Price cap effect in the performance of Greek IPOs

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Abstract

The Initial Public Offerings (IPOs) pricing has become a leading example of market inefficiency during the last decades. Although there is an extensive amount of work that provides some evidence for the existence of short-term excess performance, there in no study to document price cap effect cases. The three (3) price cap changes introduced in a period of only six years (1993-1999) provide the grounds for investigating the implications of interventions on the pricing of new issues on the first day of trading. This study not only examines the price cap phenomenon of IPOs in a small but dynamic developing market as Greece, but also examines ten factors that probably affect the performance of new issues under price cap pressure in the short run.

The empirical results indicate differences based on the price cap effect in the initials returns of the 349 IPOs launched on the Greek stock market during the 1990–2006 period. The level of underpricing varies from 24.87% in the case of ±8% price cap to 134.64% once the price cap reaches at ±99%. The cross-sectional regression results provide further insights to the determinants that incur the price cap phenomenon in Greek IPOs. Ten factors appear to be significantly effective on their performance. The survey suggests that over the study period, the degree of underpricing is determined by the intensity of demand driven by investor sentiment and reveals that offering prices do not fully adjust to prevailing market conditions. However, this work differentiates with all studies available, as it provides results associated with a colorful set of changes in regulations.

Keywords: *Initial Public Offerings, Price Cap Effect, Price Adjustment*

JEL classification: *G14, G32, G24*

1. Introduction

The pricing and performance of initial public offerings (IPOs) is one of those empirical issues that attract attention of many researchers in finance. The empirical evidence on the pricing of IPOs provides a puzzle to those who otherwise believe in efficient financial markets. Even though there is extensive amount of studies on the abnormal initial returns provided by IPOs there is not even a single study to speak on price cap phenomenon during the first days of trading. The main purpose of this study is to fill this gap using not one but three regulations changes over the covered period.

Regulations and listing requirements have played a major role around the life of IPOs. A request for a stock exchange listing is the basis of an introduction prospectus whose contents are subject to regulations and which is generally filed a few months before the admission date. In order to compile the IPO prospectus, lawyers, together with the underwriting bank examine the company regarding its legal, financial and commercial aspects. The legal includes an examination of the company's major contracts, liabilities, patents and other facts, Gajewski and Gesse (2006).

The process of a firm's IPO is characterized by the expansion of its ownership structure (Pham et al, (2003) to include a much larger number of outside investors. This leads to higher trading liquidity (Fidrmuc *et. al.* (2006)) which reduces transaction costs in future equity raising (Ibbotson and Ritter (1995) and increases firm value (Amihud and Mendelson (1986)). Promoting trading consist with general perception (Aggarwal (2003)) that the large trading volume in initial public offerings is mostly due to flipping activity.

Price cap introduction was the response by Hellenic Capital Market Commission in the extreme level of flipping. It influenced negatively the initial returns taken by investors. Consequently, the price limits account for the fact that the first day prices of new stocks in the market did not reflect the exact real value market prices as dictated by investors' demand. The final equilibrium or fair prices were formed afterwards because of the limits in the daily price movements. The paper explores the time (number of days after the listing) needed for the prices of new listings to reach their market equilibrium level during the price cap periods and compare the differences on the returns among the IPOs listed with ceilings and the newly listed firms that did not experience any price limitations during their trading in Athens Stock Exchange.

The remainder of the paper is organized as follows. Section 2 includes the broad and updated literature review on the initial performance of IPOs, across the world divided in developed and emerging markets. Section 3 looks on Price Cap trading fluctuation framework in Athens Stock Exchange (ASE). Data and methodology are presented in Section 4, whereas Sections 5 and 6 provides, the empirical findings from the research in addition to an extensive analysis. Finally, Section 7 summarizes the main results and concludes the paper by offering further recommendations for future research.

2. Empirical studies on initial performance of initial public offerings

This section reports IPOs initial performances on International developed markets referred mainly on Loughran *et al* (1994, updated 2007) and Gajewski & Gresse (2006) works. In particular, Loughran T., Ritter, J. and Rydqvist K. (2007) updated the data of their

initial work "Initial Public Offerings: International Insights", introducing evidence on the short-run performance of companies going public in many (40) countries all over the world.

2.1. Underpricing of IPOs in International Developed Markets

Lee *et. al.* (1996) and Ritter (2007) provide an analysis on the initial underpricing of 1,103 Australian IPOs listed for a period of 30 years. The findings indicate that for the period 1976-2006 the average initial returns have been 19.8%. The result is consistent with the view that unique institutional characteristics may have overwhelmed previous tests of equilibrium models of IPO underpricing.

Derrien and Womack (2003) focus on the efficiency of the main process of going public in France under different market conditions and mechanisms. They show that the overall market momentum in the three months prior to an offering is a significant ex-ante predictor of the level of underpricing. In the sample of 264 French IPOs which went public on the French official parallel market and new market between 1992 and 1998, the mean underpricing reached 13.2 percent. Husson and Jacquillat (1988), Chahine (2002) and Ritter (2007) adds in the previous evidence and show that in a portfolio of 686 IPOs during 1983-2006 period the total initial return is 10.7%.

Ljungqvist (2001), Rocholl (2005) and Ritter (2007) provides evidence for 652 German IPOs coming to the market from 1978-2006. Underpricing was significantly related to the stock market, macroeconomic conditions, insider retention rates and the inverse of real gross proceeds. Initial returns for this period of study is 26.9% and is significantly higher from a previous smaller sample of 189 firms from 1970-1993, presented by Ljungqvist (1996) with underpricing of 10.57%.

A number of researcher including Guidici and Paleari (1999), Arosio *et al* (2000) Giudici *et. al.*(2004) present an empirical study of 233 IPOs in the Milan Stock Exchange between January 1985 and December 2006. They find an underpricing of 18.2%, which is even higher during 'hot issues' periods and decreasing during the last years of the study. Interestingly, Arosio *et al* (2000) report that if the offering includes bookbuilding-pricing system, the underpricing is significantly lower (8.12% vs. 28.33% in fixed-price offering) in line with the 'information gathering' theory. Thus, under bookbuilding, the underwriter is able to reduce information asymmetry.

Jog & Riding (1987), Jog and Siristrava (1994), Kooli and Suret (2002), Kryzanowski *et. al.* (2006) and Ritter (2007) analyse the investment and operating performance of a sample of 635 Canadian IPOs between 1971 and 2006 that went public on Canadian Stock Exchange. Evidence reveals low average adjusted initial returns of 7.1 percent. The researchers have used a number of possible explanations for the low initial return of Canadian issuing firms. They find that the underpricing is significantly related to the size of the firm (IPO market in Canada is good mainly for large offerings), the prestige of the underwriter and to the period of the issue.

Ansotegui & Fabregat (2000), Otero & Fernandez (2003), Alvarez and Gonzalez (2005) provide a detailed analysis on the underpricing level of 128 Spanish IPOs, on the Madrid Stock Exchange for a period covering 20 years, 1986-2006. They report low underpricing level of 10.9 percent. However, there is a positive relationship between initial underpricing and the percentage of shares retained, confirming the signaling theory. Ansotegui and Fabregat (2000) make clear that it is possible to reduce the degree of underpricing by selecting the optimal timing, underwriter and type of placement.

Keasey and Short (1992), Levis (2002) and Loughran *et al* (1994, updated 2007) examines the performance of 3,986 firms listed and traded on the London Stock Exchange during 1959-2006. The overall average first day returns reported is 16.8%. The degree of underpricing is found to be only significant related to consistently signed with the percentage of equity remained in the firm by the original entrepreneurs, the amount of new money raised on flotation and the presence of an earning forecast. In the case of the UK, the total amount left on the table in 2000 was in excess of £2.2 billion.

Hogholm and Rydqvist (1995), Rydqvist (1997), Ritter (2007) documents IPO underpricing for companies going public on the Stockholm Stock Exchange. The Swedish sample comprises 406 new firms listed during 1980-2006. The average underpricing for the Swedish IPOs is 27.3 percent. Rydqvist stresses the case of the Swedish IPO market in marginal tax rates between salary increases (85 percent marginal tax) and capital gains (20 percent marginal tax) which led firms to allocate a significant portion of the offer to firm employees and key decision makers of the firm's suppliers, creditors and customers. The role of underpricing in this case was to replace salary increases with tax efficient capital gains. Tax motivation for underpricing disappeared when a new tax was introduced in 1990 and led to a subsequent drop. In a similar study of IPOs between 1970 and 1991, Hogholm and Rydqvist (1995) finds a positive relationship between the level of underpricing and the level of ex-ante uncertainty.

Ibbotson *et. al.* (1994) and Ritter (2007) in their research on the short-term performance of 15,490 US IPOs, (issued between 1960-2006), found that initial public offerings are significantly underpriced by 18.0%. Ljungqvist (2005) points out that underpricing has tended to fluctuate a 'great deal', averaging 21% in the 1960s, 125 in the 1970s, 16% in the 1980s, 21% in the 1990s and 40% since 2000. Summarizing their results the researchers suggest that the more established an issuer and hence the less investor uncertainty about the firms real value, the lower the amount of underpricing. In addition hot and cold performances come in waves and cold issue markets have average initial returns that are not necessary positive.

Jenkinson *et al* (2005) document that for a sample of 918 European and 3480 U.S. IPOs, European underpricing is on average 21.1 percent while the initial underpricing for the U.S. IPOs is 18.3 percent. A possible explanation for this evidence is that initial price ranges are based on less information in Europe than in the U.S. German firms present an unexpectedly high level of underpricing with 48.9 percent. When German firms are excluded from the European sample, the average underpricing falls to 13.8 percent, significantly lower than the 18.3 percent observed in the U.S. Jenkinson *et al* present two interesting samples called "rest of W Europe" and "rest of E Europe", with 75 and 29 IPOs respectively. W. Europe IPOs have, on average, low underpricing with 15.1 percent, while E. Europe IPOs have marginally higher underpricing of 18.7 percent.

Gajewski and Gresse (2006) developed an analytical survey of the European IPOs, based on a sample of 15 European countries (and of 2.104 European domestic companies) analysing various features (listing requirements, IPO-mechanism choices, performance) of the European IPO market over the period 1995-2004. As far as the short-term IPO performance is concerned, the average initial underpricing amounted to 22.0 percent over pan-European sample. Countries where underpricing is close to the mean are Poland, Portugal, the Netherlands, Switzerland and the UK. Underpricing is low in Austria, Belgium, France, Italy, Spain and Sweden while initial returns exceed the average in Germany and Greece.

Table 1: Summary of studies on the performance of initial public offerings (IPOs) in major International markets

[a]Cited in Loughran *et al*, (1994, updated 2007) for many International studies, Rogiers *et al* (1993), Loughran *et al*, (1994, updated 2007) for Belgium; Jog & Riding (1987), Jog and Siristrava(1994), Kryzanowski *et. al.* (2006) for Canada; Tian and Megginson (2006), Ma and Faff (2007), Chen et al (2007) for China; Jakobsen and Sorensen (2001) for Denmark; Brounen and Eichholtz (2002), Giudici &Roosenboom (2002), Jenkinson *et al* (2005), Gajewski and Gresse (2006) for Europe; Keloharju (1993) for Finland; Leleux and Mizuka (1997), Derrien and Womack (2003), Loughran *et al*, (1994, updated 2007) for France; Ljungqvist (1999) for Germany; Papaioannou and Travlos (1995), Kazantzis and Levis (1995), Kazantzis and Thomas (1996), Nounis (2000), Tsangarakis (2004) for Greece; Ljungqvist and Yu (2003), Fung *et al*, (2004) for Hong Kong; Guidici and Paleari (1999), Arosio *et al* (2000), Giudici *et.al.*(2004) for Italy; Marisetty and Subrahmanyam (2005) for India; Ihm (1997) for Korea; Bosveld and Venneman (2000), Jenkinson *et. al.* (2000) for the Netherlands; Yong (1995) for Malaysia; Lyn and Zychovitz (2003) for Poland; Lee et. al.(1996) for Singapore; Rydqvist (1993), Schuster (2003) for Sweden; Kunz and Aggarwal (1994), Drobetz (2003) for Switzerland; Alvarez and Gonzalez (2005) and Ansotegui and Fabregat (2000) for Spain; Kiymaz (2000) and Ince (2004) for Turkey; and Loughran, Ritter *et al*. (1994, updated 2007) for United Kingdom; Ibbotson *et. al*. (1994), Ritter (1997) for USA;.

Country	Study	Sample period	Number of firms	Initial return (%)
Australia	Lee (1996), Ritter	1976-2006	1,103	19.8%
Belgium	Loughran *et al*, (1994, updated 2007);	1984-2006	114	13.5%
Canada	Loughran *et al*, (1994, updated 2007);	1971-2006	635	7.1%
China	Ma and Faff (2007); Chen et al (2007);	1990-2005	1,394	164.5%
Denmark	Jacobsen and Sorensen (1999), Ritter;	1984-2006	145	5.4%
Europe	Gajewski and Gresse (2006)	1995-2004	2,104	22%
Finland	Keloharju (1993); Ritter;	1971-2006	162	17.2%
France	Husson and Jacquillat (2001); Ritter;	1983-2006	686	10.7%
Germany	Ljunqvist (1997), Rocholl(2005), Ritter	1978-2006	652	26.9%
Greece	Nounis, Kazantzis & Thomas	1976-2005	363	25.1%
Hong Kong	Loughran *et al*, (1994, updated 2007);	1980-2006	1,008	15.9%
Italy	Arosio et al (1999), Loughran et al (2007)	1985-2006	233	18.2%
India	Marisetty and Subrahmanyam;	1990-2004	2,713	95.4%
Korea	Dhatt, Kim & Lim; Ritter;	1980-2006	1,115	58.4%
Netherlands	Wessels; Eijgenhuijsen & Buijs; Ritter;	1982-2006	181	10.2%
Norway	Emilsen *et al*[a], Loughran et al (2007);	1984-2006	153	9.6%
Malaysia	Isa; Isa & Yong; Yong;	1980-2006	350	69.6%
Poland	Lyn and Zychovicz (2003); Ritter;	1991-2006	224	22.9%
Singapore	Lee et al; Dawson; Ritter;	1973-2006	441	28.3%
Sweden	Rudqvist (1994); Schuster (1998), Ritter	1980-2006	406	27.3%
Switzerland	Kammermann & Walchli (2000);	1983-2000	120	34.9%
Taiwan	Loughran *et al*, (1994, updated 2007);	1980-2006	1,312	37.2%
Turkey	Kiymaz (2000); Ince (2004);	1990-2004	282	10.8%
UK	Ljungqvist (2001); Levis (2000);	1959-2001	3122	16.8%
USA	Ibbotson, Sindelar & Ritter, Ritter;	1960-2006	15,490	18.0%
Overall	Loughran *et al*, (1994, updated 2007);		32,409	33.4%

Source: Loughran *et al* 'Initial Public Offering: International Insights' (1994, updated 2007)

We provide in Table 1 a summary of studies on the performance of initial public offerings (IPOs) in the main International markets. All the countries included in the sample are developed or fast emerging, like China and India, or small markets in very strong financial position, like Denmark, Finland and Norway.

3. Price Cap trading fluctuation framework in Athens Stock Exchange

Greek Market and more specifically the Hellenic Capital Market Commission (Regulatory body of Athens Stock Exchange) have made an exemption on imposing a cap since January 1993. The purpose of this regulation was to protect the stock market and the investors from speculation attacks that might be caused by the vulnerable environment of that period. This regulation was applied to all the stocks from their first day of trading. In particular, from the first day of trading, a newly listed stock price can fluctuate between ±8%. When a stock price was reaching the cap of ±8%, the stock price was fixed until the demand and the stock price fall below +8 per cent, or the supply and the stock price rises above -8% the same day. If no change happened, then the stock would start trading again on the next opening day. If the demand and supply continued to be high/low either on the pre-trading period of the day or during the trading, then stock locked again and trading of stock is transferred for the next day.

After 1 December 1996, the trading regulation was prolonged and the newly listed stocks were allowed to fluctuate between ±99% but only for the first three days of trading (from the fourth day on, the cap of ±8% was applied). Before 30 November 1996 the limit for this initial period was ±8%; in other words, there was no difference in the trading regulation for the newly listed stocks in ASE and the already listed stocks. However, this regulation changed on 1 December 1999 and the stock price of an IPO company did not oscillate between any limits for the first three trading days. Therefore, the market freely evaluated the price of a newly listed stock without the existence of a ceiling. By removing the limits, the stock price that was entering ASE could gain (or lose) any percentage of its value according only to the investor's valuation.

Entering the fourth day of trading, the security price continued to fluctuate between caps. In January 1993, a daily 8 percent limit was introduced on the movement of share prices as well as a subscription support mechanism. More specifically, trading in a stock was suspended when the price of the stock rose or dropped by 8 percent compared with the closing price of the previous day of trading. The operation of this mechanism was not subject to any time limit in the aftermarket but was usually triggered in the days immediately following launch. New rules applied in 1999 clarify that if the bid order is at the limit up or the offer order is at a limit down for first quarter of trading, the trading limit of that particular share extends to ±10% (applied after the fourth day of trading). During 2004 this limitation has prolonged to ±20%.

To summarise, changes in the regulation lead to divide our sample into four sub-periods. The first sub-period is from January 1990 to December 1992 when there was no cap during the first three days of trading. From 1 January 1993 to 30 November 1996 we have the cap of ±8% of all IPOs listed in ASE. The third period is from 1 December 1996 to 30 November1999 with a cap of ±99% (initial three days of trading) for all IPOs going public. The fourth period includes from 1 December 1999 to 31 June 2006 when there was no upper or lower ceiling.

4. Empirical Analysis of IPOs' Short-Run Performance in the A.S.E. (1990-2006)

4.1. *Data description*

The study examines the initial performance of 349 IPOs listed in the Athens Stock Exchange both in Main and Parallel board during the period from January 1990 through to June 2006. The sample contains only common and ordinary stocks. Preference stock as well as transfers from Parallel to Main market are excluded. All data are mainly extracted from IPOs prospectuses, daily press, ASE reports (History of ASE, Fact Books, Annual and Monthly Statistical Bulletins), Annual Reports of Hellenic Capital Commission and some special internet sites.[1] The prospectuses were referenced from the library and website of ASE and Capital Commission Markets resource centre.

Data for each of the issues regarding the offer price, total gross proceeds, age of IPOs companies, proportion of shares sold by owners, list of underwriters, earnings forecast, the closing date of the offer, are extracted from the prospectuses. Other additional information about the companies was extracted from databases available at the public libraries of ASE & Capital Market Commission, the library at the Bank of Greece, and the database of the Greek Parliament. In a few cases, we approached companies directly.

The data was collected in two stages. First we identified the IPOs and a number of offering characteristics. These were identified from annual issuing statistics provided in professional publications, financial press and, when necessary, direct contact with the issuing company. Second, we collected daily closing prices from the stock exchange. Stock prices (issued before June 2006) are converted into Euros.

Table 2 provides categorisation of the IPOs, into the three markets of Greece (Main, Parallel and New). The highest number of common stocks of IPOs was launched in 2000 with 53 IPOs (18 in main market and 35 in Parallel market), followed by 46 IPOs in 1994[2] (35 IPOs in main market and 11 IPOs in parallel market). The lowest number of IPOs was listed in 1992 with 5 IPO firms shows there was low liquidity in the market during that period). Interestingly, Table 2 reports the distribution of the total capital raised by year. The highest percentage (35.99%) of total proceeds is raised in 2000, followed by 18.95% in 2001. The lowest gross proceeds appear in 1992 with 0.35% of the total sample of 17 years of our study (in terms of the number of IPOs and the percentage of gross proceeds).

[1] The internet sites that were used are www.ase.gr, www.naftemporiki.gr, www.enet.gr, www.hcmc.gr. Prices of the stocks and General Index of Athens Stock Exchange were collected at predetermined times during the first year of trading.

[2] During this year, many construction companies were listed on the Athens Stock Exchange.

Table 2

Number of issues in A.S.E. divided in years and markets.

Year	Number of Issues	Main Market	Parallel Market	New Market	Total Capital Raised '000 Euros
1990	28	23	5	-	173,106
1991	14	11	3	-	132,919
1992	5	5	-	-	27,770
1993	10	10	-	-	60,983
1994	46	36	10	-	289,705
1995	20	10	10	-	70,003
1996	20	7	13	-	336,561
1997	12	3	9	-	50,734
1998	23	10	13	-	924,329
1999	38	15	23	-	889,420
2000	53	18	35	-	2,842,882
2001	21	13	6	2	1,497,054
2002	21	8	10	4	99,712
2003	18	3	12	2	121,332
2004	11	4	4	3	87,126
2005	7	3	4	-	92,157
2006	2	2	-	-	202,154
TOTAL	349	181	157	11	7,897,942

Source: Annual Reports of Hellenic Capital Market Commission, Annual & Monthly Statistical Bulletins of A.S.E

4.2 *Methodology*

We measure the level of underpricing of IPOs listed on the ASE boards using the conventional method, where the raw initial return (RIR) on the first day of trading is calculated as follows:

$$RIR_{i,t} = \frac{P_{i,1} - P_{i,0}}{P_{i,0}} \qquad (1)$$

The initial return is adjusted for market changes, taking into account movements of the Athens Stock Exchange General Index (ASEGI) between the offer price closing date and the end of first day of trading. Raw initial return, which is calculated by the above equation, does not consider time lag symptoms between the offer price closing day and the first day of trading in the stock exchange. During this period, many changes in market conditions may occur. As a result the initial return measured may be a result of changes

in market conditions. So the raw initial return is adjusted for market changes and variances.[3]

The market adjusted initial return is calculated as follows:

$$MAIR_t = [\frac{P_{i,1} - P_{i,0}}{P_{i,0}} - \frac{MI_{i,1} - MI_{i,0}}{MI_{i,0}}] \qquad (2)$$

$RIR_{i,t}$= Raw initial return of company 'i' at period t
$MAIR_{i,t}$=Market adjusted (excess) initial return of company 'i' at period t
$P_{i,0}$=IPO offer price as per prospectus of company 'i'
$P_{i,1}$=Closing price of IPO of company 'i' at the end of the first trading day
$MI_{i,0}$=ASE General Index at the date of prospectus company 'i'
$MI_{i,1}$=ASE General Index at the close of first trading day of company 'i'

To find out the equilibrium or fair market price of IPOs and as a result the raw returns that the investors earned from new issues, we calculated – for each offering listed in the ASE during the two sub-periods (January 1993-November 1999, and December 1996-November 1999) under the price cap intervention – the first day return to be accumulated over the number of consecutive days when the price cap was triggered. For example, if the share price movements trigger the price cap on the 3 consecutive days after listing and do not trigger the price cap on day 4 in the aftermarket, the real underpricing level is calculated as follows:

$$RIR_{i,4} = \frac{P_{i,4} - P_{i,0}}{P_{i,0}} = \qquad (3)$$

$P_{i,0}$=IPO offer price as per prospectus of company 'i'
$P_{i,4}$=Closing price of IPO of company 'i' at the end of the fourth trading day

The time gap in many countries is usually short (1 week in the UK) but for the sample tested it is about 47 days and can take as long as 96 days. During this period, many changes may happen in market conditions causing deviations in the observed premium measured in equation '1'. However, the raw initial return derived by equation '1' is adjusted for market changes by taking into account movements of the Athens General Index between the date of offer (prospectus date) and the first trading day of the IPOs shown in Equation '2'. Studies which have used this method are Finn and Higham (1988), Lee *et al* (1996) and Uddin (2000).

For this study, the ASE General Index (ASEGI) is used as a market benchmark. The ASEGI is the main index and is recognised as the overall indicator of market performance in Greece. It consists of a number of representative shares from various

[3] These calculations are appropriate because the equilibrium prices of stock exchange reflect not only the companies' special characteristics but also, during the formation process, by the ascending and descending of capital market.

sectors in the main board, which make a consistent portion of the total ASE market capitalisation.

5. Descriptive Statistics

5.1. *The degree of underpricing of IPOs separated into different groups*

Panel A of Table 3 shows the average raw and market adjusted initial returns for each of the four sub-periods. The average raw return at the end of the first trading day, when no ceiling restriction was present, is 36.49 percent (adjusted return 32.65 percent). During the cap of ±8 there is an initial unadjusted return of 5.63 percent (adjusted initial return of 4.94 percent) and an overall underpricing of 25.43 (adjusted return 24.87) percent. The average raw return for 71 issues during the cap of ±99 percent records a noticeable difference between the initial entry price and the price subsequently established in the market of 70.15 percent (adjusted initial return of 68.98 percent).

During the sub-period where the daily limit on stock price movement was ±8% the mean number of successive limit ups of stocks' prices was 2.59 (Panel C of table 3). In other words, the daily price movement of 93 IPOs listed in the ASE during the period January 1993–November 1996 hit the daily upper limit of 8%, an average 2.59 days during the first time of their trading and as a result reached their equilibrium price after 2.59 trading days in average. It is worth noting that only 19 out of 93 IPOs of this period examined did not reach ±8% cap on the first listing day. On the other hand, there were two IPOs that recorded their equilibrium after 11 and 10 trading days respectively, as their stock prices stopped triggering the price return cap.

Concerning the sub-period where the daily limit on stock price movement was ±99%, the mean number of limits ups of securities' prices was 0.64. It is noted that 30 out of 71 hit the daily upper limit of 99% at least one time and the stocks of four IPOs rose by 99% for three days continuously. The evidence documented above and specially those concerning the sub-period with ±8% limit indicates that the first day closing prices of new issues was not representative of investors' demand and as a result in no way reflected the equilibrium market prices of IPOs formed at their entrance day in the stock market. Thus, the price cap constraints being in force on the Greek stock market during the period under consideration, exerted substantial limitation into the fair initial price formation of IPOs.

Table 3

Distribution of Raw and Market Adjusted Initial returns

The raw initial return (RIR) measures the initial underpricing level whilst the market adjusted initial return (MAIR) adjusts the general index in the measurements. The raw initial return is calculated by $RIR_{i,t}=(P_i-P_o)/P_o$ on the end of first day of trading. The raw initial return (RIR) is adjusted for market changes taking into account the Athens Stock Exchange General Index (ASEGI) between the offer price closing date and the end of first day of trading. This is calculated as $MAIR_{i,t}=[(P_i-P_o)/P_o-(M_{i,t}-M_{i,o}/M_{i,o})]$.

Panel A: Division of the sample into four periods based on changes of regulation of initial day performance of IPOs

	Period	No of IPOs	Mean of RIR	Mean of MAIR
No ceiling	Jan 1990 – Dec 1992	47	36.49	32.65
±8% Cap	Jan 1993 - Nov 1996	93	5.63	4.94
±99% Cap	Dec 1996 - Nov 1999	71	70.15	68.98
No ceiling	Dec 1999 - June 2006	138	35.36	36.71
Overall	Jan 1990 – June 2006	349	34.66	34.24

Panel B: Division of the sample into four periods based on changes of regulation of underpricing of IPOs

	Period	No of IPOs	Mean of RIR	Mean of MAIR
No ceiling	Jan 1990 – Dec 1992	47	36.49	32.65
±8% Cap	Jan 1993 - Nov 1996	93	25.43	24.87
±99% Cap	Dec 1996 - Nov 1999	71	140.10	134.64
No ceiling	Dec 1999 - June 2006	138	35.36	36.71
Overall	Jan 1990 – June 2006	349	54.17	52.92

Panel C: Number of days that the prices of IPOs reached their upper price cap (limit up) during their listing in ASE

	Period with price cap: ±8%	Period with price cap: ±99%
Mean	2.59	0.64
Median	2.00	0.00
Standard Deviation	2.80	0.88
Minimum no of limit ups	0.00	0.00
Maximum no of limit ups	11	3
Max no of limit downs	1	0

Table 4 illustrates the mean of raw initial return (RIR) and market-adjusted initial return (MAIR) for the 349 IPOs of our sample (partitioned by years of their flotation). Panel A presents RIR and MAIR based on the first day of trading, while Panel B refers to actual results of RIR and MAIR taking into consideration the second and third day of trading when this is necessary.

Panel A presents a mean IR and MAIR of 34.66% and 34.24% respectively. It is clear that the mean first day return of IPOs is positive for every year of the period, except 1992 and 2004. The rate of return fluctuated between –10.59% and 102.78%. In particular, the highest mean for both raw and market adjusted initial underpricing is observed in 1999 with 102.78% and 98.02%, respectively. The lowest mean difference between initial entry price and price subsequently established by the market is in 1995, a year that had a cap of ±8% was in force.

Panel B shows accumulated returns over the number of consecutive days when the price cap was triggered (periods with caps of ±8% and ±99%). The period, which involves the price cap, was among 1993-1999. Carefully study of the MAIR shows that there is increase in all the years revealing that price cap prevented IPOs from reaching the equilibrium price.

Table 4: Raw and Adjusted Initial Returns by Year of Classification

*In the case where a stock reaches max/min ±8 (Jan 1993 - Nov 1996) we consider 2nd trading day (3rd, 4th if required) in order to find the actual underpricing **In the case where a stock reaches max/min ±99 (Sep 1996 – Nov 1999) we consider 2nd trading day (3rd, 4th if required) in order to find the actual underpricing.

Panel A: Raw and MAIR under Year Classification (use of 1st day of trading)

Year	IPOs	R.I.R. (%)			MAIR (%)		
		Mean	Positive	Negative	Mean	Positive	Negative
1990	28	89.54%	28	0	81.14%	27	1
1991	14	12.41%	10	4	10.31%	11	3
1992	5	-10.59%	2	3	-9.76%	2	3
1993	10	7.69%	10	0	-2.92%	2	8
1994	46	5.41%	41	7	6.62%	37	9
1995	20	4.72%	16	4	4.08%	12	8
1996	21	5.59%	19	2	5.65%	17	4
1997	12	19.91%	8	4	32.21%	9	3
1998	23	51.64%	20	3	51.59%	21	2
1999	37	102.78%	36	1	98.02%	36	1
2000	53	57.35%	41	12	56.79%	43	10
2001	21	34.61%	12	9	37.85%	15	6
2002	21	29.58%	13	8	32.63%	13	8
2003	18	5.15%	13	5	-0.72	11	7
2004	11	-1.61	7	4	-0.54	6	5
2005	7	2.08	4	3	4.77	3	4
2006	2	10.75	2	0	10.83	2	0
Total	**349**	**34.66%**	**282**	**67**	**34.24%**	**267**	**82**

Panel B: Raw and MAIR (Consider 2nd , 3rd ,4th days of trading where required)							
Year	**IPOs**		**R.I.R. (%)**			**MAIR (%)**	
		Mean	Positive	Negative	Mean	Positive	Negative
1990	28	89.54%	28	0	81.14%	26	2
1991	14	12.41%	10	4	10.31%	11	3
1992	5	-10.59%	3	2	-9.76%	3	2
1993	10	9.29%	6	2	1.83%	2	8
1994	46	18.58%	37	7	18.27%	35	11
1995	20	11.27%	13	5	11.10%	12	8
1996	21	13.96%	14	2	15.34%	17	4
1997	12	33.14%	7	1	31.37%	9	3
1998	23	61.93%	19	0	51.93%	20	3
1999	37	222.78%	27	3	219.18%	36	1
2000	53	55.11%	40	13	56.36%	42	11
2001	21	34.61%	12	9	37.85%	14	7
2002	21	29.58%	13	8	32.63%	13	8
2003	18	5.15%	13	5	-0.72	11	7
2004	11	-1.61	7	4	-0.54	6	5
2005	7	2.08	4	3	4.77	3	4
2006	2	10.75	2	0	10.83	2	0
Total	**349**	**54.17%**	**192**	**33**	**52.92%**	**183**	**42**

Specifically in 1993 (the first year that price cap regulation was applied) the equilibrium of MAIR is slightly higher than the average initial returns at the end of the first day of trading. Everything seems to change from 1994 when the increase in equilibrium MAIR is almost three times higher caused mainly from the increase at the end of first day. In 1998 we observe a balance, which reveals that the first day was enough for the IPOs to reach their equilibrium level. Finally in 1999 there is a big difference between the increase of MAIR at the end of the first day of trading and the final equilibrium price.

We observe that the IPOs present their highest raw and market adjusted initial underpricing in 1999. Athens Stock Exchange General Index (ASEGI) reached its highest level during 1999. The performance of ASEGI was one of the highest, as at the end of 1999 the Index's value was 5,353 units (6,355 units the 17th of September 1999) in relation to 2,737 units at the end of 1998.

Table 4 shows that approximately 87 percent of the IPOs' 'close' on the first day of trading with higher than the 'offer price' value. In 1998, all initial public offerings were underpriced and offered positive first day returns. Welch and Ritter (2002) report that 70 percent of U.S. IPOs experience a higher price at the end of the first trading day. We now divide our sample into four periods. These periods are from January 1990–

December 1992 (no limit on ceiling), January 1993–November 1996 (cap of ±8%), December 1996–November 1999 (cap of ±99%) and finally from December 1999–June 2006 (no limit on ceiling).

Panel A of Table 5 shows the distribution of raw and market adjusted initial returns. There are eighty-two and 36 IPOs with 'market adjusted initial return less than zero percent' and 'market adjusted initial return with more that 100 percent', respectively. There is a big gathering of IPOs raw returns in the low underpriced category of 5.1 to 10 percent. Overall market-adjusted classification seems to be more equally distributed in comparison to raw initial returns.

Panel B provides RIR and MAIR for all 349 IPOs listed in ASE for the period from January 1990 to June 2006. The median in both cases is much lower than the mean. In the case of IR there is a median of 8% at the same time when the mean is 34.66%. The main reason for the low median is the ceiling of ±8 for the period January 1993–November 1996 that had as a result seventy-four IPOs that hit the maximum and low level. It is noteworthy in table 5 that the maximum MAIR has been the enormous 472.35%.

In the IPOs with positive average initial returns, the highest level of underpricing of 472.35 percent is recorded for 'Petropoulos', a trader of commercial vans and cars that was founded in 1974 and listed in December 1999. The IPO with the highest positive average underpricing over a consecutive number of days is recorded 'Dionic', a H/Y production and printing company with 751.52 percent. 'Dionic' experienced a maximum of 99% (maximum cap of ±99%) for three consecutive days, and from an offer price of € 7.92 the share price jumped to € 62.44 after 4 days of trading.

The company with the highest level of overpricing with 43.20 percent was 'Logismos', a company dealing with computerisation services to corporations and organisations in the private as well as the public sector. The large difference between the mean and the median values indicates a large positive skewness in the distribution. However, the kurtosis coefficient of 15.61 indicates a significant deviation from normality. The standard deviations of the raw and market adjusted initial return are 60.09 percent and 59.84 percent, respectively. These figures suggest a very high level of dispersion in the initial returns.

The results reported in Table 6 segregate the initial performance of the IPOs by industry sector. The findings highlight that the 'Media/TV' sector had the highest average MAIR of 70.05 percent with the second highest average MAIR by 'Industrial Mineral' sector with 62.19 percent. Among the samples, the 'Investment' sector IPOs had the lower initial returns with an average MAIR of 2 percent. As expected, the 'finance' group of firms provides the lowest initial returns (IR) to their investors with 19.80% at the same time that 'industrial' classified firms provide on average double the returns of finance firms.

Table 5: Distribution of Raw and Adjusted Underpricing

The raw initial return measures the gross initial underpricing level whilst the MAIR is the market adjusted return. The raw initial returns is calculated by $RIR_{i,t}=(P_i-P_o)/P_o$ on the first day of trading. The raw initial return is adjusted for market changes taking into account the Athens Stock Exchange General Index (ASEGI) between the closing date and the first day of trading. This is calculated $MAIR_{i,t}=[(P_i-P_o)/P_o-(M_{i,t}-M_{io}/M_{io})]$.

Panel A: Distribution of Raw and Market Adjusted Initial Returns

Distribution	Raw Initial Returns	MAIR
Lower than –15.01%	15	17
-15 < x <-5.01	28	30
-5 < x < 0	27	35
0.1 < x < 5	36	34
5.1 < x < 10	91	45
10.1 < x < 20	18	46
20.1 < x < 40	29	41
40.01< x < 70	38	33
70.01< x < 100	44	32
Over 100	23	36
	349	349

Panel B: Raw and Market Adjusted Initial Returns for 349 firms listed in ASE during (1990-2006)

	Raw Initial Returns	MAIR
Mean (%)	34.66	34.24
Median	8.00	12.64[4]
Standard Deviation	60.09	59.84
Skew-ness	3.201	3.234
Std error of Skew-ness	0.131	0.131
Kurtosis	1109	15.614
Std error of kurtosis	0.260	0.260
Minimum (%)	-37.50	-43.20
Maximum (%)	472.42	472.35

Table 6: Raw and Market Adjusted Initial Returns of 349 IPOs listed on the Main and Parallel Market of the ASE based on industry classification

Raw and Market Adjusted Initial Returns under industry classification				
IPO Group No of Firms	**Raw Initial Returns (%)**	**R.I.R. St. Deviation (%)**	**MAIR (%)**	**MAIR Standard Deviation (%)**
Industry Category				
Chemicals (11)	28.61	40.96	29.04	36.40
Construction (42)	19.77	34.49	17.74	35.12
Food/Beverage (36)	45.38	71.83	46.16	70.91
Industrial Mineral (25)	61.12	108.08	62.19	107.38
Information Technology (40)	60.32	76.60	45.37	64.25
Metal (22)	24.31	34.27	24.58	32.28
Petrol (4)	6.39	16.65	4.96	22.214
Telecom (4)	13.36	14.39	18.57	14.14
Textiles (27)	27.09	55.15	28.76	57.26
Banks (11)	29.27	37.10	32.50	41.11
Financial (28)	22.28	40.43	16.36	36.64
Investments (12)	5.43	27.71	2.00	25.66
Commercial (17)	19.54	31.56	22.72	40.44
Health (9)	11.43	19.64	14.19	21.38
Housing (20)	24.40	29.38	46.82	75.82
Media/TV (15)	70.75	92.85	70.05	91.54
Services (4)	17.87	40.39	28.28	40.58
Travel (22)	42.76	47.42	42.44	44.25
Industry (211)	38.21	44.80	40.77	56.37
Finance (51)	19.80	36.70	16.45	35.02
Miscellaneous (87)	34.43	57.60	43.04	63.97
Total (349)	**34.66**	**60.09**	**34.24**	**59.84**

6. Cross Sectional Regression

6.1. *Formulation of Hypotheses-Determinants of the short run IPO performance in Greece*

We considered many determinants for initial underpricing of IPOs. We search for eleven of them and we try to find out their influences on our model. These determinants are: (1) listing board classification, (2) age of the firm by the date it goes public, (3) Time Lag period, (4) Privatization, (5) company size, (6) demand multiple, (7) underwriters'

reputation, (8) hot/cold period of issuing, (9) sold ownership, (10) industry classification (11) risk. Table 7 summarizes the explanatory variables, giving briefly their definition and type of measure that will be used. Therefore, the regression model is specified as follows:

The following regression equations are used to assess the determinants of underpricing

$$P_t = a_0 + a_1 LBC_1 + a_2 AGE_1 + a_3 TLAG_1 + a_4 PRIV_1 + a_5 SIZE_1 + a_6 DM_1 + a_7 UR_1 + a_8 H/C_1 + a_9 OWN_1 + a_{10} IND_1 + \varepsilon_i \quad (1)$$

and

$$P_t = a_0 + a_1 LBC_1 + a_2 AGE_1 + a_3 TLAG_1 + a_4 PRIV_1 + a_5 SIZE_1 + a_6 DM_1 + a_7 UR_1 + a_8 H/C_1 + a_9 OWN_1 + a_{10} IND_1 + a_{11} RISK_1 + \varepsilon_i \quad (2)$$

where t = 12, 24 and 36 months respectively and ε_i = error term

Table 7

Summary of Explanatory Variables

For **a**, the variable is classified as 0,1 where 0=main market, 1=parallel & new markets, For **b**, the variable is defined as 0 and 1, where 0=privatizing public sector firm and 1= private sector firm, and for **c**, the variable is denoted as 0 and 1, where 0=medium or low reputation of underwriter and 1=high reputation underwriter. For **d**, the variable is denoted as 1 and 0, where 1= upward (hot) market (1997-1999) and 0=elsewhere.

Variable Name in Abbreviation	Variable Definition	Type of Measure
LBC	Listing Board Classification (main, parallel or new market)[a]	Discrete
AGE	Age of the firm by the date it goes public	Continuous
TLAG	Time Lag period	Continuous
PRIV	Corporate Condition of the company [b]	Discrete
SIZE	Size of the IPO firms, calculated as the number of shares, multiplied by the offer price	Continuous
DM	Demand Multiple	Continuous
UR	Underwriters' Reputation [c]	Discrete
H/C	Hot/Cold Dummy Variable [d]	Discrete
OWN	Sold ownership	Continuous
IND	Industry Classification	Discrete
RISK	Standard deviation of returns in the first month	Continuous

where t = 12, 24 and 36 months respectively and ε_i = error term

In the subsequent paragraphs, we will provide in detail the eleven variables of our multivariate regression model. We will concentrate on preceding evidence and consider the hypotheses for the case of Greece. In order to find out the possible determinants of IR/MAIR and to explore their relative relationships, the following conjectures are constructed.

LBC_1 is a dummy variable equal to 1 if the offering is listed in the main market and 0 if it is not. The Athens Stock Exchange (ASE) consists of three markets, the Main,

the Parallel and the New markets. The 'Main' market is the oldest one, dating back to the foundation years of the Athens Stock Exchange in 1879, whereas the 'Parallel' market was formed in 1990 and the 'New' market in 2001. Uddin (2001) reports that firms listed in the second board of Malaysia have higher initial underpricing in contrast with the IPOs listed in the main market. Schlag and Wodrich (2004) found that IPOs listed in the main market experience significantly lower returns in the short-run, whereas those that are listed in the secondary market, tend to overperform. Regarding the Greek stock market, firms that are listed mainly in the Main board, are those with more developed structure and the information they might have available for public use comes as a result of wide research and high costing. This creates a secure atmosphere among the investors who assess those IPOs near to their actual value leaving small window for underpricing.

AGE_i is the operating history of a firm prior to going public and is employed as a proxy for ex-ante uncertainty. Ritter (1984), Clarkson and Merkley (1994), Nazir and Zin (1998), Kiymaz (2000) and Kaneko and Pettway (2003) support that older firms have more public information available than younger firms, so they are expected to have lower ex-ante uncertainty. Especially companies operating for less than ten years, provide lower level of information to the public. 'New' market companies are known to be relatively young (less than 17 years old) compared to 'main' market companies – the youngest having an operating history of only one year. Such IPOs are expected to be highly underpriced.

$TLAG_i$, the period between the official date of the prospectus announcement (or offer price date) and the listing date of an IPO, in developed countries is assumed to be short, however in less developed countries it is expected to be longer. In Greece, TLAG varies between 5 days and 70 days at maximum. During the TLAG period, changes in the market conditions might affect the price performance of the IPOs. Loughran *et al* (1994, updated 2007) suggest that the longer the time period between setting the offer price and listing, the greater will be the underpricing, conditional on the offer not being withdrawn. Chowdhry and Sherman (1996) report that the time between the IPO announcement day (that is, the day of prospectus) and the first day of market trading affects the underpricing level. Su and Fleisher (1998) find a positive relationship between the average initial returns of IPOs and the time gap between issue and flotation dates in their sample for China's premier stock market, Shanghai Stock Exchange. We conclude therefore that a long period of waiting for a firm (in the midterm of the IPO announcement to listing) will create a negative environment to investors, with consequences of higher level of underpricing – (positive).

$PRIV_i$ is the transfer of ownership from the public sector (government) to the private sector (business). It is expressed as a dummy variable equal to 1 if the offering is a privatization IPO and 0 if it is not. Privatization programs have been undertaken in many countries across the world, falling into three major groups. The first is privatization programs conducted by transition economies in Central and Eastern Europe after 1989 in the process of instituting a market economy. The second is privatization programs carried out in developing countries under the influence of international financial institutions such as the World Bank and IMF. The third is privatization programs carried out by developed country governments, the most comprehensive probably being those of New Zealand and the United Kingdom in the 1980s and 1990s. Greece belongs in the third category as privatization took place through public offerings and the development of a well functioning capital market. It has been the second part of 90's when Greek Government

realised they had to sell a number of firms that were not operating so efficiently under State control**.** The first big privatisation occurred in 1996 when the Telecommunication Organization, the country's largest firm, entered the stock market.

Looking on European evidences Aussenegg (1999) shows that underpricing in Poland drops by about 75% for privatisation IPOs and 50% for private sector IPOs. The increased underpricing of privatised IPOs reflects on the high demand for shares at the initial offer period followed a higher rationing. Florio and Manzoni (2004), in a study on privatisations in the UK, find that in actual terms the British firms are considerably underpriced. Their findings on short term underpricing provide evidence of an unweighted average abnormal return on the first day of about 13%. After all we expect that privatised IPOs will be positively associated with the level of underpricing.

$SIZE_i$, is the magnitude of the offering, measured as the product of the offering price and the number of shares being offered. Banz (1981), Reinganum (1981), Kiem (1983), Kazantzis and Thomas (1996), Zarowin (1990), Kiymaz (2000) and Hensler Hensler (2000) document that if smaller firms tend, on average, to be more risky, then first day returns are expected to be bearish related to firm size. Keloharju (1993), in a study on Finnish IPOs, finds that a negative abnormal performance is mostly concentrated in small companies, whereas the medium and large size companies have considerably less negative abnormal performance. Notwithstanding the different arguments, we expect that the level of underpricing will be lower in large firms as their management will be able to provide more information to investors, thus creating a positive atmosphere and reducing the information asymmetry to a minimum possible level. The last is in connection with the higher spread of shares that all the big firms have as a target to achieve.

DM_i, occurs when demand for shares exceeds the supply or number of shares offered for sale. As a result, the underwriters or investment bankers must allocate the shares among investors. In private placements, this occurs when a deal is in great demand because of the company's growth prospects. Koh and Walter (1989), Brennan and Franks (1995), Booth and Chua (1996), Mello and Parson (1998) and Stoughton and Zechner (1998) show that relative demand by large investors is significantly positively associated with underpricing and consistent with large investors being better informed while Keloharju (1993) reports that a higher demand multiple reflects the greater absorption capacity of the market. Amihud *et al* (2003) signal that excess demand is affected by factors that are known before the IPO, such as issue characteristics and market conditions. In this case underpricing has, as its primary purpose, to attract some level of excess demand, and that issue must be priced with high underpricing. Summarizing previous evidences, we hypothesize that IPOs with a high demand multiple (oversubscription) are associated with a high degree of underpricing

UR_i, is a dummy variable taking a value of one (1) if the underwriter is one of the big five investment Banks, otherwise UND_i is coded zero (0). The lead underwriter plays an important role in pricing and distributing an IPO, certifying the quality of the issue by their past performance in IPO underwriting. The last has attracted this study to search underwriter's reputation. Beatty and Ritter (1986), Beatty and Welch (1996) and Carter *et al* (1998) report that a prestigious underwriter can help the issuer to get a higher price for its shares, which is to accept a smaller IPO discount than normal. Thus, the reputable underwriter's goal is to set the issue price to maximise profits earned from the IPO. Johnson and Miller (1988), Carter and Manaster (1990), Beatty and Welch (1996), Booth

and Deli (1996), Carter *et al* (1998) and Kim and Ritter (1999) specify that prestigious underwriters are associated with lower risk offerings and lower initial returns expected from IPOs, which are underwritten by reputable banks. Ljungqvist and Wilhelm (2002) suggest that issuers who employ underwriters with larger market shares experience lower underpricing. Similarly, Benveniste *et al* (2002) predict that certain banks have sufficient market power to spread the costs of information production more uniformly across deals. Consistent with the available literature, we expect that IPOs listed by underwriters' reputation would have lower average returns as compared to IPOs listed by non-reputable underwriters.

$HC_{i,}$ is a dummy variable equal to 1 for hot periods and 0 if it is a cold. Hot issue periods are associated with those months where there is an average initial return greater than the half, whilst cold period issues are identified as those with an average initial return of less than the half. IPOs experience higher level of discounting during the hot periods as those are characterized by great uncertainty. It needs more effort than usual to attract uninformed investors. Schuster (2002), Gounopoulos et al (2008) suggest that some IPOs prefer to be issued in 'hot' markets when initial returns are high and the general level of the stock market is increasing, while other IPOs select 'cold' markets periods when initial returns are low and the general stock market level is stable or declining. Affleck-Graves (1996), Lowry and Schwert (2002) Benveniste *et al* (2003), Derrien and Womack (2003) and Kaneko and Pettway (2003) suggest after measuring the relationship of the initial return with the market movements that companies should choose the cold issue market to go public so that they can gain from higher prices of hot periods.

OWN_i**,** measure the percentage of ownership sold by pre IPO shareholders. It was Leland and Pyle (1977) developed a valuation model where the current value of a firm depends on the confidence the pre-IPO owners show to their firm. By selling small percentage of their firm they signal firm quality. Habib and Ljungqvist (2001) developed a second model which relates underpricing to the insiders' participation in the offering and the magnitude of the dilution they suffer on retained shares. They argue that if the insiders' personal wealth is at stake (because of the secondary shares they sell at the time of the IPO) then they would have every reason to care about the level of underpricing. They show that the larger the secondary sale by insiders, the smaller is the level of underpricing.

IND_i**,** classifies IPOs in groups based on their sector. A dummy variable of 1 was assigned to risky industries (with an average beta greater than 1), whilst 0 is assigned to less risky industries (with average betas less than 1). Sectors like construction, technology firms and textiles found to have beta higher than 1, while housing, commercial and travel firms have beta lower than one. Clarckson and Merckley (1994) use the industry as variable that affects the average initial under pricing. Industries, which have a factor beta greater than one, were more risky, therefore the underpricing level was even higher. Kooli and Suret (2001) report that the underpricing of Canadian IPOs varies widely in different industries. Mining, real estate, oil and gas and technology IPOs are more underpriced than production and film production IPOs.

$RISK_i$**,** is measured as the standard deviation of returns in the first month of trading. With some positive probability, a firm's true type is revealed to investors in the immediate post-IPO financing stage. This exposes low-quality issuers to the risk that any cheating on their part will be detected in the first month after going public and they can

reap the benefit from imitating the high-quality issuers' signal. Provided the risk of detection and the implied reduction in IPO proceeds are sufficiently great to deter the low-quality firms from imitating the high-quality ones in the after-market, a high-quality firm can influence investors' after-market beliefs about its value by deliberately leaving money on the table at the IPO. This money is 'recouped' when the firm returns to the market at a later date. Low-quality firms refrain from mimicking the signal (i.e. from underpricing) because the risk of detection means they may not be able to recoup the cost of the signal later (Ljungqvist(2005).

Before we will proceed in testing we search the correlation between the independent variables. The Pearson Correlation matrix in Table 8 suggests that no multi-colinearity problem exists among the control variables in this study.

Table 8
Pearson Correlation Matrix

Variables	1	2	3	4	5	6	7	8	9	10
1 LBC	1.000									
2.AGE	-0.156**	1.000								
3.TLAG	-0.038	0.090	1.000		-					
4.PRIV	-0.218**	0.164**	-0.150**	1.000						
5.SIZE	-0.295**	0.249**	-0.235	0.331**	1.000					
6.DM	0.198**	0.012	0.008	-0.098	-0.035	1.000				
7.UR	0.568	-0.050	-0.096	0.028	-0.140**	-0.095	1.000			
8.H/C	-0.001	0.075	0.108*	0.028	0.137*	0.355**	-0.158**	1.000		
9.OWN	-0.239	-0.040	-0.150**	-0.019	0.048	-0.169**	0.071	0.142**	1.000	
10.IND	-0.112*	0.043	-0.010	0.064	0.082	-0.003	-0.049	0.048	-0.022	1.000

6.2. *Empirical Results*

In our effort to investigate possible explanations for price cap effect in the performance of IPOs we run a series of multiple regression models, using the IR/MAIR returns as dependent variables. Initially, we ran multiple regression models using the explanatory variables described in Table 7. The R^2 and F statistics test whether the ten independent variables we take together can significantly explain the dependent variable, 'Market Adjusted Initial Return'. The results of the OLS estimations can be found in Tables 9, 10 and 11. The t-statistics are robust for heteroskedasticity using the White (1980) process.

In table 9 model 1 includes all the 349 IPOs that went public during the 16 years of this study. Model 2 excludes the financial firms because they are very different from other types of companies in terms of their accounts and assets. The third model uses initial return (IR) as the dependent variable avoiding the influence that general index causes in the meantime period.

Table 10 includes the regression results of 4 different samples (periods). The first sample uses the 93 IPOs that were listed with price cap of ±8% while the second focuses on the 71 firms that were listed with price cap of ±99%. There are 185 IPOs that were

listed during non-restricted with ceilings periods in the Greek market. Finally we exclude all the financial IPOs and we constitute the fourth sample with 152 firms.

Table 11 regression models makes use of the extra independent variable, 'Risk', which is measured as the standard deviation of returns in the first month of trading. The main reason for using 'Risk' is to test the IPO behaviour in the immediate aftermarket. The first test of table 11 uses all 349 that went public during the period of this study. The second regression focus on the 93 IPOs that were listed with price cap of ±8% while the third model study the 71 firms that were listed with price cap of ±99%. It is noteworthy to mention that when we test IPOs with price cap of ±8% the independent variable H/C disappears as all the IPOs during that period were listed in a cold period.

We find that regression '1' of table 9 explains 40.0 percent of the variation in market adjusted initial returns while regression '3' of table 9 provides an explanatory power for initial returns of 42.7%. Models '1' and '2' for IPOs listed with ±8% and ±99% ceilings of table 10 explain the regression at 12.8% and 36% respectively. Analytically the results on the coefficients of the two largest samples (regressions '1', '2' of table 9) are presented below.

6.2.1. *Factors analysis*

LBC_i variable measured by a discrete factor, categorising IPOs in the main, the secondary and new market, is positive and highly statistically significant at '1' percent level for the total sample (includes all 349 IPOs). This suggests that firms listed in the main market have a higher level of underpricing. Our result opposes the hypothesis for negative sign and it opposes Uddin (2001), who records that firms listed in the secondary market have higher initial underpricing in relation to the IPOs listed in the main market. The result rejects conjecture one. We do find significant result for the sample, which excludes the financial IPOs. Similar to the study of the whole sample, main market non financial listed IPOs are highly associated with market adjusted initial returns.

The coefficient for AGE_i is negative and highly statistically significant at 1 percent level for the whole sample. This result indicates that IPOs with short history operation before going public are highly associated with short term underpricing. Our result is consistent with Ritter (1984), and Kaneko and Pettway (2003) that younger firms have less public information available than older firms, so they are expected to have higher ex-ante uncertainty and higher level of underpricing. The result confirms conjecture two.

Everything seems to remain unchangeable once we exclude the financial IPOs. Age coefficient remains significant with the expected negative sign. Thus, our result is consistent with the result reported by Kiymaz (2000), indicating that firms with long operating history are associated with lower market adjusted initial return.

The $TLAG_i$ variable in both samples is insignificantly related to the level of underpricing. Negative sign suggests that a short waiting period has a negative impact on the initial underpricing. It gives the information and the sentiment to investors that the issuer of the firm is not sure if they have to go public or not. Our results are inconsistent with Su and Fleisher (1999), who explain that the longer the time of flotation, the more uncertainty is associated with the IPO. Statistical insignificance as well as opposite from the expected sign of time lag makes us reject conjecture three.

During the period of this study there have been a series of privatisations ($PRIV_i$). This was our main motive in using this factor as independent variables and proceeds with testing. The results show that privatisations in Greece are not associated with better short-term returns. The situation does not change even when we exclude the financial IPOs from our initial sample. It seems that the Greek government does not use underpricing as a credible signal in order to attract investors in the state owned firms. This finding is similar to Lyn and Zychowicz (2003) that there is no significant relationship between the magnitude of initial underpricing and PRIV, indicating that it makes no difference whether the public offering is a privatisation or non-privatisation transaction.

The $SIZE_i$ proves to be highly significant at 1 percent level in both our samples. In both cases the sign is positive, which is opposite from the hypothesis indicating that large firms are associated high level of underpricing. Our result opposes the coefficient reported by Kiymaz (2000), indicating an inverse relationship between firm size and underpricing. Similarly we find opposite findings to Keloharju (1993), that a negative abnormal performance is mostly concentrated in small companies, whereas the medium and large size companies have considerably less negative abnormal performance. Obviously we reject conjecture five as both our models opposes the hypothesis for negative relationship between size and underpricing.

The coefficient for demand multiple (DM_i) is positive and significant at '1' percent level. This gives support to our hypothesis that oversubscription is associated with a high level of market adjusted initial returns. This is consistent with Keloharju (1993) and Koh and Walter (1989), who report that demand multiple of IPOs during the offer period is one of the most important determinants of underpricing. The result also gives support to the notion that IPOs of small companies are, indeed, marked by a limited supply of shares, usually lower than the corresponding demand for those shares, leading to significant over-subscription. The results confirm conjecture six.

The coefficient for underwriter's reputation (UR_i) is positive and statistically insignificant in both samples. This opposes the notion defined by Beatty and Ritter (1986), that a prestigious underwriter can help the issuer to get a higher price for its shares. It is in line and supports Beatty and Welch (1996) and Cliff and Dennis (2004) Ljungvist et. al. (2006) that the correlation between underpricing and underwriters reputation has changes signs from negative in the 1970s and 1980s to positive in the 1990s. Our regression results do not give any support to conjecture seven.

Hot/Cold (H/C_i) control variable is positive and significant at '10' percent level indicating that 'hot period' IPOs are associated with higher underpricing. The last means that newly listed firms that go public during 'hot periods' offer higher profits to investors and leave greater amount of money 'on the table'. It is better for small businesses to get listed in the stock exchange during a hot period because otherwise they may have difficulties to complete the offer (adequate subscription). Our evidence contradicts the Ibbotson and Jaffe (1975) findings that companies should choose the cold issue market to go public so that they can gain from higher prices of hot periods. Our evidence clearly supports conjecture eight.

The coefficient for sold ownership (OWN_i) is positive in the case that we consider the Financial IPOs and positive once those are excluded. In both cases the results are statistical insignificant. The result indicates that a high level of sold ownership by the entrepreneurs is associated with high underpricing. This result is consistent with

Allen and Faulhaber (1989) and Ljungqvist and Wilhelm (2002) that we can see the best information about a company's future prospects by the fraction of shares given by owners after the IPO. Conjecture nine is rejected.

The IND_i has the predicted sign in both samples but it is highly insignificant. Our results are consistent with Fernadez *et al* (1993) reporting differences in mean initial returns among industries but mainly the mean difference test does not reveal any statistical significance. The results rejects conjecture ten.

To summarise, the market adjusted initial return (underpricing) in Greece is high for large with short history IPOs that manage to get listed in the Main market of ASE during hot periods with high level of demand multiple. The main difference that occurs once we exclude the financial IPOs is that the period in which firms decide to go public stops being a significant factor.

It could be argued that the above regression results may be sensitive due to the ceiling in the initial performance of the IPOs. To assess this sensitivity, and to ensure even more reliable results, we divide our sample into four periods based on the three changes of regulation for initial day performance. Regressions '1', Table 10 enlightens our study by focusing on the period of ±8% cap (93 IPOs). The adjusted R^2 is 0.128 and F value 2.42. The regression indicates 'DM' and 'IND' variables are statistically significant and consistent with the signs as expected. All other variables, 'LBC', 'AGE', 'TLAG', 'PRIV', 'SIZE', 'UR' and 'OWN' are statistical insignificant.

We continue by selecting all the IPOs that were listed during the price cap period of ±99%. The adjusted R^2 in model '2' is 0.360. The results of the model indicate three variables, 'DM' and 'H/C' are highly significant with the underpricing. The signs in these two variables were to be expected, indicating that among the IPOs listed with upper/lower ceiling of ±99%, firms listed in hot periods with high demand multiple experienced high level of underpricing. The remaining variables prove fruitless in explaining the underpricing level for IPOs which had a price cap of ±99%.

Regressions '3' in table 10 exclude all IPOs listed in ASE under cap regulations (both ± 8% and ± 99% - remain 185 IPOs). The explanatory power of model '3' is high and stands at a level of 76.9%. Model '3' comprises all the explanatory variables affecting underpricing. Six variables, 'TLAG', 'SIZE', 'DM', 'UR', 'H/C' and 'OWN', are statistically significant with underpricing while four more variables, 'LBC', 'AGE', 'PRIV', and 'IND' are statistically insignificant.

When we run model '4' - all firms listed without price cap excluding financial IPOs - the validity of the model falls to 32.1 percent. Firstly, 'DM' variable continues to remain significant being more powerful as a factor. Secondly, 'AGE' of the IPOs by the time they go public becomes a significant variable. Surprisingly 'SIZE' and 'H/C' are no longer a significant variable of underpricing. Finally 'TLAG' and 'IND' factors have the predicted sign without being significant.

Table 9: Results of multivariate regression (enter and step-wise) analysis of cross sectional variation in MAIR as dependent variable for 349 IPOs (298 excluding financial firms) listed on ASE over the 1990-2006 period

(1) MAIR=[(Pi-Po)/Po-(Mii-Mio/Mio)], (2) LBC, Listing Board Classification which gets the value '1' if listed in 'main market', '2' if listed in 'parallel market' and '3' if listed in the 'new market' (3) AGE, Ln (1+AGE) the natural log of the total of one plus the age of the company in years on the listing date, (4) TLAG, Time lag between IPO announcement (the date of prospectus and first day of trading, (5) PRIV, Privatised firms gets the value '1' otherwise '0', (6) Size - market capitalization, log of the total number of outstanding shares after the IPO multiplied by price per share, (7) DM, demand multiple for firm i, (8) UR, Underwriters reputation which gets the value '1' for reputable underwriters and '0' for non reputable, (9) H/C, IPO listed in Hot Periods '1' and IPOs listed during Cold periods gets '0', (10) OWN, proportion of given ownership during the going public process, (11) IND, identify the sector of IPOs. It gets the value '1' if it belongs to industry group, the value '2' if it is a financial firm and the value '3' if belongs to Miscellaneous group.

Specifications	(1) - MAIR	(2 – exclude financial firms)	(3) – IR
Constant	-3.592 (0.000)***	-2.202 (0.028)**	-0.982 (0.327)
LBC	0.139	0.126	0.069
	2.850 (0.004)***	2.401 (0.017) **	1.349 (0.178)
AGE	-0.058	-0.077	-0.049
	-1.753 (0.005)***	-2.094 (0.037)**	-1.465 (0.143)
TLAG	-0.033	-0.050	-0.050
	-0.909 (0.364)	-1.292 (0.197)	-1.281 (0.201)
PRIV	-0.018	-0.008	0.000
	-0.905 (0.366)	-0.475 (0.635)	-0.005 (0.996)
SIZE	0.128	0.101	0.050
	3.587 (0.004)***	2.676 (0.007)***	1.311 (0.190)
DM	0.564	0.556	0.581
	5.314 (0.000)***	4.947 (0.000)***	5.547 (0.000)***
UR	0.016	0.023	0.012
	0.355 (0.722)	0.464 (0.643)	0.262 (0.793)
H/C	0.091	0.079	0.151
	1.687 (0.092)*	1.341 (0.181)	2.778 (0.005)***
OWN	0.043	0.012	0.029
	1.461 (0.145)	0.282 (0.778)	0.898 (0.369)
IND	-0.63	-0.042	-0.052
	-1.489 (0.137)	-0.867 (0.386)	-1.224 (0.221)
R^2	0.422	0.405	0.443
R^2 Adjusted	0.405	0.384	0.427
F-value	24.29	19.20	26.49
N	349	292	349

Table 10: Results of multivariate regression analysis of cross sectional variation in MAIR as dependent variable for IPOs listed with ±8% ±99% and without ceiling during 1990-2006

(1) all IPOs listed on ASE excluding period of cap ±8%, (2) all IPOs listed on ASE excluding period of cap ±100% (3) all IPOs listed without any ceiling (4) all IPOs listed without any ceiling excluding financial firms. Model (1) to (4) includes the explanatory variables as stated in table 9. T-values are calculated using the standard errors corrected for heteroskedasticity using the procedure described by White (1980). The asterisks *, **, *** indicate the level of significance at 1, 5 and 10 percent respectively.

Specifications	1 – (IPOs listed with ±8%)	2 – (IPOs listed with ±99%)	3 – (IPOs listed without any ceiling	Ex financial IPOs
Constant	0.327 (0.744)	-1.107 (0.273)	1.367 (0.173)	-0.452 (0.651)
LBC	-0.022	0.248	-0.014	0.112
	-0.162 (0.871)	1.417 (0.163)	-0.465 (0.642)	1.591 (0.113)
AGE	-0.045	-0.022	0.000	-0.098
	-0.333 (0.739)	-0.187 (0.852)	0.013 (0.989)	-2.058 (0.041)**
TLAG	-0.071	-0.010	0.073	0.020
	-0.632 (0.529)	-0.108 (0.914)	2.451 (0.015)**	0.370 (0.711)
PRIV	0.058	0.055	0.024	-0.007
	0.664 (0.508)	0.902 (0.330)	1.008 (0.314)	-0.240 (0.810)
SIZE	-0.002	0.078	-0.066	0.024
	-0.012 (0.990)	0.724 (0.472)	-2.208 (0.028)**	0.488 (0.626)
DM	0.415	0.581	0.329	0.562
	3.961 (0.000)***	5..831 (0.000)***	1.858 (0.064)*	4.281 (0.000)***
UR	0.076	-0.207	0.091	0.069
	0.782 (0.436)	-2.061 (0.441)**	1.769 (0.078)*	0.955 (0.341)
H/C		0.139	0.117	-0.028
	-	3.601 (0.007)***	2.758 (0.006)***	-.425 (0.671)
OWN	-0.034	0.169	0.602	-0.030
	-0.294 (0.769)	1.415 (0.161)	3.233 (0.001)***	-0.084 (0.933)
IND	-0.208	-0.045	-0.018	-0.040
	-2.141 (0.035)**	-0.491 (0.615)	-0.503 (0.615)	-0.679 (0.498)
R^2	0.218	0.458	0.781	0.366
R^2 Adjusted	0.128	0.360	0.769	0.321
F-value	2.42	4.67	63.75	8.11
N	93	71	185	151

Table 11: Results of regression analysis (including risk factor) of cross sectional variation in MAIR as dependent variable for IPOs listed during 1990-2006

(1) All IPOs listed in ASE (2) all IPOs listed on ASE excluding period of cap ±8%, (3) all IPOs listed on ASE excluding period of cap ±100% (4) all IPOs listed without any ceiling (5) all IPOs excluding financial firms (6) RISK variable measured as the standard deviation of returns in the first month of trading. T-values are calculated using the standard errors corrected for heteroskedasticity using the procedure described by White (1980). The asterisks *, **, *** indicate the level of significance at 1, 5 and 10 percent respectively.

Specifications	1 – (All IPOs listed in ASE)	2 – (IPOs listed with ±8%)	3 – (IPOs listed with ±99%)	4 – (IPOs without any ceiling)	5 - Ex financial IPOs
Constant	2.451 (0.014)**	0.176 (0.860)	0.912 (0.365)	1.182 (0.239)	-0.900 (0.368)
LBC	0.052	0.024	0.018	-0.012	0.080
	-0.859 (0.390)	-0.081 (0.935)	0.111 (0.911)	-0.388 (0.698)	1.823.(0.069)*
AGE	0.030	-0.11	0.051	0.017	-0.038
	1.759 (0.079)*	-0.347 (0.729)	0.461 (0.646)	0.582 (0.561)	-1.126.(0.261)
TLAG	-0.027	-0.046	-0.030	0.061	-0.051
	-1.967 (0.050)*	-0.772 (0.442)	-0.330 (0.742)	2.112 (0.036)**	-1.744 (0.082)*
PRIV	-0.005	0.073	0.041	0.026	-0.003
	0.870 (0.385)	0.835 (0.406)	-1.254 (0.252)	1.169 (0.244)	.-0.299 (0.818)
SIZE	0.010	0.005	-0.118	-0.068	0.036
	-2.82 (0.005)***	0.032 (0.974)	-1.040 (0.302)	-2.201 (0.029)**	1.004 (0.316)
DM	0.138	0.406	0.380	0.178	0.283
	1.835 (0.067)*	3.845 (0.002)***	2.827 (0.006)***	1.253 (0.211)	2.469.(0.141)**
UR	0.014	0.084	-0.121	0.062	0.026
	0.177 (0.640)	0.833 (0.407)	-1.031 (0.307)	1.431 (0.154)	0.520 (0.603)
H/C	0.020		0.095	0.109	0.017
	1.858 (0.064)*	-	2.434 (0.018)**	2.725 (0.007)***	.0.336 (0.737)
OWN	0.021	-0.023	-0.024	0.254	0.004
	0.163 (0.870)	-0.200 (0.842) ()	-0.247 (0.806)	1.269 (0.206)	.0.109 (0.913)
IND	-0.072	-0.211	-0.095	-0.050	-0.068
	-2.412 (0.016)**	-2.169 (0.033)**	-0.976 (0.334)	-1.400 (0.163)	-1.508.(0.132)
RISK	0.731	0.084	0.397	0.524	0.475
	14.72 (0.000)***	0.897 (0.372)	2.867 (0.005)***	3.392 (0.009)***	.3.229 (0.001)***
R^2	0.782	0.224	0.525	0.839	0.532
R^2 Adjusted	0.77	0.124	0.428	0.829	0.513
F-value	107.48	2.23	5.44	83.30	28.69
N	341	93	71	185	289

7. Conclusion

This study aims to examine the performance of IPOs under price cap restrictions in Greece by providing unique evidence from this small-developed market and also to scrutinize the factors that might be effective on the performance under this price cap limitation. Specifically, using a sample of 349 IPOs launched on the Athens Stock Exchange over the 1990-2006 period, this study documents average first day adjusted initial return of 34.6% and raw first day initial return slightly lower at 34.24%. We have made clear in this study that the first day closing prices of new issues were not representative of investors' demand and as a result in no way reflected the equilibrium market price of IPOs formed at the day of entry to the stock market.

The actual initial premium returns that investors earned from new issues require the first day returns to be accumulated over the number of consecutive days when the price cap was triggered. The new figure, after the accumulated average market-adjusted under-pricing, is 52.92 percent. This result is consistent with the empirical evidence presented on the main European markets (Loughran *et al* (1994, updated 2007)). The raw initial return is 54.17 percent; higher than the last evidence of 51.7% by Kazantzis and Thomas (1996) for the Athens Stock Exchange.

We observe that institutional changes (price cap) played an important role in the setting of the closing price of IPOs after their listing in the stock market and seriously affected the initial returns taken from the new issues in the IPO market. The results suggest that price cap changes affects positively the first day IPO returns taken from investors participated in the IPO Greek market. There is evidence that the first day prices of new stocks in the market did not reflect the exact equilibrium market prices as the investors demand reveals. The final equilibrium was formed afterwards because of the limits in the daily price movements.

Focus on annual underpricing for the seventeen years of our study shows that the average adjusted underpricing for 1999 was 219.18% while this figure dropped down to 37.85% for 2001. On the other hand, industry categorization reveals that 'Media/TV' companies experience the highest underpricing in the ASE with 70.05% followed by 'industrial mineral', while 'investment' IPOs present the lowest adjusted initial returns with 2.00%.

We specify a model containing variables suggested by conjectures drawn from empirical literature of short-term performance. The model explains 40.5 percent of the underpricing phenomenon in Greece (exclusion of 'Finance IPOs' reduces explanatory power to 38.4 percent). The results of multivariate regression reveal that listing board classification, age, size, demand multiple and hot environment during the period of going public, are statistically significant variables. All the above except size variable have consistent sign with the coefficients predicted in the hypotheses. When financial IPOs are excluded from the sample, 'H/C' cease to be a significant variable while 'LBC' and 'AGE' remains significant factor at 5 percent level.

The evidence for 'H/C' periods indicates that the Greek market may be susceptible to the type of heightened and periodic investors' interest compatible with the insights provided by Ibbotson (1975), Ibbotson and Jaffe (1975), Ritter (1984), and Lynn and Zychowitz (1995). Our finding is also consistent with Loughran and Ritter (2002), that the performance of the stock market prior to initial offering is significantly related to the level of underpricing.

Testing on three partial samples, namely 'IPOs listed in periods without caps of ±8%', 'IPOs listed in periods without caps of ±99%' and 'IPOs listed without any price cap', reveals different results. In the case of 'IPOs listed in periods with price cap of ±8%' demand multiple and industry classification are the two variables that remain significant. All the remaining control variables proves insignificant and most of them appear to have unexpected signs.

To understand the Greek IPO market in depth, further examination can contribute to the study of allocation of shares through bookbuilding mechanism. Second, it is worth making a comparative study between costs (gross spread) and indirect costs (initial underpricing offered by the issuer - money spent by the underwriters to attract investors). Third, although precise and reliable information on the percentage of foreign participation in each offering for Greece is not available, it may be interesting to investigate the impact of foreign participation on the degree of underpricing. Dunbar's (2000) suggestion that underwriters are punished by subsequent loss of underwriting market share raises a very interesting issue that needs further investigation. Finally, the effect of IPO lockup expiration date on stock price in Greece will shed some light on the IPOs, which are advantaged by price support mechanism.

References

Affleck-Graves, J., S. Hedge, and R. Miller, 1996, Conditional price tends in the aftermarket for initial public offerings, *Financial Management* 25, 25-40.

Aggarwal, R., 2003, Allocations of Initial public offerings and flipping activity, *Journal of Financial Economics* 68, 111-158.

Allen, F. , and G. Faulhaber, 1989, Signaling by underpricing in the IPO market, *Journal of Financial Economics* 23, 303-323.

Alvarez, S., and V. Gonzalez, 2005, Signaling and the Long-run performance of Spanish Initial Public Offerings (IPOs), *Journal of Business Finance & Accounting* 32, 325-349.

Amihud, Y., and H Mendelsen, 1986, Asset pricing and the bid ask spread, *Journal of Finacial Economics* 17, 223-249.

Amihud, Y., H. Samuel, and K. Amir, 2003, Allocations, adverse selection and cascades in IPOs: Evidence from the Tel Aviv Stock Exchange, *Journal of Financial Economics* 68, 137-158.

Ansetegui, C., and J. Fabregat, 2000, Initial public offerings on the Spanish Stock Exchange, *Working Paper, ESADE*.

Arosio, R., G. Guidici, and S. Paleari, 2000, What drives the initial market performance of Italian IPOs? An empirical investigation on underpricing and price support, *2000 FMA Annual Meeting, Seattle*.

Arosio, R., G. Guidici, and S. Paleari, 2000, Why do internet stock IPOs leave so much money on the table, *SSRN Working Paper*.

Aussenegg, W., 1999, Going public in Poland: Case-by-case privatizations, mass privatization and private sector Initial Public Offerings, *working paper*.

Banz, R., 1981, The relationship between return and market value of common stocks, *Journal of Financial Economics* 9, 3-18.

Beatty, R., and J. Ritter, 1986, Investment banking, reputation, and the underpricing of initial public offerings, *Journal of Financial Economics* 15, 213-232.

Beatty, R., and I. Welch, 1996, Issuer expenses and legal liability in Initial Public Offerings, *Journal of Law and Economics* 34, 542-602.

Benveniste, L., W. Busaba, and W. Wilhelm, 2002, Information externalities and the role of underwriters in primary equity markets, *Journal of Financial Intermediation* 11, 61-86.

Benveniste, L., A. Ljungqvist, Wilhelm Jr., and X. Yu, 2003, Evidence of information spillovers in the production of investment banking services,, *Journal of Finance* 58, 577-608.

Booth, J., and D. Deli, 1996, Factors affecting the number of outside directorships held by CEOs, *Journal of Financial Economics* 40, 81-104.

Bosveld, R., and M. Vanneman, 2000, Initial public offering on the Amsterdam Stock Exchange, *Working Paper* NUON and Boston Consulting Group.

Brennan, M. , and J. Franks, 1995, Underpricing, ownership and control in initial public offerings of equity securities in the UK, *Journal of Financial Economics* 45, 391-413.

Brounen, D., and P. Eichholtz, 2002, Initial Public Offerings: Evidence from the British French and Swedish property share markets, *Journal of Real Estate Finance & Economics* 24, 103.

Capital Market Commission, 2002, Annual Report of 2002, (Athens).

Carter, B., F. Dark, and R. Singh, 1998, Underwriter reputation, initial returns, and the long run performance of IPO stocks, *Journal of Finance* 53, 285-311.

Carter, B., and S. Manaster, 1990, Initial Public Offerings and the underwriter reputation, *Journal of Finance* 45, 1045-1067.

Chahine, S., 2002, Ex-Ante uncertainty and gross spreads for small and medium sized IPOs, *European Financial Management Association Conference, Helsinki 24-28 June*.

Chen, Z., J. Choi, and C. Jiang, 2007, Corruption in State Owned Firms: Evidence from China's IPOs." *working paper, Temple University*.

Chowdhry, B., and A. Sherman, 1996, International differences in oversubscription and underpricing of IPOs, *Journal of Corporate Finance* 2, 359-381.

Clarckson, P., and J. Merkley, 1994, Ex Ante uncertainty and the underpricing of IPO's: Further Canadian evidence, *Canadian Journal of Administrative Sciences* 11, 54-67.

Cliff, M , and D. Denis, 2004, Do Initial Public Offering Firms Purchase Analyst Coverage with Underpricing?, *Journal of Finance* 59, 2871-2901.

Derrien, F., and K. Womack, 2003, Auction vs Book-building and the control of underpricing in Hot IPO markets, *Review of Financial Studies* 16, 31-61.

Drobetz, W., M. Kammermann, and U. Waelchli, 2003, Performance of Initial Public Offerings: The evidence from Switzerland, *Working Paper, University of Basel*.

Dunbar, C., 2000, Factors affecting investment bank initial public offering market share, *Journal of Financial Economics* 55, 3-41.

Fernadez, P., E. Martinez-Abascal, and A. Rahnema, 1993, Initial Public Offerings: The Spanish experience, *Working paper*.

Fidrmuc, J. , M. Goergen, and L. Renneboog, 2006, Insider Trading, News Releases and Ownership Concentration, *Journal of Finance* 61, 2931-2973.

Finn, M., and R. Higham, 1988, The performance of unseasoned new equity issues-cum stock exchange listing in Australia, *Journal of Banking & Finance* 12, 333-351.

Florio, M., and K. Manzoni, 2004, Abnormal returns of UK privatizations: from underpricing to outperformance, *Applied Economics* 36, 119-136.

Fung, Y., F. Gul, and S. Radhakrishnan, 2004, Investment banks repeated IPO business opportunities and IPO underpricing, *Working Paper*.

Gajewski, J., and C. Gresse, 2006, A survey of the European IPO Market, *Working Paper*.

Giudici, G., S. Paleari, and R. Redondi, 2004, IPO underpricing in Italy, *Applied Financial Economics* 14, 170-194.

Giudici, G., and P. Roosenbloom, 2002, Pricing initial public offerings in Europe: What has changed?, European Financial Management Association (London).

Gounopoulos, D., C. Nounis, and P. Stylianides, 2008, Short and Long term performance of IPOs in Cyprus Stock Exchange, *Journal of Financial Decision Making* 4.

Guidici, G. , and S. Paleari, 1999, Underpricing, Price Stabilization and Long Run Performance in

Initial Public Offerings: A Study on the Italian Stock Market Between 1985 and 1998, *SSRN Working Paper*.

Habib, M., and A. Ljungqvist, 2001, Underpricing and entrepreneurial wealth losses in IPOs; theory and evidence, *Review of Financial Studies* 14, 433-458.

Husson, B., and B. Jacquillat, 1988, French new issues, underpricing and the alternative methods of distribution, *NATO Advanced research workshop*.

Ibbotson, R. , J. Sindelar, and J.. Ritter, 1994, Initial Public Offerings, *Journal of Applied Corporate Finance* 1, 37-45.

Ibbotson, R., and J. Jaffe, 1975, Hot Issue Markets, *Journal of Finance* 30, 1027-1042.

Ibbotson, R., and J. Ritter, 1995, Initial Public Offerings, in R. Jarrow, V. Maksimovic, and W. Ziemba, eds.: *Handbooks of Operations Research and Management Science* (North-Holland, Amsterdam).

Ibbotson, R.. 1975, Price performance of common stock new issues, *Journal of Financial Economics* 2, 235-272.

Ihm, B., 1997, Initial returns in Seoul Stock Exchange, *Korean Journal of Financial Management*.

Jakobsen, J.., and O. Sorensen, 2001, Decomposing and testing Long-Run returns - with an application to Initial Public Offerings in Denmark, *Working paper from Copenhagen Business School, Department of Finance*.

Jenkinson, T., A Morrison, and Wilhelm J., 2005, Why are European IPO's so rarely priced outside the indicative price range?, *Journal of Financial Economics*.

Jog, V., and Riding L., 1987, Underpricing in Canadian IPO's, *Financial Analysis Journal* 48-54.

Jog, V., and A. Siristrava, 1994, Underpricing of Canadian Initial public offerings 1971-1992, *Journal of Financial Analysts* 81-89.

Johnson, J., and R. Miller, 1988, Investment banker prestige and the underpricing of initial public offerings, *Financial Management* 17, 17-29.

Kaneko, T., and R. Pettway, 2003, Auctions versus book building of Japanese IPOs, *Pacific-Basin Finance Journal* 11, 439-462.

Kazantzis, C., and M. Levis, 1995, Price support and initial public offerings: evidence from Athens Stock Exchange, *Journal in International Business and Finance* 12, 185-200.

Kazantzis, C., and D. Thomas, 1996, The IPO Puzzle and institutional constraints: Evidence form Athens Stock Market, in M. Levis, ed.: *Empirical Issues in raising equity capital* (Amsterdam: Elsevier).

Keasey, K., and Short H., 1992, The underpricing of initial public offerings: some UK evidence, *International Journal of Management Sciences* 429-448.

Keloharju, M., 1993, The winner's curse, legal liability, and the long-run price performance of initial public offerings in Finland, *Journal of Financial Economics* 34, 251-277.

Kiem, D., 1983, Size-Related anomalies and stock returns seasonality, *Journal of Financial Economics* 12, 13-32.

Kim, M., and J. Ritter, 1999, Valuing IPOs, *Journal of Financial Economics* 53, 409-437.

Kiymaz, H., 2000, The initial and aftermarket performance of IPOs in an emerging market: evidence from Istanbul stock exchange, *Journal of Multinational Financial Management* 10, 213-227.

Koh, F., and F. Walter, 1989, A direct test of Rock's model of the pricing of unseasoned issues, *Journal of Financial Economics* 23, 251-272.

Kooli, M., and J. Suret, 2001, The underpricing of initial public offerings: Further Canadian Evidence, *Cirano, Montreal*.
Kooli, M., and J. Suret, 2002, The underpricing of initial public offerings: Further Canadian Evidence, *Cirano, Montreal*.
Kryzanowski, L. , S. Lazrak, and I. Rakita, 2006, The Behavior of Prices, Trades and Spreads for Canadian IPOs., *Multinational Finance Journal* 7.
Kunz, M., and R. Aggarwal, 1994, Why initial public offerings are underpriced: evidence from Switzerland, *Journal of Banking & Finance* 18, 705-723.
Lee, P., S. Taylor, and T. Walter, 1996, Expected and realised returns for Singaporean IPOs: Initial and long-run analysis, Pacific-Basin Finance Journal.
Lee, Philip J., Stephen L. Taylor, and Terry S. Walter, 1996, Australian IPO pricing in the short and long-run, *Journal of Banking & Finance* 20, 1189-1210.
Leland, H., and D. Pyle, 1977, Information Asymmetry, financial structure and financial structure intermediaries, *Journal of Finance* 32, 317-387.
Leleux, B., and D. Muzyka, 1997, European IPO markets: The post-issue performance imperative, *Entreupreneurship: Theory and Practice* 21, 111-118.
Ljungqvist, A., 1996, Can Firms Outwit the Market? Timing Ability and the Long Run Performance of IPOs", in M. Levis, ed.: *Empirical Issues in Raising Equity Capital.* (North Holland, Amsterdam).
Ljungqvist, A., 1999, IPO underpricing wealth losses and the curious role of venture capitalists in the creation of Pubic Companies, *Working Paper* Said School of Business, Oxford.
Ljungqvist, A., 2005, IPO underpricing, in B. Eckbo, ed.: *Handbook of Empirical Corporate Finance* (North-Holland).
Ljungqvist, A., F. Marston, and W. Wilhelm, 2006, Competing for securities underwriting mandates: Banking relationships and analyst recommendations, *Journal of Finance* 61.
Ljungqvist, A., V. Nanda, and Singh A., 2001, Hot markets, investor sentiment, and IPO pricing, *Journal of Business, forthcoming.* 79.
Ljungqvist, A., and Jr. Wilhelm, W., 2002, IPO allocations: discriminatory or discretionary?, *Journal of Financial Economics* 65, 167-201.
Ljungqvist, A., and X. Yu, 2003, Stock market development, liquidity and corporate governance, *Working Paper, New York University*.
Loughran, T., and J. Ritter, 2002, Why don't issuers get upset about leaving money on the table of IPOs?, *Review of Financial Studies* 15, 413-443.
Loughran, T., J. Ritter, and K. Rydqvist, 1994, updated 2007, Initial public offerings: International insights, *Pacific-Basin Finance Journal* 2, 165-199.
Lowry, M., and W. Schwert, 2002, IPO market cycles: Bubbles or sequential learning, *Journal of Finance* 57, 1171-1200.
Lyn, E. , and E. Zychowicz, 2003, The performance of new equity offerings in Hungary and Poland, *Global Finance Journal* 14, 181-195.
Lynn, M., and P. McGuiness, 1995, The incidence nature and impact of extraordinary items on earnings: An explanatory study for Hong Kong, *The International Journal of Accounting* 30, 62-82.
Ma, S., and R. Faff, 2007, Market conditions and the optimal IPO allocation mechanism in China, *Pacic-Basin Finance Journal* 15, 121-139.
Marisetty, V. , and M. Subrahmanyam, 2005, Group Affiliation and the Performance of Initial Public Offerings in the Indian Stock Market, *NYU working paper*.
Mello, A., and J. Parson, 1998, Going public and the ownership structure of the firm, *Journal of Financial Economics* 49, 79-109.
Nazir, N.., and R.. Zin, 1998, An examination of the underpricing of Initial Public Offerings (IPOs) in Malaysia: 1990-1995, *Finance Conference* Kuala Lumpur, Malaysia.
Nounis, C., 2000, The difference between the listing and equilibrium Price of Initial Public Offerings of common stocks in Athens Stock Exchange, 1994-1998, *Economic Review, Commercial Bank of Greece* 24, 38-49.
Otero, S., and A. Fernandez, 2003, Initial Public Offerings: The Spanish Case, *Working Paper, Oviedo University*.
Papaioannou, N., and G. Travlos, 1995, New listings in the Athens Stock Exchange: A theoretical and empirical analysis. The Greek Financial System-Trends and Perspectives., *Foundation for Economic & Industrial Research – Alpha Bank* 215-278.
Pham, P., P. Kalev, and A. Steen, 2003, Underpricing, stock allocation, ownership structure and post-listing liquidity of newly listed firms, *Journal of Banking & Finance* 27, 919-947.
Reinganum, M., 1981, Misspecification of capital asset pricing: Empirical anomalies based on earnings, yields and market value, *Journal of Financial Economics* 9, 19-46.

Ritter, J., 1984, The hot issue market of 1980, *The Journal of Business* 57, 215-240.
Ritter, J., 1997, Initial Public Offerings, in D. Logue, and J. Seward, eds.: *Warren Gorham & Lamont Handbook of Modern Finance*.
Rocholl, J., 2005, Initial Returns in German Stock Market, *Working paper, University of North Carolina*
Rogiers, B., S. Manigart, and H. Ooghe, 1993, Emprisish Onderrzoek naar Undepricing van Beursintroducties op de Beurs van Brussel, *working paper*.
Rydqvist, K., 1993, Initial public offering in Sweden, *Working Paper, Stockholm School of Economics*.
Rydqvist, K., 1997, IPO underpricing as tax-efficient compensation, *Journal of Banking & Finance* 21, 295-313.
Rydqvist, K., and K. Hogholm, 1995, Going public in the 1980s: evidence from Sweden, *European Financial Management* 1, 287-315.
Schlag, C., and A. Wodrich, 2004, Has There Always Been Underpricing and Long-Run Underperformance? - IPOs in Germany Before World War I.
Schuster, J., 2002, The cross section on European IPO return, *European Financial Management Association Conference, London 2002*.
Schuster, J., 2003, IPO's insight from seven European countries, *Financial Markets Group*.
Stoughton, N., and J. Zechner, 1998, IPO Mechanism, monitoring and ownership structure, *Journal of Financial Economics* 49, 45-77.
Su, D., and B. Fleisher, 1998, Explaining IPO initial returns in China, *Emerging Market Quarterly* 2, 1-16.
Su, D., and B. Fleisher, 1999, An empirical investigation of underpricing in Chinese IPO's, *Pacific-Basin Finance Journal* 7, 173-202.
Tian, L., and W. Megginson, 2006, Extreme Underpricing: Determinants of Chinese IPO Initial Returns", *Peking University and University of Oklahoma working paper*.
Tsangarakis, N., 2004, The price performance of Initial Public Offerings in Greece, *Managerial Finance* 30.
Uddin, W., 2000, IPO Initial Underpricing in Malaysia: The effect time lag, 7th Asia Pacific Finance Association.
Uddin, W., 2001, Performance of 207 IPOs in KLSE, *Working paper, Singapore University*.
Welch, I., and J. Ritter, 2002, A review of IPO activities, pricing and allocation, *Journal of Finance* 57, 1795-1828.
White, H., 1980, Heteroskedasticity-consistent covariance matrix estimator and a direct test of heteroskedasticity, *Econometrica* 48, 817-838.
Yong, O., 1995, Initial Public Offerings: the Malaysian Experience: 1990-1994, *University of Kebangsaan, Malaysia*.
Zarowin, P., 1990, Size, Seasonality and Stock market overreaction, *Journal of Financial and Quantitative Analysis* 25, 113-125.