehow.com

underpricing. As direct costs considered all those expenses which are related to the listing decision. For example, underwriting fees paid to the lead investment communities; banks, lawyers, auditors. In addition direct costs are fees paid to the Stock Exchange, advertising or press costs. While indirect costs are considered those that have an impact on the equity valuation. The major expenses associated with an IPO are summarized in the remainder of this section.

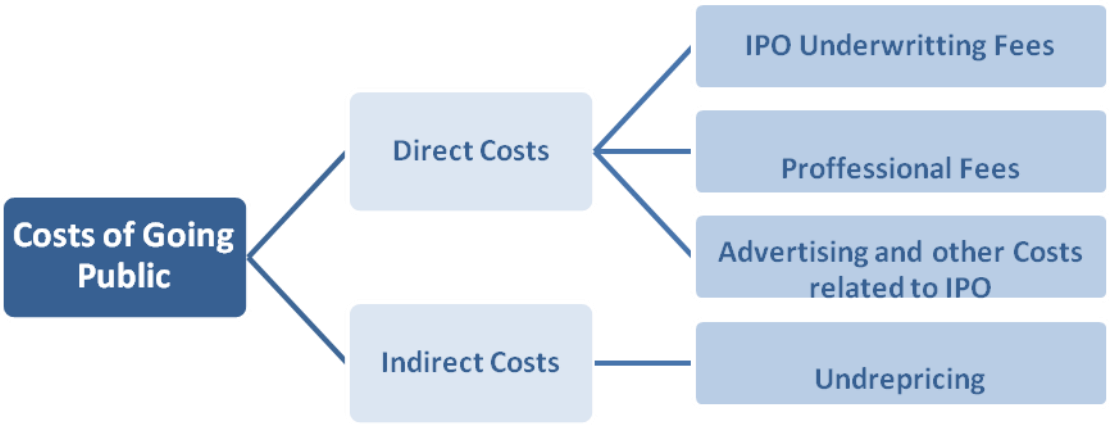

Figure 1: Direct and Indirect Costs associated with the listing decision

Underwriting fees: When a company is going to make a public offering, its first step is to select an investment bank to advise it and to perform underwriting functions in connection with the issue.[2] Among the direct costs, the underwriting fees paid to investment banks typically represent the largest cost item of an IPO. The underwriters' commission is expressed in a percentage term ranging from six to nine percent of the public offering of new common stock issue.

[2] Katrina Ellis(1999), A Guide to the Initial Public Offering Process

Professional fees: Companies going public often engage professional advisors that can navigate the way through the complex and time consuming process. Professional fees include any kind of payable professional advice; legal, accounting and audit fees. These kinds of fees vary with the circumstances and depend on the company's size, scope and the complexity of the operations.

Advertising and other costs related to IPOs: These costs cover printing of the registration statement, the prospectus, the stock certificates and the underwriting documents. Moreover cover all the publishing and advertising procedure.

Underpricing: The indirect cost of an Initial Public Offering, commonly known as IPO underpricing, is one of the most perplexing puzzles in finance. It is observed in almost every financial market in the world and across all procedures of share allocation. Many empirical studies have documented a strong trend of issuing companies to systematically offer their shares at a significant discount. According to Ljungqvist and Wilhelm (2003), this IPO discount is measured as the difference between the offer price and the closing market price of the first trading day.[3] Although most IPOs are underpriced, the level varies among IPOs with different characteristics, allocation mechanisms, underwriter reputation and financial market conditions.[4]

3. Long-run performance Evaluation

The success of an Initial Public Offering is best evaluated by how well the firm performs in the long run period. Long-run performance of IPO is a performance that is being analyzed in the long-run periods of time, two until three years or more after the listing date. When we are talking about long-run underperformance we mean a situation of long-run performance of IPO, which shows a decline from year to year.[5] In recent years, academic researchers focused their attention on the long-run performance of newly listed firms. The evidence which has emerged from several studies is that during the first few

[3] Ljungqvist and Wilhelm (2003),IPO pricing in the Dot-com Bouble, Journal of Finance 58
[4] http://www.qfinance.com , Lena Booth, The Cost of Going Public: Why IPOs Are Typically Underpriced
[5] Mahardhini Fuadillah, Agus Harjito (2009), Long-run IPO performances and it's influencing factors: the case of Indonesian Stock Exchange

years of their public listing IPOs significantly and economically underperforms comparable benchmarks (Loughran, 1994).

The phenomenon of long-run underperformance of newly listed firms is of great interest because has several implications on all those factors associated with an IPO; beginning with the firms which decide to go public. If IPOs underperform in the long-run, issuers raise less capital and they suffer an opportunity cost of low returns on shares they retain. A poor performance in the long run will affect negatively the primary market investors too, who will be discouraged from holding shares beyond the first days of trading. In the same way, if new offerings systematically underperform in the long run, secondary market investors who were not able to buy shares at subscription will seek alternative investments and they would not be interest anymore in the case of an IPO. As concerns the underwriters, if they price an IPO above its true market value, subscribers would possibly reject such an offering because they would receive inferior returns. On the other hand, if underwriters price IPOs below their true market values deprive issuers the opportunity to raise external equity capital, leading them to find another way of investing their money.

There is a considerable variation in the measures of abnormal returns and the statistical tests that empirical researchers use to detect long-run abnormal returns. Ritter (1991) for example suggests that the selection of a benchmark portfolio, the length of the period over which the performance is measured as well as the sample selection criteria explain the differences in observed performances and it might be a good tool to avoid misleading results. Ritter supports that the simplest and more intuitive measure for abnormal returns is the buy-and-hold adjusted returns *(BHAR)*.

The above method is recommended by Barber and Lyon too. Barber and Lyon (1997) in their study on long-run abnormal returns claim that many of the common methods used to calculate the long-run returns are conceptually flawed or lead to biased test statistics. Moreover, they support that the cumulative abnormal returns *(CARs)* as a measurement technique is a biased predictor of long-run buy-and-hold abnormal returns. So they concluded in using the *BHAR* method to examine abnormal returns. Additional, they propose that the distribution of the *BHAR* is positively skewed and does not have a zero mean.

Mitchell and Stafford (2000) argue that the *BHAR* is the most appropriate estimator because of its tendency to be more sensitive to the problem of cross-sectional dependence among sample firms. Moreover, Barber and Lyon (1997) support that the

BHAR "is measuring the investor experience" and that is more appropriate for researchers who are studying whether the offerings listed in the stock market earned abnormal returns or not. In addition, Kothari and Warner (1997) through their study concluded that the common estimation procedures can produce biased *BHAR* estimates and those biases arise from new listings, rebalancing of benchmark portfolios and skewness of multiyear abnormal returns.

On the other hand, Fama (1998) argues that the *BHAR* methodology is biased because the systematic errors that arise with imperfect expected returns proxies are compounded with long-horizon returns. In addition Fama supports that "any estimation method that ignores cross-sectional dependence of event firm abnormal returns that are overlapping in calendar-time is likely to produce overstated test statistics". Therefore, the methodology for measuring long-term abnormal returns Fama strongly recommends is a monthly calendar-time portfolio. The key advantage of this method is that forms portfolios in calendar time and not in event time, which means that biases included by potential clustering are minimized. However this method has many opponents; Kothari and Warner (1997) and Lyon, Barber, and Tsai (1999) argue that the calendar-time portfolio approach is severely misspecified for nonrandom samples.

According to all mentioned above and for the purposes of the study, the method of buy-and-hold returns (*BHAR*) will be used to evaluate the long-run performance of the three European countries' IPOs. This methodology involves the calculation of the three years buy-and-hold returns which are calculated by using the raw returns and the excess or adjusted returns. Also regarding the period time, will be from the first trading day after the companies are listing until the three year anniversary of their listings.

4. Review of Literature

4.1 Some previous studies

In the finance literature there exist numerous studies which investigate the aftermarket performance of IPOs. Prior research studies concentrate mainly on the phenomenon of long-run performance of IPOs. Ritter (1991) was the first financial economist who produced academic evidence documenting poor abnormal returns that follow an IPO. Ritter analyzes the performance of 1526 IPOs issued between 1975 and 1984 in US and

calculates returns based on cumulative average adjusted returns (*CAR*) as well as three year buy-and-hold abnormal returns (*BHAR*). He concluded that firms underperformed the market benchmark by about 29% in the three year period after their launch and that IPOs make bad medium- to long-term investments. Ritter explained that there are some possible explanations for the underperformance condition; they are risk miss-measurement, bad luck, fad and over-optimism.

Subsequent research using larger and longer sample periods confirmed the initial results of Ritter. Loughram and Ritter (1995) expanded upon the initial Ritter's study, using a sample of 4.753 operating companies' IPOs between 1970 and 1990. They used a variety of procedures and benchmarks and concluded that the average underperformance in the US market is 7% to 8% per year for five years.

Drobetz, Kammerman and Walchli (2005) estimated the long-run performance of 109 Swiss IPOS from 1983 to 2000 by *BHAR*, skewness-adjusted wealth ratios and cumulative abnormal returns using 120 months of secondary market returns. They use a much longer sample period than is usually applied in the literature and they conclude that the underperformance after three years was only about 7.5%.

The long-run performance of UK IPOs for the period of 1991 until 1995 was analyzed by Goergen, Khurshed and Mudambi (2007). They examined the performance of 252 IPOs that were listed on the London Stock Exchange using various methodologies such as *BHAR, CAR* and Fama and French three-factor returns. The *CAR* that they observed over the first 36 months was -21.3%. Goergen, Khurshed and Mudambi concluded in two main findings. Firstly, the percentage of equity issued and the degree of multinationality of a firm are the key predictors of its performance after an IPO. And secondly, small firms behave differently from large firms and suffer from worse long-run performance than large firms.[6]

Additionally, a study performed by Jaskiewicz, Gonzalez, Menendez and Schiereck (2005) examines the long-run stock market performance of German and Spanish IPOs. Their sample consists of 153 firms between 1990 and 2001 and they use *BHAR* in order to determine abnormal returns. They conclude that the underperformance after three years was 32.8% for German and 36.7% for Spanish IPOs. Furthermore, Jaskiewicz,

[6] Goergen, M., Khurshed, A. & Mudambi R., 2007.The Long-Run Underperformance of Initial Public predict.

Gonzalez, Menendez and Schiereck through a regression obtain that in family-owned businesses, strong family involvement has a positive impact on the long-run stock market performance, whereas the age of the firm has a negative influence.[7]

It is interested to note that a similar study performed by Bessler and Thies (2007) using a sample of 218 firms over the period 1977 to 1995. Using a *BHAR* period of three years they calculated the returns as 12.7%. Bessler and Thies support that the poor long-run performance of IPOs only happened in some companies, while the other companies show positive long-run. So, every company will not show the same long-run underperformance condition.

Based on this assumption, many researchers are interested in explaining the reasons why some companies show underperformance in the long run IPO, while the others do not. Dimovski and Brooks (2004) examined the role of financial and non-financial characteristics of IPOs. They concluded that there are relationships between IPO and pre-IPO financial performance. (Offer price, capital sought, hare options, underwritten, market sentiment, capital retained and limited liability etc.). They found that only market sentiment and the underwriter options have positive coefficient, while share option and DPS yield have negative coefficient relationship.[8]

Gounopoulos, Merikas, Karli, Nounis (2009) analyze the initial and aftermarket returns for US- listed shipping IPOs. Their main objective of their research is to test the extent to which signaling models explain the reasons for the issuance of IPOs using the long-term price performance approach. Their sample consists of 61 IPOs listed during the period 1987–2007 in four major US Stock Exchanges and they use a variety of methods for measuring long-term abnormal returns; *BHAR*, *CAR, FF3F* models. In order to check for an explanation of cross-sectional differences of the long-run performance of the US-listed Shipping IPOs they implement a multivariate regression using a number of potential factors such as the size and the age of the firm before going public, the underwriter's reputation, the proportion of given ownership by the initial shareholders, the reputation of the stock exchange and the country where IPOs have their headquarters.

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[7] Jaskiewicz, Gonzalez, Menendez and Schiereck, (2005). Long-Run IPO Performance Analysis of German and Spanish Family-Owned Businesses

[8] Mahardhini Fuadillah, Agus Harjito (2009), Long-run IPO performances and it's influencing factors: the case of Indonesian Stock Exchange

A unique academic research was conducted by Alvarez and Gonzalez (2001), analyzing the Spanish IPOs of 56 firms during the period 1987-1997. In their study they have used different methods in order to examine the robustness of the long-run performance of the IPOs regarding various specifications of the model; buy-and-hold returns (BHR), calendar-time portfolios and the Fama and French three-factor model. They believed that the result of long-run IPO performance examination depends on the methodology is used. Thus, there exists long-run underperformance when buy-and-hold returns are used and not when mean calendar-time returns are employed.

This result was mentioned above is in line with the evidence presented by Brav and Gompers (1997) in reference to the fact that the use of *BHRs* tends to magnify the long-run underperformance of IPOs. They investigate the long-run underperformance of recent firms IPOs in a sample of 934 venture-backed IPOs from 1972-1992 and 3.407 nonventure-backed IPOs from 1975-1992. They believe that the results of *BHAR* are different from the Fama-French's model in explaining the long-run performance, and on the other hand *BHAR* gives different result comparing with the method of Average Monthly Market Adjusted Return (*MMAR*).

As concerns the performance of IPOs in the aftermarket, although most studies show that IPOs significantly underperform in the first few years of their public listing, on the other hand some academic researchers find that new issues generate positive abnormal returns in the long-run such as McDonald and Jacquillat (1974), Dawson (1987) and Kiymaz (1997). McDonald and Jacquillat for example fulfilled their study using 31 IPOs in France for the time period 1968-1971 and concluded in a percentage of 15.60% positive abnormal returns. Moreover Dawson (1987) who examined 21 IPOs in Malaysia during the period of 1978 to 1993 and Kiymaz (1997) who evaluated 138 IPOs from 1990 until 1995 in Turkey, they concluded that the performance after 3 years were 18.20% and 44.10% respectively.

Table 1: Summary of IPO long-run performance

Country	Authors	N	Period	AIR
US	Ritter (1991)	1526	1975-1984	-29%
US	Loughram and Ritter (1995)	4753	1970-1990	-8%
Switzerland	Drobetz, *et al.* (2005)	109	1983-2000	-7,50%
UK	Goergen, *et al.* (2007)	252	1991-1995	-21,30%
Germany	Jaskiewicz, *et al.* (2005)	153	1990-2001	-32,80%
Spanish	Jaskiewicz, *et al.* (2005)	153	1990-2001	-36,70%
Germany	Bessler and Thies (2007)	218	1977-1995	-12,70%
France	McDonald and Jacquillat (1974)	31	1968-1971	15,60%
Malaysia	Dawson (1987)	21	1978-1993	18,20%
Turkey	Kiymaz (1997)	138	1990-1995	44,10%

Notes: a) N signifies the number of observations included in each respective study and b) AIR denotes the average initial returns.

4.2 Influencing Factors according to the Literature

Company Size: In this study as company size is taken the total current market value of all the company's outstanding shares stated in the pricing currency. Capitalization is a measure of corporate size. Brav and Gompers (1997) and Brav (2000) showed that smaller companies have a worse stock market performance than bigger one. Drobetz, Kammermann and Walchli (2005) through their research concluded that Swiss IPOs have poor long-run performance and showed that those firms tend to be small. Gounopoulos (2005) claimed that smaller firms tend to be more risky and in addition Jaskiewicz, Gonzalez, Memendez and Schiereck (2005) showed that the German and Spanish family owned businesses that are small have more negative long-run performance than bigger one.

Issue Size: Issue size is defined as the current number of shares outstanding and the offer price issued (Counopoulos, 2005).[9] The size of the offer has been shown to have an effect on the long-run performance of IPOs. According to Carter, Dark and Singh (1998) the larger the offer characterized by the IPO the less the risky the offer as it is indicative

[9] Mahardhini Fuadillah, Agus Harjito (2009), Long-run IPO performances and it's influencing factors: the case of Indonesian Stock Exchange.

of a more established firm.[10] In many studies the size of the issue was an important factor to control the issuer's overall risk and issue uncertainty. For example if there is a particularly large new issue that is going to trade in a Stock Exchange, it is very often that the stock will "get a lot of attention" either from the media or financial analysts. So on the one hand a high offering size could create confidence while on the other hand if the offering size is low it could create uncertainty.

Time Lag: According to Gounopoulos (2006) time lag is defined as the period between the official date of the prospectus announcement (or offer price date) and the first day the company is listed public. This variable has been well researched by literature and the general idea is that time lag has a negative implication either for underwriter or the investor. The latter has to wait to get informed about the actual market value of his purchase security, so this situation creates uncertainty. While in the case of the underwriter, this waiting time creates costs. Furthermore any possible change of the Economy could affect negatively the price performance (Thomadakis, 2007).

Leverage: Leverage is defined as the ratio of total liabilities divided by total assets. Leverage Ratio is used to see the effect of firms' debt level on its profits and its IPO's performance. It is an important subject in corporate finance and theory assumes that a high leverage show a high level of risk. On the other hand, leverage may also increase the return on equity. More specifically, it is expected that as the firms' debt level increases IPO performance of the firm should also increase. Chen (2001) and Eckbo and Norli (2005) showed that leverage factor is influential in IPO long-run performance. They claim that high-leveraged IPOs are riskier and this riskiness declines over time after issuance.

[10] Prabeshan Govindasamy(2010), The long run performance of initial public offerings in South Africa.

5. Objectives of the study and data sources

This study has been aimed at appraising the price performance of European IPOS (German, UK, and France) and to judge the extent of potential underperformance. This chapter covers the objectives of the study, data sources and methodology performed in the study.

5.1 Sample of data

The aim of this study is to determine the long run performance of IPOs in the three biggest markets of Europe. The research design adopted is thus a quantitative one due to the data analysis required. In order to determine the long-run performance of IPOs, information on share price history and that of a benchmark is required.

The sample consists of 485 firms listed and subsequently traded on Exchange Market during the period of January 1, 2006 and December 31, 2009. Information on new issues was obtained from Thomson One database. According to the information of Thomson database, during that period 745 IPOs have taken place in three European countries; 151 in Germany, 221 in France and 373 in United Kingdom. From this sample of 745 IPOs I excluded 260 firms due to insufficient data or other firm-specific reasons. Since I have searched the appropriate ticker for every company of my sample, I downloaded daily stock prices from Bloomberg database. Moreover, a broad market index for each country was used as the benchmark to adjust the data and provide the abnormal returns required (CAC Index for France, DAX Index for Germany and UKX Index for United Kingdom). I calculated benchmark-adjusted returns as the raw return on a stock minus the benchmark return over the first day of trading. This is the general procedure used to estimate IPOs performance and adopted by most researchers as was mentioned above. The companies included in the sample have different years of listed, thus the data have been collected based on the year of each company. Summarizing we observe that the sample selection is based on three particular criteria; first of all this study is conducted to private and public companies listed in Germany, in UK and in France, secondly the samples are the companies doing IPO during the period from 2006 until 2009 and finally the sample will be observed for 3 years after the listing date. Table 2 provides the yearly frequency of IPOs, while Table 3 provides the number of IPOs in different industries.

Table 2: Yearly Frequency of IPOs

Year	France	Germany	UK	Total
2009	21	3	8	32
2008	19	4	13	36
2007	61	45	95	201
2006	56	40	120	216
Total	157	92	236	**485**

The highest number of IPOs is observed in year 2006 with 216 IPOs, followed by 201 IPOs in year 2007. In the next two years 2008 and 2009 the percentage of IPOs is reduced rapidly; 36 new listings for year 2008 and 32 IPOs for year 2009. A possible explanation of that situation could be the global financial crisis that started to show its effects in the middle of 2007 and into 2008.

Table 3: Industry Classification

Industries	Number of IPOs	% of Total
Consumer Products and Services	51	10,52%
Consumer Staples	16	3,30%
Energy and Power	35	7,22%
Financials	81	16,70%
Healthcare	33	6,80%
High Technology	79	16,29%
Industrials	57	11,75%
Materials	35	7,22%
Media and Entertainment	26	5,36%
Real Estate	37	7,63%
Retail	18	3,71%
Telecommunications	17	3,51%
Total of Industries 12	**485**	**100,00%**

The firms of the sample belong to twelve different sectors. As we can see from the table above, the majority of the sample (approximately 55% of total sample- 268 IPOs) is observed in four industries, Consumer Products and Services, Financials, High Technology and Industrials.

5.2 Theoretical Framework and Hypotheses Development

The primary aim of this research is to investigate the long-run performance of IPOs in Germany, UK and France. Following from the literature, an assessment of this performance over a three year period will be employed as this was shown from previous studies as a standard evaluation period. This study uses two groups of indicators, those that represent the long-run performance of IPOs and those that influence the relationship between long-run performance and some factors.

All the hypotheses are implemented in the following study are based on previous findings. According to an important number of researchers who have conducted research in different markets in the world, firms' IPOs finally underperform the market showing a decline from year to year after the listing day. According to those researches, this study assumes that the three countries will also have a long-run underperformance. Thus this study formulates the hypothesis as follows:

***H_1**: Germany's, United Kingdom's and France's IPOs show long-run underperformance.*

In previous chapter the four potential factors that influence the long-run performance of an IPO were quoted and analyzed; First of all the company size. According to the most researchers smaller firms tend to be more risky. So, we assess that the company size affect the long-run performance positive. The hypothesis is formed as follows:

***H_2**: The company size will influence the long-run positively.*

The next factor is studied in the multiple regression is the Issue Size (Size of the stock). It is said that the larger the number of stocks offered the lower the underperformance of long-run IPOs. This happens because more issue size means lower uncertainty of ex post value (Thomadakis, 2007). The third hypothesis is formulated as follows:

H_3: *The Issue Size will influence the long-run performance positively.*

The next factor is Time Lag, the period between the offer price date and the listing date of an IPO. As was mentioned previously, the longer the time period is, the more the uncertainty either for investor or the underwriter. Thus the Time Lag will influence the long-run performance negatively. The related hypothesis is formulated below:

H_4: *The longer the waiting period of a firm to get listed the lower the long-run performance.*

Last but not least influencing factor is the Leverage. It is expected that as the firms' leverage increases, IPO performance of the firm should also increase. So looking at that assumption the fifth hypothesis of the study is formulated as follows:

H_5: *Leverage will influence the long run performance positively*.

5.3 Objectives of the study

More specifically, the study has been designed to achieve the following two objectives:

- To study the long-run performance of IPOs in Germany United Kingdom and France; if the IPOs show long-run underperformance or not.
- To investigate in depth and assess what factors influence IPO long-run performance and to what extent.

6. Research Methodology

The most commonly used methodology for long-term analysis is the Buy-and-Hold Adjusted Returns *(BHAR).* Arrawal, Jaffe and Mandelker (1992), Rau and Vermalen (1998), Cusatis, Miles and Woolridge (1993) have showed that the long-run effect analysis is necessary because the valuation effects of restructuring may occur also in the long-term horizon and not only at time of the announcement. According to Ritter (1991) *BHAR* is the simplest and most intuitive measure for raw returns.

In this paper the method is used for this purpose is the Buy-and-Hold Adjusted Returns estimator. The *BHAR* is defined as the raw return minus the corresponding market return (Thomadakis, 2007). For the calculation of raw returns I downloaded from Bloomberg Database the last stock prices in daily term for each company. Raw return is the individual return for each company while market return is the average return from all listed companies in a Stock Exchange Market or in a country generally. In this study *BHARs* are computed using daily data for 125, 250, 375, 500, 625 and 750 days (6, 12, 18, 24, 30 and 36 months) as the difference between the compounded actual return of the company and the compounded return of the market. The formula is used for the calculation of *BHAR* is the following one:

$$BHAR = \prod_{t=0}^{T}[1 + R_{it}] - \prod_{t=0}^{T}[1 + R_{mt}]$$

where,

$\boldsymbol{R_{it}}$ is the time *t* log-return on security *i*

$\boldsymbol{R_{mt}}$ is the time *t* log-return on the market index

The advantage of using this method is that the terminal values of investing in both the IPO and the benchmark are compared (Bessler and Thies, 2007). From the formula of *BHAR* we can easily understand that if a company's raw returns are more than market's returns (positive *BHAR*), the performance of that company is better than the average performance of company listed in stock exchange market or in a country more generally. In the averse case, when the returns of a company are lower than the market's returns (negative *BHAR*), the performance of the company is worse.

Also in the long-term horizon analysis *BHAR* is tested for the statistical significance. Firstly, the t-statistics for the different normal return estimation procedures are computed. Due to the fact that market returns are used as reference portfolio in order to estimate normal returns, the distribution of abnormal returns in the long-runs is positively skewed. This results in misspecified t-statistics, for which reasons the skewness-adjusted t-statistic[11] is calculated as shown by the following equation:

[11] Pastor-Llorca and Martin-Ugedo, (2004)

$$t_{Skewness-adjusted} = \sqrt{N}\,(S + \frac{1}{3}\,\hat{\gamma}\,S^2 + \frac{1}{6N}\,\hat{\gamma})$$

Where,

N is the number of events in the sample

S $S = \frac{ABHAR_t}{[6(BHAR_1)]}$

$\hat{\gamma}$ is the coefficient of skewness

Estimated $\sum_{i=0}^{n} \frac{(BHAR_{i,t} - ABHAR_t)^3}{[N\sigma(BHAR_t)^3}$

$ABHAR_t$ and $\sigma(BHAR)_t$ are the sample mean and cross-sectional standard deviation of buy-and-hold returns for the sample of N events.

The next part of this study involves the implementation of a multiple regression in order to examine the relationship between each factor and the long-run performance of companies' IPOs. Previous studies have identified a number of determinants for the long-term underperformance of the IPOs, however for the purposes of this study, four of them were chosen and their overall significance will be investigated. The specification adopted is the following:

$$BHAR_i = c + \beta_1 (CS)_i + \beta_2 (IS)_i + \beta_3 (TLAG)_i + \beta_4 (LEV)_i + \varepsilon_i$$

Where, εi is the error term or disturbance, *CS* is the company size, *IS* is the issue size, *TLAG* is a period which called time lag and *LEV* is the leverage ratio. All these factors are analyzes below.

From the model above, we can see that Company Size, Issue Size, Time Lag and Leverage will influence BHAR as $\beta 1, \beta 2, \beta 3, \beta 4$ respectively. This means that if there is a change in Company size for example as one then the BHAR will change as $\beta 1$, while if there is a change of Company size as two, the BHAR will change as $2(\beta 1)$ and so on.

7. Empirical Results

7.1 Preliminary analysis

The long-run performance for the IPOs in the sample was calculated using *BHAR* method. The sample period used was for IPOs listed between 2006 and 2009. As concerns the location, the sample of this study covers the three biggest European markets: German, UK and France Market. Only those listings that provided at least for one semi-annual period share prices data was included in the sample. The *BHAR* was calculated either for the three countries together or for each one separately in a semiannual term.

As it was mentioned previously the advantage of using this method is that the terminal values of investing in both the IPO and the benchmark are compared. In this study *BHARs* are computed using daily data for 125, 250, 375, 500, 625 and 750 days (6, 12, 18, 24, 30 and 36 months) as the difference between the compounded actual return of the company and the compounded return of the market. For the calculation of *BHAR* I follow the procedure most studies do; I exclude the first day returns, since the price at the end of the first trading day is a better proxy for firm value than the IPO price. Also a simple cross-sectional *t*-test is calculated to test the null hypothesis that the expected *BHAR* for each event firm is zero. If the value of *t*-statistic is greater than 2, then we conclude that the result is statistically significant, meaning that *BHAR* is different from zero (alternative hypothesis).

The table below represents the average *BHAR* for each period of time (6-month period) for the three countries in combination. In the fourth column the value of *t*-statistic is quoted in order to evaluate the significance of our results.

Table 4: Average *BHAR* and test of significance

Period of time	Mean ***BHAR***	Percentage	***t*-statistic**
6-month	0,0886	8,86%	4,9384
12-month	0,1252	12,52%	5,0638
18-month	0,2054	20,54%	8,4428
24-month	0,2536	25,36%	11,4023
30-month	0,2776	27,76%	10,6197
36-month	0,2589	25,89%	10,3423

As we can see from the table above, *BHARs* overperform substantially the market in every single period, with *BHAR* reaches its highest positive figure in the fifth semester (27.76%). At the end of the second year mean-adjusted returns were doubled comparing to the first year, while at the end of the third year a low decline is observed. These results reveal that new issues in German, UK and France stock markets offer investors substantial long-term adjusted returns for at least three years after listing. This positive performance distinguishes the European market from other cases where the positive returns wane at the end of the first months or better within one year after listing. In addition all the *BHARs* are significant since their *t*-statistic is pretty higher that the critical value of 2, meaning that we reject the null hypothesis that the expected *BHAR* for each company is equal to zero.

In the same conclusion we are leading if we examine the *BHAR* for each country individually. As concerns the Germany, all *BHARs* overperform the market in a high percentage for each semester. The results are presented below. The mean adjusted returns are beginning with an overperformance of 14.46% in the first 6 months, increase in the next semesters and finally touch a significant high value of 41.42% in the fifth semester. While, the results of the last period reveal a potential reduction of mean *BHAR*. In other words we find evidence that investors, who participated in German market during the period 2006-2009, obtained strong long-term positive returns until the third year after their listing. According to the *t*-statistics values we reject the null hypothesis that the expected *BHAR* for each company is equal to zero.

Table 5: Average *BHAR* and test of significance for Germany

Period of time	Mean ***BHAR***	Percentage	***t*-statistic**
6-month	0,1446	14,46%	8,2530
12-month	0,1570	15,70%	4,9163
18-month	0,2983	29,83%	8,7395
24-month	0,2798	27,98%	9,4334
30-month	0,4287	42,87%	11,2687
36-month	0,4142	41,42%	17,0533

Evaluating the results of UK and France, we conclude that both produce positive returns for every semester. Despite the fact that every single period the performance percentage is increasing for the two countries, Germany "remains at the top". UK reaches its highest positive figure in the fourth semester with an overperformance of

28.34%, while France in the whole second year with a value of 17.10% for the first semester and 17.49% for the second one. *T*-statistic values indicate significance for both countries, leading to the rejection of null hypothesis for zero mean *BHAR*.

Table 6: Average *BHAR* and test of significance for United Kingdom

Period of time	Mean ***BHAR***	Percentage	***t*-statistic**
6-month	0,0568	5,68%	2,4957
12-month	0,1097	10,97%	4,5684
18-month	0,1859	18,59%	8,346
24-month	0,2834	28,34%	13,8389
30-month	0,2677	26,77%	11,8126
36-month	0,2661	26,61%	10,0634

Table 7: Average *BHAR* and test of significance for France

Period of time	Mean ***BHAR***	Percentage	***t*-statistic**
6-month	0,0934	9,34%	4,8177
12-month	0,1312	13,00%	6,7458
18-month	0,1713	17,10%	9,6878
24-month	0,1749	17,49%	10,0187
30-month	0,1639	16,39%	9,9376
36-month	0,1032	10,32%	5,2246

7.2Regression Results

This research analyzes the performance of IPOs in Germany, UK and France. Thus this study will try to examine the condition of each company for three years in a semiannual term. For this purpose a multivariable regression is performed in order to check which factors influence firms' abnormal returns. The *BHARs* are used as independent variables, while the dependent variables are the following: 1) company size, 2) issue size, 3) leverage and finally 4) time lag.

I choose one multiple regression including the four explanatory factors instead of four separate regressions because I believe that is of greater interest and the result would

be more valid having more than one variables in the regression at the same time. The general equation with k regressors (independent variables) is as follows:

$$y_t = \beta_1 + \beta_2\chi_{2t} + \beta_3\chi_{3t} + \ldots + \beta_k\chi_{kt} + u_t, \quad t=1,2,\ldots,T$$

Where the *variables* $\chi_{2t}, \chi_{3t}, \ldots, \chi_{kt}$ are a set of explanatory variables which are thought to influence y and the coefficient estimates $\beta_1, \beta_2, \ldots, \beta_k$ are the parameters that quantify the effect of these variables on y. This means that every coefficient measures the average change in the explained variable (dependent) per unit change in a given explanatory variable (independent), holding all other explanatory variables constant at their average values.[12] So adjusting the above regression model to the cross-sectional data of this study we conclude in the following regression:

$$BHAR_i = c + \beta_1 (CS)_i + \beta_2 (IS)_i + \beta_3 (TLAG)_i + \beta_4 (LEV)_i + \varepsilon_i$$

Where $BHAR_i$ are the buy-and-hold adjusted returns, c is the constant term, CS is the company size, IS is the issue size, $TLAG$ is the period between the announcement date and the listing date, LEV is the leverage ratio of each listing company, $\beta_1, \beta_2, \beta_3, \beta_4$ are parameters to be estimated and finally, ε_i is the error term or disturbance assuming the usual properties. Parameter estimates for the above equation, by means of the Ordinary Least Squares estimation technique (OLS), along with their associated standard errors, t-statistics and p-values are analytically illustrated in Tables below. Six different regressions are prepared in order to examine the relationship between the returns and the influencing factors in each period of time.

[12] Chris Brooks (2008), Introductory Econometrics for Finance, second edition, Cambridge, pg 88-89

Table 8: Estimation output for first 6-month period

Variable	Coefficient	Std. error	*t*-Statistic	*p*-value
Constant	-0.163893	0.160130	-1.023502	0.3100
Issue Size	0.173515	0.040285	4.307145	0.0001
Leverage	0.009364	0.013307	0.703693	0.4843
Company Size	-0.074202	0.022981	-3.228882	0.0020
Time Lag	-0.009914	0.017756	-0.558378	0.5786

Regression Diagnostic Statistics			
R-squared	0.263404	Mean dependent var	0.132558
Adjusted R-squared	0.215881	S.D. dependent var	0.356652
S.E. of regression	0.315817	Akaike info Criterion	0.604391
Sum squared resid	6.183923	Schwarz criterion	0.768920
Log likelihood	-15.24710	Hannan-Quinn criter.	0.669496
F-statistic	5.542732	Durbin-Watson stat.	1.839438
Prob(F-statistic)	0.000702		

According to econometric literature most of the independent variables should be individually significant. The significance for a coefficient can be affirmed by the corresponding *t*-statistic or alternatively by the associated *p*-value. The *t*-statistic is calculated by dividing the estimated coefficient by the associated standard error. So we know whether each and every independent variable (Issue Size, Leverage, Company Size, Time Lag) is individually significant or not to influence the dependent variable *(BHAR)*. If the *p*-value of *t*-statistic is less than 0.05 (selected level of significance) then we reject the null hypothesis ($\beta_1=0, \beta_2=0, \beta_3=0, \beta_4=0$) and accept the alternative hypothesis ($\beta_1\neq0, \beta_2\neq0, \beta_3\neq0, \beta_4\neq0$). In our case, only two variables appear to be significant, the Issue Size with a *p*-value of 0.0001 and the Company Size with a *p*-value of 0.0020. This means that these particular independent variables are considered significant to influence the *BHAR*. As concerns the first coefficient we could say that on each one percent increase of *BHAR*, there would be an impact on 0.173515 percent of total share, provided that all the other variables remain constant. While for the second coefficient we could say that on each one percent increase of *BHAR*, there would be an impact on 0.074202 percent decrease of current market capital percentage, with the assumption that all the other variables remain constant.

The next parameter we are examining is the "Goodness of Data Fit", meaning how well the regression model actually fits the data. The most common goodness statistic is

known as R^2 and is defined as follows: "the square of the correlation between the values of the dependent variable and the corresponding fitted values from the model"[13]. A correlation coefficient must lie between -1 and +1. A value close to 1 indicates that the model explains nearly all of the variability of the dependent variable about its mean value, while on the other hand a value close to 0 indicates that the model fits the data poorly. As we can see from the table above the R^2 value is 0.263404. This means that 26.34% variation in *BHAR* (depended variable) can be explained jointly by the four independent variables. The rest 73.66% variation in *BHAR* can be expressed by residuals or other variables (other than Issue Size, Leverage, Company Size and Time Lag).

In addition, for testing the joint significance of all the independent variables included in the model the value of *F*-statistic is evaluated. If the *p*-value of *F*-statistic is less than 0.05 then we can reject the null hypothesis ($\beta_1=\beta_2=\beta_3=\beta_4=0$) and accept the alternative one ($\beta_1\neq\beta_2\neq\beta_3\neq\beta_4\neq0$). This means that the independent variables jointly can influence the depended variable (*BHAR*). Since the *p*-value is less than 0.05 (more specifically equal to zero) we reject the null hypothesis and we conclude that there is at least one coefficient which is significantly different from zero.

Last but not least summary statistic is analyzed is the Durbin-Watson. Durbin-Watson is used to test if the residual series from an estimated model are autocorrelated. A Durbin-Watson close to 2.0 is consistent with no serial correlation, while a value close to 0 means that probably there is serial correlation. As we can see from the output regression above, the Durbin-Watson is approximately 1.84, a quite satisfied value that confirms the absence of correlation.

[13] Chris Brooks (2008), Introductory Econometrics for Finance, second edition, Cambridge, pg 106

Table 9: Estimation output for second 6-month period

Variable	Coefficient	Std. error	*t*-Statistic	*p*-value
Constant	-0.482567	0.121428	-3.974115	0.0001
Issue Size	0.165447	0.030591	5.408361	0.0000
Leverage	0.019191	0.015906	1.206564	0.2301
Company Size	-0.000117	3.38E-05	-3.452066	0.0008
Time Lag	-0.007892	0.010150	-0.777523	0.4385

Regression Diagnostic Statistics			
R-squared	0.262429	Mean dependent var	0.099112
Adjusted R-squared	0.236321	S.D. dependent var	0.457094
S.E. of regression	0.399448	Akaike info Criterion	1.043985
Sum squared resid	18.03017	Schwarz criterion	1.161387
Log likelihood	-56.59510	Hannan-Quinn criter.	1.091653
F-statistic	10.05142	Durbin-Watson stat.	1.638407
Prob(F-statistic)	0.000001		

The table above represents the results for the second regression corresponding the second semi-annual period. As we can see only three variables appear to be significant, the Constant variable with a *p*-value of 0.0001, the Issue Size with a *p*-value of 0.0000 and the Company Size with a *p*-value of 0.0008. This means that these particular independent variables are considered significant to influence the *BHAR*. The constant can be interpreted as follows: if all the independent variables are simultaneously equal to zero then *BHARs* are equal to -0.482567. As concerns the Issue Size variable, we could say that on each one percent increase of *BHAR*, there would be an impact on 0.165447 percent increase of total share, provided that all the other variables remain constant. While for the next coefficient, Company Size we could say that on each one percent increase of *BHAR*, there would be an impact on 0.000117 decrease of current market capital percentage, with the assumption that all the other variables remain constant. As regards the correlation in this model the value of R^2 (0.262429) indicates that the model pretty well fits the data. This means that 26.25% variation in *BHAR* (depended variable) can be explained jointly by the four independent variables. The rest 73.75% variation in *BHAR* can be expressed by residuals or other variables (other than Issue Size, Leverage, Company Size and Time Lag). In addition, for testing the joint significance of all the independent variables included in the model the value of *F*-statistic is evaluated. Since the *p*-value is less than 0.05 (specifically equal to zero) we reject the null hypothesis

($\beta_1=\beta_2=\beta_3=\beta_4=0$) and we conclude that there is at least one coefficient which is significantly different from zero. Finally as we can see from the output regression above, the Durbin-Watson is approximately 1.64, a quite satisfied value that confirms the absence of correlation.

Table 10: Estimation output for third 6-month period

Variable	Coefficient	Std. error	*t*-Statistic	*p*-value
Constant	-0.338304	0.117127	-2.888349	0.0044
Issue Size	0.147681	0.030624	4.822329	0.0000
Leverage	0.008005	0.008771	0.912587	0.3629
Company Size	-8.71E-05	2.77E-05	-3.147579	0.0020
Time Lag	-0.002608	0.009869	-0.264210	0.7920

Regression Diagnostic Statistics

R-squared	0.158718	Mean dependent var	0.190059
Adjusted R-squared	0.136432	S.D. dependent var	0.423626
S.E. of regression	0.393668	Akaike info Criterion	1.004911
Sum squared resid	23.40121	Schwarz criterion	1.102663
Log likelihood	-73.38308	Hannan-Quinn criter.	1.044614
F-statistic	7.121995	Durbin-Watson stat.	1.717996
Prob(F-statistic)	0.000028		

Examining the third period we can see again only three variables appear to be significant, the Constant variable with a *p*-value of 0.0044, the Issue Size with a *p*-value of 0.0000 and the Company Size with a *p*-value of 0.0020. This means that these particular independent variables are considered significant to influence the *BHAR*. The constant can be interpreted as follows: if all the independent variables are simultaneously equal to zero then *BHARs* are equal to -0.338304. As concerns the Issue Size variable, we could say that on each one percent increase of *BHAR*, there would be an impact on 0.147681 percent increase of total share, provided that all the other variables remain constant. While for the next coefficient, Company Size we could say that on each one percent increase of *BHAR*, there would be an impact on 0.000008 decrease of current market capital percentage, with the assumption that all the other variables remain constant. As regards the correlation in this model the value of R^2 (0.158718) indicates that the model does not fit the data as well as in the previous case. In addition, for testing the joint significance of all the independent variables included in the model the value of *F*-statistic is evaluated. Since the *p*-value is less than 0.05 (specifically equal to zero) we reject the

null hypothesis ($\beta_1=\beta_2=\beta_3=\beta_4=0$) and we conclude that there is at least one coefficient which is significantly different from zero. Finally as we can see from the output regression above, the Durbin-Watson is approximately 1.64, a quite satisfied value that confirms the absence of correlation.

Table 11: Estimation output for fourth 6-month period

Variable	Coefficient	Std. error	*t*-Statistic	*p*-value
Constant	-0.416239	0.106809	-3.897047	0.0001
Issue Size	0.180510	0.028690	6.291742	0.0000
Leverage	0.004881	0.005816	0.839270	0.4024
Company Size	-0.000117	3.05E-05	-3.826668	0.0002
Time Lag	-0.003853	0.009278	-0.415274	0.6784

Regression Diagnostic Statistics

R-squared	0.201582	Mean dependent var	0.226677
Adjusted R-squared	0.184225	S.D. dependent var	0.427966
S.E. of regression	0.386540	Akaike info Criterion	0.962936
Sum squared resid	27.49202	Schwarz criterion	1.048696
Log likelihood	-85.99743	Hannan-Quinn criter.	0.997679
F-statistic	11.61394	Durbin-Watson stat.	1.764106
Prob(F-statistic)	0.000000		

Among the independent variables used for the fourth regression only the Constant, the Issue Size and the Company Size appear to be statistically significant even at the 0.05 significance level, while all the remaining variables are statistically insignificant. Additionally, as it can be inferred by the value of the R^2, which is 0.201582, the included into the model independent variables explain almost the 1/4 of the dependent's variability. The value of the *F*-statistic for testing the joint significance of all the independent variables included in the model is pretty high (11.61) with the associated *p*-value to be equal to zero. Therefore, we reject the null hypothesis ($\beta_1=\beta_2=\beta_3=\beta_4=0$) and we can conclude that there is at least one coefficient which is significantly different from zero. At last the Durbin-Watson is approximately 1.76, a high value that eliminates the evidence of correlation.

Table 12: Estimation output for fifth 6-month period

Variable	Coefficient	Std. error	*t*-Statistic	*p*-value
Constant	0.465442	0.119533	3.893824	0.0001
Issue Size	-0.061080	0.034090	-1.791694	0.0748
Leverage	0.006571	0.010227	0.642488	0.5214
Company Size	2.41E-05	3.12E-05	0.771943	0.4411
Time Lag	0.004712	0.009840	0.478863	0.6326

Regression Diagnostic Statistics			
R-squared	0.020153	Mean dependent var	0.277121
Adjusted R-squared	-0.001382	S.D. dependent var	0.400592
S.E. of regression	0.400868	Akaike info Criterion	1.036007
Sum squared resid	29.24659	Schwarz criterion	1.122401
Log likelihood	-91.86668	Hannan-Quinn criter.	1.071014
F-statistic	0.935844	Durbin-Watson stat.	1.955325
Prob(F-statistic)	0.444404		

In the fifth regression model the results comparing to the previous outputs are changing. Among the independent variables used for the regression only the Constant appears to be statistically significant, while all the remaining variables are statistically insignificant since their *p*-values are less than 0.05. Additionally, as it can be inferred by the value of the R^2, which is 0.020153, the included into the model independent variables do not explain the dependent's variability pretty well. The value of the *F*-statistic for testing the joint significance of all the independent variables included in the model is pretty low (0.93) with the associated *p*-value to be equal to 0.444. Therefore, we accept the null hypothesis ($\beta_1=\beta_2=\beta_3=\beta_4=0$), meaning that all the independent variables cannot jointly explain or influence the *BHAR*. On the other hand Durbin-Watson statistic is on a significant high level, revealing the absence of correlation.

Table 13: Estimation output for sixth 6-month period

Variable	Coefficient	Std. error	*t*-Statistic	*p*-value
Constant	-0.577412	0.122176	-4.726062	0.0000
Issue Size	0.240117	0.031926	7.521054	0.0000
Leverage	-0.007602	0.006853	-1.109297	0.2688
Company Size	-0.000116	4.01E-05	-2.897343	0.0042
Time Lag	-0.010659	0.011138	-0.956994	0.3398

Regression Diagnostic Statistics			
R-squared	0.247712	Mean dependent var	0.263079
Adjusted R-squared	0.231269	S.D. dependent var	0.522686
S.E. of regression	0.458278	Akaike info Criterion	1.303552
Sum squared resid	38.43335	Schwarz criterion	1.389628
Log likelihood	-117.5339	Hannan-Quinn criter.	1.338427
F-statistic	15.06448	Durbin-Watson stat.	2.046381
Prob(F-statistic)	0.000000		

Among the independent variables used for the fourth regression only the Constant and the Issue Size appear to be statistically significant, while all the remaining variables are statistically insignificant. Additionally, as it can be inferred by the value of the R^2, which is 0.247712, the included into the model independent variables explain almost the 1/4 of the dependent's variability. The value of the *F*-statistic for testing the joint significance of all the independent variables included in the model is pretty high (15.06) with the associated *p*-value to be equal to zero. Therefore, we reject the null hypothesis ($\beta_1=\beta_2=\beta_3=\beta_4=0$) and we can conclude that there is at least one coefficient which is significantly different from zero. Finally the Durbin-Watson is approximately 2, a quite high value that eliminates the evidence of correlation.

Continuing, when the ordinary least squared estimation method is used it would be wiser to test if the explanatory variables are correlated with one another. The situation when the explanatory variables are very high correlated with each other is known as multicollinearity. The problem arises from multicollinearity is that inflates the standard errors, so it is difficult to assess the significance of the regressors used in our model. High value for the correlation coefficient is considered a value above 0.8. In order to test whether or not there is an evidence of multicollinearity six different correlation matrixes have been prepared in E-views. The following table is quoted below, represents an example for the first correlation matrix for the first period of the study.

Table 14: Correlation Matrix for the first 6-month period

Regressors	Bhar	Issue Size	Leverage	Company Size	Time Lag
Bhar	1.000000				
Leverage	-0.001294	1.000000			
Company Size	-0.090912	-0.177754	1.000000		
Time Lag	-0.048741	6.31E-05	-0.076477	1.000000	
Issue Size	0.370395	-0.103397	0.662311	-0.047371	1.000000

As we can easily understand there is no evidence of multicolinnearity for that particular set of regressors since all the correlation coefficients are well below the threshold value of 0.8. The remaining correlation coefficients from the other periods of time (quoted in appendix) also resulted in the absence of multicolinnearity.

8. Conclusion

This dissertation study adds unique evidence to the international literature by examining the performance of IPOs in three European countries simultaneously and scrutinizing the factors that might affect their performance after listing. Specifically, using a sample of 485 IPOs launched on various stock exchanges between 2006 and 2009, this study documents pretty high mean *BHARs*. The *BHARs* are examined for three years after their listing in a semiannual term. The results of the study reveal that IPOs in Germany, UK and France continue to overperform the market in the 6, 12, 18, 24 and 36 months' holding period following their listing. On average, the IPOs overperform their market benchmark by 8.86%, 12.52%, 20.54%, 25.36%, 27.76% and 25.89% after one, two, three, four, five and six semesters of listing respectively. Furthermore, long-run returns are estimated for each country individually, concluding to the same results with the former case; continuously increase of *BHARs* until the first semester of the third year after listing.

Later on, a multivariable regression is performed in order to check which factors influence firms' abnormal returns. The *BHARs* are used as independent variables, while the dependent variables are the following: 1) company size, 2) issue size, 3) leverage and finally 4) time lag. The results show that only two variables influence the long-run returns

which are the number of shares issued (issue size) and the current market capital (company size). Moreover there is a positive relationship between the issue size factor and the long-run performance of IPOs and then between the leverage and the long-term performance after listing. On the other hand the regression results reveal that there is a negative relationship between the company size and the long-run performance of IPOs and also between the time lag and the long-run performance of firms after listing.

The aim of this study is to provide investors with the necessary knowledge to make informed decisions regarding the choice of potential investment opportunities. The previous findings and the new empirical results are quoted in this dissertation study, could be guidance for the companies who intend to go public for first time. It is important for investors to understand that making an IPO does not always lead to high positive abnormal returns. Ever though some companies earn high returns in the early aftermarket period, there is always the possibility of underperformance after two or three years.

Potential future researchers could investigate IPOs in greater extent by using larger sample sources or a longer time horizon. The sample could include more European countries or could be divided into subgroups based on the Stock Exchange or the sector they participate. As concerns the time horizon, a time extension would be interesting since the current study reveals evidence of *BHAR* diminishing after two years. Hence, in order to have a more thorough and definite point of view a 5-year period could be an appropriate one.

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Appendix

Company Name	Ticker from Bloomberg	Location
Groupe CLAF SA	MLCLA FP Equity	France
Gartmore Group Ltd	GRT LN Equity	United Kingdom
CFAO	CFAO FP Equity	France
Magillem Design Services SA	MLMGL FP Equity	France
Reworld SA	MLREW FP Equity	France
Poiray Joaillier SA	MLPOI FP Equity	France
M Winkworth Plc	WINK LN Equity	United Kingdom
Flex LNG Ltd	FLNG EU Equity	United Kingdom
Impax Asian Environmental	IAEM LN Equity	United Kingdom
Weya SA	MLWEY FP Equity	France
Vtion Wireless Technology AG	V33 GR Equity	Germany
Indian Energy Ltd	IEL LN Equity	United Kingdom
MPH Mittelstaendische Pharma	93MV GR Equity	Germany
NewRiver Retail Ltd	NRR LN Equity	United Kingdom
BioQuanta SA	MLBQA FP Equity	France
Plant Advanced Technologies	MLPAT FP Equity	France
Quantum Genomics SAS	MLQGC FP Equity	France
Ipernity Org SA	MLIPY FP Equity	France
Crosslog SA	MLCRO FP Equity	France
Debflex SA	MLDEX FP Equity	France
Orkideus SA	MLORK FP Equity	France
Sapmer SA	ALMER FP Equity	France
Vanexport SA	MLVAN FP Equity	France
Arthur Maury SA	MLAMY FP Equity	France
Flatex AG	FLA GR Equity	Germany
Groupe Rivalis SA	MLRIV FP Equity	France
New Look Group PLC	648227Q LN Equity	United Kingdom
NewRiver Retail Ltd	NRR LN Equity	United Kingdom
Solabios SA	ALSOA FP Equity	France
Cecurity.com SA	MLCEC FP Equity	France
Woogroup SA	MLWOO FP Equity	France
TXCOM SA	ALTXC FP Equity	France
Trans Consult Inter-tio-l SA	MLTCO FP Equity	France
Infosat SA	MLSAT FP Equity	France
Fonciere SEPRIC SA	SPRIC FP Equity	France
Ecolutions GmbH & Co KGaA	EO2 GR Equity	Germany

Citibase Holdings PLC	3118981Z LN Equity	United Kingdom
Acropolis Telecom SA	ALACR FP Equity	France
JSA Technology SA	MLJSA FP Equity	France
Social Media Group SA	MLSMG FP Equity	France
Motocab SA	MLCAB FP Equity	France
Smalto SA	MLSML FP Equity	France
MTD Fi-nce SA	MLMTD FP Equity	France
Onemedia France SARL	MLOMF FP Equity	France
Sunkar Resources PLC	SKR LN Equity	United Kingdom
SMA Solar Technology AG	S92 GR Equity	Germany
The Mighty Troglodytes	3619222Q FP Equity	France
Cadogan Petroleum PLC	CAD LN Equity	United Kingdom
The ReThink Group PLC	RTG LN Equity	United Kingdom
Ipsogen SA	ALIPS FP Equity	France
Toutabo SA	MLABO FP Equity	France
Facilasol Group	MLFAC FP Equity	France
GK Software AG	GKS GR Equity	Germany
Iofina PLC	IOF LN Equity	United Kingdom
Ropal Europe AG	RO5K GR Equity	Germany
Orege SA	MLORE FP Equity	France
Obtala Resources PLC	OBT LN Equity	United Kingdom
Share PLC	SHRE LN Equity	United Kingdom
Longships PLC	LONG LN Equity	United Kingdom
OptinaTime SA	MLOTI FP Equity	France
RocTool SA	MLROC FP Equity	France
Valiant Petroleum PLC	VPP LN Equity	United Kingdom
MGIC PLC	MGIC LN Equity	United Kingdom
TP70 2008 (I) VCT	TPV1 LN Equity	United Kingdom
TP70 2008 (II) VCT	TPV2 LN Equity	United Kingdom
Kertel SA	MLKER FP Equity	France
Car Telematics SA	MLCTL FP Equity	France
designcapital PLC	DESC LN Equity	United Kingdom
Randall & Quilter Invest Hldgs	RQIH LN Equity	United Kingdom
Evolve Capital PLC	EVOL LN Equity	United Kingdom
SmartQuantum Group	MLSMA FP Equity	France
Hybrigenics SA	ALHYG FP Equity	France
Fonterelli GmbH & Co KGaA	FTR GR Equity	Germany
Ely Capital PLC	ELYP PZ Equity	United Kingdom

Flarepilot PLC	FLAP PZ Equity	United Kingdom
SnackTime PLC	SNAK LN Equity	United Kingdom
Globo PLC	GBO LN Equity	United Kingdom
Baqus Group PLC	BQS LN Equity	United Kingdom
BlueWater Bio Intl Ltd	BWB LN Equity	United Kingdom
Eurasian natural Resources	ENRC LN Equity	United Kingdom
Ashmore Global Opportunities	AGOL LN Equity	United Kingdom
Adili PLC	ADIL LN Equity	United Kingdom
PurVia AG	3PV GR Equity	Germany
Plastics Capital PLC	PLA LN Equity	United Kingdom
Mindscape France	ALMIN FP Equity	France
Daldrup & Sohne AG	4DS GR Equity	Germany
e-Therapeutics Ltd	ETX LN Equity	United Kingdom
manroland AG	2643758Q GR Equity	Germany
Tracsis PLC	TRCS LN Equity	United Kingdom
Asian Bamboo AG	5AB GR Equity	Germany
MeVis Medical Solutions AG	M3V GR Equity	Germany
EAVS	MLEAV FP Equity	France
KTG Agrar AG	7KT GR Equity	Germany
Xcite Energy Ltd	XEL LN Equity	United Kingdom
Abbey Protection PLC	ABB LN Equity	United Kingdom
FranconoWest AG	4FR GR Equity	Germany
HCI Hammonia Shipping AG	HHX GR Equity	Germany
Boomerang Plus PLC	BOOM LN Equity	United Kingdom
Global Oil & Gas AG	3GO GR Equity	Germany
Bike Expand	MLBIK FP Equity	France
i2s SA	ALI2S FP Equity	France
Telecity Group PLC	TCY LN Equity	United Kingdom
Surikate Mittelstands AG	SAS GR Equity	Germany
Bureau Veritas SA	BVI FP Equity	France
Groupe Plus-Values	MLPVG FP Equity	France
Red Leopard Holdings PLC	RLH LN Equity	United Kingdom
Centrotherm Photovoltaics AG	CTN GR Equity	Germany
Eco City Vehicles PLC	ECV LN Equity	United Kingdom
Voxan SA	MLVOX FP Equity	France
Mobotix AG	MBQ GR Equity	Germany
Chamarre SCA	CHANV FP Equity	France
London Mining PLC	LOND LN Equity	United Kingdom

Astellia	ALAST FP Equity	France
Arion Entreprise SA	MLARI FP Equity	France
Metalliance	MLETA FP Equity	France
Unika Groupe	MLUKA FP Equity	France
All Leisure Group PLC	ALLG LN Equity	United Kingdom
Delignit AG	DLX GR Equity	Germany
Cargofresh AG	C1F GR Equity	Germany
Envio AG	EIO GR Equity	Germany
Kurawood PLC	KURA LN Equity	United Kingdom
Craneware Plc	CRW LN Equity	United Kingdom
TRSB SAS	MLTRS FP Equity	France
Cards Off SA	MLOFF FP Equity	France
Real Office Group PLC	REAL LN Equity	United Kingdom
Hampden Underwriting PLC	HUW LN Equity	United Kingdom
Carrefour SA-Real Estate	CA FP Equity	France
Trailor ACTM Inter-tio-l SA	MLTAI FP Equity	France
Kiwara PLC	KIW LN Equity	United Kingdom
GoAdv SA	ALGOA FP Equity	France
Sepura	SEPU LN Equity	United Kingdom
Televista SA	MLVST FP Equity	France
Hollywood Media Services PLC	HOL LN Equity	United Kingdom
Orolia SA	ALORO FP Equity	France
SNR	SNR LN Equity	United Kingdom
SAF-HOLLAND GmbH	SFQ GR Equity	Germany
Moneysupermarket.com	MONY LN Equity	United Kingdom
GlobeOp Financial Services SA	GO/ LN Equity	United Kingdom
Happydoo	MLHAP FP Equity	France
Acheter-Louer.fr SA	ALALO FP Equity	France
I-Design Group PLC	IDG LN Equity	United Kingdom
Tawa PLC	TAW LN Equity	United Kingdom
Smith & Williamson Group	SWNGGRF LN Equity	United Kingdom
m4e AG	MU4 GR Equity	Germany
Shieldtech PLC	STEC LN Equity	United Kingdom
Norcros PLC	NXR LN Equity	United Kingdom
CapRegen PLC	CGN LN Equity	United Kingdom
Freshwater UK PLC	FWUK LN Equity	United Kingdom
Groupimo	ALIMO FP Equity	France
Homag Group AG	HG1 GR Equity	Germany

Arkoon Network Security SA	ALARK FP Equity	France
EnviTec Biogas AG	ETG GR Equity	Germany
Superglass Holdings PLC	SPGH LN Equity	United Kingdom
Cervin ENR SA	MLCVN FP Equity	France
Solia SA	MLSOL FP Equity	France
Bionersis SA	ALBRS FP Equity	France
Mount Engineering PLC	MOU LN Equity	United Kingdom
EuropaCorp SA	ECP FP Equity	France
Zeta Biotech	MLZTA FP Equity	France
ZhongDe Waste Technology AG	ZEF GR Equity	Germany
Cobra Holdings PLC	CBRA LN Equity	United Kingdom
OFI Private Equity Capital SA	2728917Q FP Equity	France
m-u-t AG	M7U GR Equity	Germany
SDI Group PLC	SDIG LN Equity	United Kingdom
Tognum AG	TGM GR Equity	Germany
Vivalis SA	VLS FP Equity	France
Monitise PLC	MONI LN Equity	United Kingdom
Fountaine Pajot SA	ALFPC FP Equity	France
VTG AG	VT9 GR Equity	Germany
STEICO AG	ST5 GR Equity	Germany
AGO AG Energie + Anlagen	AGY GR Equity	Germany
Westminster Group PLC	WSG LN Equity	United Kingdom
Medicsight Plc	MDST LN Equity	United Kingdom
Argan SA	ARG FP Equity	France
Saltus European Debt	SED LN Equity	United Kingdom
Vicorp Group PLC	VICP LN Equity	United Kingdom
Fi-xo Environnement SA	MLFXO FP Equity	France
GlobeOp Fi-ncial Services	GO/ LN Equity	United Kingdom
InVision Software AG	IVX GR Equity	Germany
Gerresheimer AG	GXI GR Equity	Germany
Homair Vacances SA	ALHOM FP Equity	France
Modern Water Plc	MWG LN Equity	United Kingdom
Vergnet SA	ALVER FP Equity	France
PV Crystalox Solar PLC	PVCS LN Equity	United Kingdom
Pressure Technologies PLC	PRES LN Equity	United Kingdom
IC Telecom SA	ALICT FP Equity	France
Demos SA	ALDMO FP Equity	France
Eaga PLC	EAGA LN Equity	United Kingdom

MarineTrack Ltd	AAZ LN Equity	United Kingdom
Caneo SA	MLCAN FP Equity	France
DF Deutsche Forfait AG	DE6 GR Equity	Germany
blinkx PLC	BLNX LN Equity	United Kingdom
Boetzelen Real Estate AG	0296987D GR Equity	Germany
JP Morgan Progressive	JPSZ LN Equity	United Kingdom
Hargreaves Lansdown Plc	HL/ LN Equity	United Kingdom
Batla Minerals	MLBAT FP Equity	France
Hilton Food Group PLC	HFG LN Equity	United Kingdom
Halloren Schokoladenfabrik AG	H2R GR Equity	Germany
Rugby Estates Invest Trust PLC	RUGB LN Equity	United Kingdom
genOway	ALGEN FP Equity	France
CompuGroup Medical AG	COP GR Equity	Germany
Roxi Petroleum PLC	RXP LN Equity	United Kingdom
DL Software SA	ALSDL FP Equity	France
Cineworld Group PLC	CINE LN Equity	United Kingdom
Versatel AG	VTW GR Equity	Germany
Bglobal PLC	BGBL LN Equity	United Kingdom
Xchanging PLC	XCH LN Equity	United Kingdom
Wellstream Holdings PLC	WSM LN Equity	United Kingdom
Adthink Media	ALADM FP Equity	France
Cheops Technology	MLCHE FP Equity	France
Volga Gas PLC	VGAS LN Equity	United Kingdom
Ingenious Live VCT 2 PLC	IEVC LN Equity	United Kingdom
Ingenious Live VCT 1	ILV1 LN Equity	United Kingdom
ORA Capital Partners Plc	ORA LN Equity	United Kingdom
AFC Energy PLC	AFC LN Equity	United Kingdom
Local Shopping REIT PLC	LSR LN Equity	United Kingdom
SMT Scharf AG	S4A GR Equity	Germany
eXpansys PLC	XPS LN Equity	United Kingdom
Edge Performance VCT PLC	EDGE LN Equity	United Kingdom
METabolic EXplorer SA	METEX FP Equity	France
Rexel SA	RXL FP Equity	France
EpiStem Holdings PLC	EHP LN Equity	United Kingdom
Eurogerm SA	ALGEM FP Equity	France
Alstria Office AG	AOX GR Equity	Germany
FLAG Telecom Group Ltd	FTL LI Equity	United Kingdom
Estavis AG	E7S GR Equity	Germany

Brossard SA	ALBRO FP Equity	France
Inland PLC	INL LN Equity	United Kingdom
Avanti Communications	AVN LN Equity	United Kingdom
VITA 34 Inter-tio-l AG	V3V GR Equity	Germany
Braveheart Invest Grp Ltd	BRH LN Equity	United Kingdom
Holosfind SA	ALHOL FP Equity	France
Incity Immobilien AG	IC8 GR Equity	Germany
Gottex Market Neutral Trust	GMNT LN Equity	United Kingdom
Adenclassifieds SA	ADEN FP Equity	France
Twintec AG	TIN GR Equity	Germany
Polis Immobilien AG	PQL GR Equity	Germany
Varengold AG	VG8 GR Equity	Germany
Vectron Systems AG	V3S GR Equity	Germany
Trust Property Ma-gement PLC	TPM LN Equity	United Kingdom
Nighthawk Energy PLC	HAWK LN Equity	United Kingdom
Safestore Holdings PLC	SAFE LN Equity	United Kingdom
Notrefamille.com SA	ALNFA FP Equity	France
HanseYachts AG	H9Y GR Equity	Germany
BH Macro	BHMG LN Equity	United Kingdom
Kromi Logistik AG	K1R GR Equity	Germany
IPSO Ventures PLC	IPS LN Equity	United Kingdom
Equable Properties PLC	EQU LN Equity	United Kingdom
Leni Gas & Oil	LGO LN Equity	United Kingdom
Neuropharm Group PLC	NPH LN Equity	United Kingdom
Sports Direct Intl PLC	SPD LN Equity	United Kingdom
Cie Fonciere Fideimur SA	CFI FP Equity	France
Hexagon Human Capital PLC	HHC LN Equity	United Kingdom
Mon Plus Beau Jour	MLPBJ FP Equity	France
Broca Plc	BROC LN Equity	United Kingdom
Gem Diamonds Ltd	GEMD LN Equity	United Kingdom
Ariston Real Estate Ag	A3E GR Equity	Germany
Cellectis SA	ALCLS FP Equity	France
Entreparticuliers.com	ALENT FP Equity	France
Diamondcorp Plc	DCP LN Equity	United Kingdom
Helius Energy Plc	HEGY LN Equity	United Kingdom
Auto Escape SA	ALAUT FP Equity	France
Dev Property Development PLC	DPD LN Equity	United Kingdom
Novalia Francgines	MLNOF FP Equity	France

Dietswell Engineering SA	ALDIE FP Equity	France
VDI Group SA	ALVDI FP Equity	France
Ashley House PLC	ASH LN Equity	United Kingdom
Optimark SA	MLOPM FP Equity	France
Brightside Group PLC	BRT LN Equity	United Kingdom
Timan Oil & Gas PLC	TMAN LN Equity	United Kingdom
Transiciel	TRA FP Equity	France
Vertu Motors PLC	VTU LN Equity	United Kingdom
Genfit SA	ALGFT FP Equity	France
All Points North PLC	APNO LN Equity	United Kingdom
Northern Bear PLC	NTBR LN Equity	United Kingdom
Terreis SA	TER FP Equity	France
eFront SA	ALEFT FP Equity	France
CQS Rig Fi-nce Fund	RIG LN Equity	United Kingdom
Auplata SA	ALAUP FP Equity	France
JPMorgan Income & Growth inves	JIGC LN Equity	United Kingdom
Imagi-tik PLC	IMTK LN Equity	United Kingdom
Taihua PLC	TAIH LN Equity	United Kingdom
Renewable Power & Light PLC	RPL LN Equity	United Kingdom
Sabien Technology Group PLC	SNT LN Equity	United Kingdom
Symrise AG	SY1 GR Equity	Germany
Consolidated Vending PLC	CVD LN Equity	United Kingdom
Turenne Investissement SA	ALTUR FP Equity	France
Brainjuicer Group PLC	BJU LN Equity	United Kingdom
SeLoger.com SA	SLG FP Equity	France
SKW	SKW GR Equity	Germany
Salamander Energy PLC	SMDR LN Equity	United Kingdom
Groupe Promeo SA	ALMEO FP Equity	France
Francotyp-Postalia AG & Co KG	FPH GR Equity	Germany
Southern Bear PLC	CVN LN Equity	United Kingdom
EDF Energies Nouvelles SA	EEN FP Equity	France
Klemurs SCA	KMU FP Equity	France
Hitechpros SA	ALHIT FP Equity	France
Just Retirement(Holdings)PLC	JR/ LN Equity	United Kingdom
Golden Prospect Precious Metal	GPM LN Equity	United Kingdom
Japaninvest Group PLC	2003151Z LN Equity	United Kingdom
SiC Processing AG	2998610Q GR Equity	Germany
Trilogiq	ALTRI FP Equity	France

Korian	KORI FP Equity	France
nabaltec AG	NTG GR Equity	Germany
BlueBay Asset Ma-gement PLC	BBAY LN Equity	United Kingdom
Nouveaux Constructeurs SA	LNC FP Equity	France
LSL Property Services PLC	LSL LN Equity	United Kingdom
Money Debt & Credit Group PLC	MDCG LN Equity	United Kingdom
Wilex AG	WL6 GR Equity	Germany
PETROTEC AG	PT8 GR Equity	Germany
Hochschild Mining PLC	HOC LN Equity	United Kingdom
Ab Fenetres Grp	ALABF FP Equity	France
MedicX Fund Ltd	MXF LN Equity	United Kingdom
Styles & Wood Group PLC	STY LN Equity	United Kingdom
Betbrokers PLC	BETB LN Equity	United Kingdom
In-te Pharma SA	IPH FP Equity	France
Proton Power Systems PLC	P6K GR Equity	Germany
Thomas Fleurs SA	MLTFL FP Equity	France
ECT Industries SA	ALNSE FP Equity	France
Muehlhan AG	M4N GR Equity	Germany
Neuf Cegetel SA	NEUF FP Equity	France
CWI Real Estate AG	CW6 GR Equity	Germany
LHS AG	LHS GR Equity	Germany
hotel.de AG	HTL GR Equity	Germany
GAGFAH Immobilien Ma-gement	GFJ GR Equity	Germany
Dunelm Group PLC	DNLM LN Equity	United Kingdom
Nanogate AG	N7G GR Equity	Germany
Assima PLC	0361337D LN Equity	United Kingdom
Lee Diversified Opportunities	813845Z LN Equity	United Kingdom
Hurricane Fuels PLC	825781Z LN Equity	United Kingdom
Ashmore Investment Ma-gement	551746Z LN Equity	United Kingdom
Cazenove Absolute Equity Ltd	CAEL LN Equity	United Kingdom
Biffa PLC	BIFF LN Equity	United Kingdom
Hogg Robinson Group PLC	HRG LN Equity	United Kingdom
GWB Immobilien AG	G7B GR Equity	Germany
Selectirente Fonciere d'Invest	SELER FP Equity	France
SSP Holdings PLC	SSPH LN Equity	United Kingdom
debitel AG	DBL GR Equity	Germany
Hydrogen Group PLC	HYDG LN Equity	United Kingdom
Mousset & Cie	MLMOU FP Equity	France

Network Data Holdings PLC	NDH LN Equity	United Kingdom
Invista Real Estate Investment	INRE LN Equity	United Kingdom
Xiring SA	ALXIR FP Equity	France
Biocare Solutions PLC	BSN LN Equity	United Kingdom
FranconoRheinMain AG	F7R GR Equity	Germany
Chromex Mining PLC	CHX LN Equity	United Kingdom
Aquabella Group PLC	AQA LN Equity	United Kingdom
Probability PLC	PBTY LN Equity	United Kingdom
Aurelian Oil & Gas PLC	AUL LN Equity	United Kingdom
Velosi Ltd	VELO LN Equity	United Kingdom
Energetix Group	EGX LN Equity	United Kingdom
Best of the Best Plc	BEST LN Equity	United Kingdom
Qimonda AG	QI1A GR Equity	Germany
Bankgesellschaft Berlin AG	BBINS30 GR Equity	Germany
CareCapital Group PLC	CARE LN Equity	United Kingdom
1PM PLC	OPM LN Equity	United Kingdom
Heritage Underwriting Agency	HUA LN Equity	United Kingdom
Imperial Innovations Group PLC	IVO LN Equity	United Kingdom
Tesfran SA	TEF FP Equity	France
ITN -novation AG	I7N GR Equity	Germany
Goldplat PLC	GDP LN Equity	United Kingdom
Proservia SA	ALPRV FP Equity	France
Heritage Uderwriting Agency	UML LN Equity	United Kingdom
Silverdell PLC	SID LN Equity	United Kingdom
aleo solar AG	AS1 GR Equity	Germany
Arden Partners PLC	ARDN LN Equity	United Kingdom
Piscines Groupe GA	ALPGG FP Equity	France
Target Resources PLC	TGT LN Equity	United Kingdom
Voyageurs du Monde SA	ALVDM FP Equity	France
NetBooster SA	ALNBT FP Equity	France
Futura Medical PLC	FUM LN Equity	United Kingdom
Standard Life PLC	SL/ LN Equity	United Kingdom
Southern Cross Healthcare	SCHE LN Equity	United Kingdom
Biofrontera AG	B8F GR Equity	Germany
nationwide Accident Repair	NARS LN Equity	United Kingdom
Tasty PLC	TAST LN Equity	United Kingdom
ProwebCE SA	ALPRW FP Equity	France
Bauer AG	B5A GR Equity	Germany

Greatland Gold PLC	GGP LN Equity	United Kingdom
African Consolidated Resources	AFCR LN Equity	United Kingdom
LeGuide.com SA	ALGUI FP Equity	France
Kloeckner & Co SE	KCO GR Equity	Germany
Heurtey Petrochem SA	ALHPC FP Equity	France
Parrot SA	PARRO FP Equity	France
Puricore	PURI LN Equity	United Kingdom
Heliocentris Fuel Cells AG	H2FA GR Equity	Germany
Sound Oil PLC	SOU LN Equity	United Kingdom
Medicrea SA	ALMED FP Equity	France
Weborama	ALWEB FP Equity	France
10tacle studios AG	T1C GR Equity	Germany
Demag Cranes AG	D9C GR Equity	Germany
May Gurney Integrated Services	MAYG LN Equity	United Kingdom
Avid Holdings	AVD LN Equity	United Kingdom
Aeroports de Paris SA	ADP FP Equity	France
Dillistone Group Plc	DSG LN Equity	United Kingdom
Cedip Infrared Systems	ALCED FP Equity	France
Le Noble Age SA	LNA FP Equity	France
Medica SA	MDCA FP Equity	France
Corsie Group	CEG LN Equity	United Kingdom
Inspired Gaming Group PLC	INGG LN Equity	United Kingdom
YOC AG	YOC GR Equity	Germany
PROACTIS Holdings PLC	PHD LN Equity	United Kingdom
CELEOS SA	ALCEL FP Equity	France
GENEART AG	G6A GR Equity	Germany
St James's Energy Ltd	STJ LN Equity	United Kingdom
Inova Holding Ltd	INA LN Equity	United Kingdom
European Islamic Investment	EIIB LN Equity	United Kingdom
Silverjet PLC	SIL LN Equity	United Kingdom
Roth & Rau AG	R8R GR Equity	Germany
Air Berlin PLC & Co	AB1 GR Equity	Germany
Digital Identification	D7S GR Equity	Germany
Acertec PLC	ACER LN Equity	United Kingdom
Cineworld Group PLC	CINE LN Equity	United Kingdom
Atelis Ltd	ATEL LN Equity	United Kingdom
MBB Industries AG	MBB GR Equity	Germany
H&T Group PLC	HAT LN Equity	United Kingdom

Turbotec Products	TRBO LN Equity	United Kingdom
Mastrad SA	ALMAS FP Equity	France
Biofutures Inter-tio-l PLC	BIP LN Equity	United Kingdom
Debenhams PLC	DEB LN Equity	United Kingdom
Bioganix PLC	BGX LN Equity	United Kingdom
Baltic Oil Terminals PLC	BTC LN Equity	United Kingdom
Dresdner Factoring AG	D2F GR Equity	Germany
Oxford Catalysts Group PLC	OCG LN Equity	United Kingdom
ReEnergy Group Plc	RGY LN Equity	United Kingdom
Lansdowne Oil & Gas PLC	LOGP LN Equity	United Kingdom
Horizonte Minerals PLC	HZM LN Equity	United Kingdom
Rift Oil PLC	RIFT LN Equity	United Kingdom
Lamarthe SA	ALLMR FP Equity	France
Press Index SA	ALPRI FP Equity	France
Mission Marketing Group PLC	TMMG LN Equity	United Kingdom
Icade SA	ICAD FP Equity	France
Wacker Chemie AG	WCH GR Equity	Germany
Legrand SA	LR FP Equity	France
ModeLabs Group SA	MDL FP Equity	France
Renovo	RNVO LN Equity	United Kingdom
MAGIX AG	MGX GR Equity	Germany
Bio-Gate AG	BIG GR Equity	Germany
Pantheon Resources PLC	PANR LN Equity	United Kingdom
Ludorum PLC	LUD LN Equity	United Kingdom
Melchior Japan Investment Tr	MJT LN Equity	United Kingdom
Prodware SA	ALPRO FP Equity	France
Patrizia Immobilien AG	P1Z GR Equity	Germany
Optimus SA	MLOPT FP Equity	France
CashBox PLC	CBOX LN Equity	United Kingdom
Charlemagne Capital Limited	CCAP LN Equity	United Kingdom
CeGeREAL SA	CGR FP Equity	France
Amboise Investissement SCA	LTA FP Equity	France
Northbridge Industrial Svcs	NBI LN Equity	United Kingdom
Playtech Ltd	PTEC LN Equity	United Kingdom
Millet Innovation SA	ALINN FP Equity	France
Morson Group Ltd	MRN LN Equity	United Kingdom
Fonciere Paris France SA	FPF FP Equity	France
ecotel communication AG	E4C GR Equity	Germany

Venteco PLC	VTO LN Equity	United Kingdom
Evolis SA	ALTVO FP Equity	France
Zueblin Immobiliere France	ZIF FP Equity	France
Kalahari Minerals PLC	KAH LN Equity	United Kingdom
Servocell Group	SERV LN Equity	United Kingdom
Kleenair Systems Intl PLC	KSI LN Equity	United Kingdom
Invocas Group PLC	INVO LN Equity	United Kingdom
Ovum PLC	OVM LN Equity	United Kingdom
Rightmove.co.uk	RMV LN Equity	United Kingdom
Cohort Plc	CHRT LN Equity	United Kingdom
Scott Wilson Group PLC	SWG LN Equity	United Kingdom
Betex Group PLC	BTX LN Equity	United Kingdom
Arthro Kinetics PLC	AKI LN Equity	United Kingdom
Clean Air Power Ltd	CAP LN Equity	United Kingdom
Phynova Group PLC	PYN LN Equity	United Kingdom
Work Group Plc	WORK LN Equity	United Kingdom
Mobile Streams PLC	MOS LN Equity	United Kingdom
Personal Screening PLC	PSP LN Equity	United Kingdom
AdEPT Telecom PLC	ADT LN Equity	United Kingdom
Cagney PLC	CGNY LN Equity	United Kingdom
primion Technology AG	P4T GR Equity	Germany
QinetiQ Group PLC	QQ/ LN Equity	United Kingdom
Optos PLC	OPTS LN Equity	United Kingdom
Email Vision	ALEMV FP Equity	France
BP Marsh & Partners PLC	BPM LN Equity	United Kingdom
1000Mercis SA	ALMIL FP Equity	France
Store Electronic Systems SA	SESL FP Equity	France
Chariot(UK)PLC	CRT LN Equity	United Kingdom
Clasquin	ALCLA FP Equity	France
Appian Technology PLC	APN LN Equity	United Kingdom
Stratex Inter-tio-l PLC	STI LN Equity	United Kingdom

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

Regressors	Bhar	Issue Size	Leverage	Company Size	Time Lag
Bhar	1.000000				
Issue Size	0.418834	1.000000			
Leverage	0.078899	-0.010911	1.000000		
Company Size	-0.228885	0.099764	0.041476	1.000000	
Time Lag	-0.088036	-0.104399	0.035933	-0.063445	1.000000

Table 16: Correlation Matrix for the third 6-month period

Regressors	Bhar	Issue Size	Leverage	Company Size	Time Lag
Bhar	1.000000				
Leverage	0.064708	1.000000			
Company Size	0.313822	-0.015789	1.000000		
Time Lag	-0.153584	-0.010313	0.237843	1.000000	
Issue Size	-0.033340	0.002760	-0.063660	-0.040790	1.000000

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

Regressors	Bhar	Issue Size	Leverage	Company Size	Time Lag
Bhar	1.000000				
Leverage	0.098445	1.000000			
Issue Size	0.365826	0.103447	1.000000		
Company Size	-0.133708	0.007718	0.295195	1.000000	
Time Lag	-0.039468	0.010662	-0.049496	-0.033902	1.000000

Table 18: Correlation Matrix for the fifth 6-month period

Regressors	Bhar	Issue Size	Leverage	Company Size	Time Lag
Bhar	1.000000				
Issue Size	-0.117088	1.000000			
Leverage	0.034752	0.085646	1.000000		
Company Size	-0.002475	0.436470	-0.009425	1.000000	
Time Lag	0.041298	-0.047775	0.015482	-0.026033	1.000000

Table 19: Correlation Matrix for the sixth 6-month period

Regressors	Bhar	Issue Size	Leverage	Company Size	Time Lag
Bhar	1.000000				
Issue Size	0.452302	1.000000			
Leverage	-0.054583	0.030396	1.000000		
Company Size	0.000780	0.380634	-0.000906	1.000000	
Time Lag	-0.109992	-0.105596	-0.007424	-0.032663	1.000000