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The Long-Run Performance of Firms Going Public

M.Sc. Financial Analysis for Executives

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SUMMARY

Numerous studies have documented an underperformance of firms going public during the first years of their public trading. The aforementioned underperformance can be attributed, among other reasons, to informational inefficiency of the IPO market, the adoption of discretionary accruals adjustments by firms which report unusual high earnings, investor sentiment and over-optimism, the underpricing phenomenon and various other reasons. We have to keep in mind that, since asset pricing literature has not provided us with a model that can accurately and credibly measure risk-adjusted post-IPO performance, we cannot account for the long-run performance of IPOs with certainty. In the research that follows I use three measures to calculate long-run performance; average market-adjusted returns, median market-adjusted returns and cumulative market-adjusted returns.

The purpose of this dissertation is to investigate and try to identify if such an anomaly is present. The results of the research conducted in this dissertation will be compared and contrasted with the findings of previous work and research documented.

The structure of the dissertation is as follows: in the first part several basic elements and concepts of an initial public offering are documented. In the second part is a literature review where various past studies are presented. The third part describes the methodology used to reach a result about the long-run performance of IPOs while the fourth part presents these results. Also, this part contains comparison of the findings with the documented results of the IPO-literature. The fifth and last part of the dissertation puts forward the conclusions of the dissertation along with a brief summary of the results.

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1. INTRODUCTION

Most businesses begin life as proprietorships or partnerships, and if they become successful and grim, at some point they find it desirable to become corporations. Initially, most corporate stock is owned by the firms' founding managers and key employees. Even start-up firms that are ultimately successful usually begin with negative free cash flows due to their high growth rates and product development costs hence; they must raise capital during these high-growth years. If the founding owners have invested all of their own financial resources in the company they must turn to outside sources of capital. Start-up firms generally have high growth opportunities relative to assets-in-place and they suffer from especially large problems with asymmetric information. Therefore, they must raise external capital primarily as equity rather than debt. In the United States of America in order for investors to be protected from fraudulent stock issues, in 1933 Congress enacted the Securities Act, which created the Securities and Exchange Commission (SEC) to regulate the financial markets. The Securities Act regulates interstate public offerings but it also provides several exemptions that allow companies to issue securities through private placements that are not registered with the SEC.

For most start-ups, the first round of external financing comes through a private placement of equity to one or two individual investors called *"angles"*. In return for a typical investment in the range of $50,000 to $400,000, the angels receive the stock and perhaps also a seat on the board of directors. Because the angles can influence the strategic direction of the company, it is best that they bring experience and industry contacts to the table not just cash.

As the company grows, its financing requirements may exceed the resources of individual investors, in which case it is likely to turn to a venture capital fund. A venture capital fund is a private limited partnership, which typically raises $30 million to $80 million from a relatively small group of primarily institutional investors, including pension funds, college endowments, and corporations. The managers of venture capital fund called venture capitalist or VCs are usually very knowledgeable and experienced in a particular industry, such as health care. A venture capital fund is an investment fund that manages money from investors seeking private equity stakes in startup and small- and medium-size enterprises with strong growth potential. These

investments are generally characterized as high-risk/high-return opportunities. The venture capital fund usually has a pre-specified life of 7-10 years after which it is dissolved either by selling the portfolio companies' stock and distributing the proceeds to funds' investors or by directly distributing the stock to the investors.

1.2. THE DECISION TO GO PUBLIC

Going public is a monumental decision for any company. It forever changes how a company goes about doing business. A public company has access to more, and often deeper, sources of capital than a private company. The actual process of going public can be time-consuming and presents certain unique challenges that a company should be prepared to undertake. Going public means selling some of a company's stock to outside investors and then letting the stock trade in public markets. It is the process of offering securities — generally common stock — of a privately owned company for sale to the general public. The first time these securities are offered is referred to as an initial public offering, or IPO. An initial public offering is a transformational event for an organization. The preparation for "being public" is just as important as the preparation for "going public." A company will need to meet additional requirements and continuing obligations as a public company that may require new skill sets, additional resources and changes to the business.

A company usually begins to think about going public when the funding required to meet the demands of its business begins to exceed the company's ability to raise additional capital through other channels at attractive terms. But simply needing capital does not always mean that going public is the right, or even possible, answer.

Generally, a company that outpaces the industry average in growth will have a better chance of attracting prospective investors than one with marginal or inconsistent growth. Investment bankers want the offering that they underwrite to be successful. Therefore, they look for companies that can fulfill several tried and true criteria to boost the chances for a successful offering and good performance in the aftermarket. Here are some of the most important factors:

- An attractive product or service, preferably one with a competitive advantage and sufficiently large market

- An experienced management team

- A positive trend of historical financial results

- Favorable financial prospects

- A well-thought-out, focused business plan

- Strong financial, operational, and compliance controls

To gain credibility with the investing public, the organization must have experienced leadership that functions well as a team. Ownership by management demonstrates to investors that it has a vested interest in the company's future. To have a successful IPO, management must be committed to the time and effort involved in meeting registration requirements, conducting analyst and other investor-facing meetings, and providing financial reports required by both the SEC and shareholders on a timely basis. It must also be prepared to upgrade the company's system of management controls and financial reporting well in advance of the offering to ensure compliance with full disclosure requirements and shorter financial reporting deadlines, both of which are necessary to maintain credibility and investor confidence after the IPO.

Selling equity represents a permanent forfeiture of a portion of the returns associated with corporate growth. Also, raising equity capital in the public markets can entail substantial costs, such as underwriting and other advisors' fees and expenses. The advantages and disadvantages of going public are discussed below:

- Increases liquidity and allows founders to harvest their wealth. The stock of private or closely held, corporations is illiquid. It may be hard for one of the owners who want to sell some of his/hers shares to find a ready buyer and even if a buyer is located, there is no established price on which to base the transaction.

- Permits founders to diversify. As accompany grows and becomes more valuable, its founders often have most of their wealth tied up in the company. By selling some of their stock in a public offering, they can diversify their holdings, thereby reducing the riskiness of their personal portfolios.

- Facilitates rising new corporate cash. If a privately held company wants to raise cash by selling new stock it must either go to its existing owners, who

may not have any money or may not want to put more money into the same company. However it is usually quite difficult to get outsiders to put money into a closely held company, because if the outsiders do not have voting control (more than 50% of the stock), the inside stockholder can take advantage of them. Going public which brings with it both public disclosure of information and regulation by the SEC, reduces this problem and thus makes people more willing to invest in the company which makes it easier for the firm to raise capital.

- Establishes a value for the firm. If a company wants to give incentive stock options to key employees, it is useful to know the exact value of those options, and employees much prefer to own stock, options of stock that is publicly traded and therefore liquid. Also, when the owner of a privately owned business dies, state and federal tax appraisers must set a value on the company for estate tax purposes. Often, these appraisers set a higher value than that of a similar publicly traded company.

- Facilitates merger negotiations. Having an established market price helps when a company is either being acquired or seeking to acquire another company where it will pay for the acquisition with stock.

- Increases potential markets. Many companies report that it is easier to sell their products and services to potential customers after they have become publicly traded company.

Although going public benefits a company in the aforementioned ways it also has disadvantages. Some of these disadvantages are listed below.

- Cost of reporting. A publicly owned company must file quarterly and annual reports with the SEC and various state agencies. These reports can be a costly burden, especially for small firms.

- Disclosure. Management may not like the idea of reporting operating data, because these data will then be available to competitors. Similarly the owners of the company may not want people to know their net worth, and since a publicly owned company must disclose the number of shares owned by its officers, directors and major stockholder, it is easy enough for anyone to

     multiply shares held by the price per share to estimate the net worth of insiders.

- Self-dealings. The owners-managers of closely held companies have may opportunities for various types of questionable but legal self-dealings, including the payment of high salaries, nepotism, personal transactions with the business. Such self-dealings, which are often designed to minimize their personal tax liabilities, are much harder to arrange if a company is publicly owned.

- Inactive market/low price. If the firm is very small and if its shares are not traded frequently its stock will not really be liquid and the market price may not represent the stock's true value. Security analysts and stock brokers simply will not follow the stock because there will not be sufficient trading activity to generate enough brokerage commissions to cover the costs of following the stock.

- Control. Because of possible tender offers and proxy fights, the managers of publicly owned firms who do not have voting control must be concerned about maintaining control. Further, there is pressure on such managers to produce annual earnings gains, even when it might be in the shareholders' best long-term interests to adopt a strategy that reduces short term earnings but raises them in future years. These factors have led a number of public companies to go private in leveraged buyout deals where the managers borrow the money to buy out the non-management stockholders.

- Investor relations. Many CFOs of newly public firms report that they spend two full days a week talking with investors and analysts

There are no hard-and-fast rules regarding if or when a company should go public. This is an individual decision that should be made on the basis of the company's and stockholders' own unique circumstances. If a company does decide to go public, either by selling newly issued stock to raise new capital or by the sale of stock by the current owners the key issue is setting the price at which shares will be offered to the public. The company and its current owners should want to set the price as high as possible. The higher the offering prices the smaller the fraction of the company the current owners will have to give up to obtain any specified amount of money. On the other hand potential buyers want the price set as low as possible

The demand for initial public offerings can vary dramatically, depending on overall market strength, the market's opinion of IPOs, industry economic conditions, technological changes, and many other factors. Stock market volatility is one of the most unpredictable aspects of going public and it makes timing the IPO key in achieving the best possible result. Although it is impossible to accurately forecast the market's mood, a company must consider the importance of timing and be prepared to alter its timetable. When a bull market is booming, the market window for new corporate offerings tends to open and these new offerings enjoy bursts of popularity.

In a declining market, however, the market window tends to close and IPO activity slows down and may even come to a stop. A company must consider the importance of timing and be prepared to alter its timetable. In general, from the initial meeting of all of the team members until the first filing, it can take at least three months (under the best circumstances), although the timeframe from the first filing to the effective date can be significantly longer. At any time, an IPO window may be open for companies within certain favored industries and sometimes the window may be open for companies in all industries. Missing an IPO window by as little as a few weeks can result in a postponed or withdrawn IPO or a lower market valuation. Accordingly, in addition to reviewing how companies in a specific industry are faring, a company should also look at valuations in the overall market. Hot markets accept many offerings, but companies do not want to be the deal that is just one day too late. Recognizing the urgency of the registration process is critical. Even in a slower market environment, there is what is referred to as an "industry pop" or "industry flurry." "Industry pops" are tricky since some IPOs may be perceived as a "me too" company and not as strong as the leader, and when interest wanes, the window of opportunity closes quickly. However, "industry pops" give the public investor good current information on comparable companies in order to make valid pricing decisions. Market conditions will also impact the valuation of a company and the eventual pricing of its stock.

1.3. THE PROCESS OF GOING PUBLIC

After a company decides to go public it faces the problem of how to sell its stock to a large number of investors. To help in this process the company assigns to an investment bank also called underwriter to do that job for it.

First the investment bank helps the firm determine the preliminary offering price or price range for the stock and the number of shares to be sold. The investment bank's reputation and experience in the company's industry are very important in convincing potential investors to purchase the stock at the offering price. In effect, the investment bank certifies that the stock is not overpriced, fact that comforts investors. Second the investment bank sells the shares to its existing clients which include a mix of institutional investors and retail customers. Third the investment bank through its associated brokerage house will have an analyst cover the stock after it is issued. This analyst will regularly distribute reports to investors describing the stock's prospects, which will help maintain an interest in the stock. Well respected analysts increase the likelihood that there will be a liquid secondary market for the stock and that its price will reflect the company's true value.

The firm and its investment bank must next decide whether the bank will work on a best efforts basis or will underwrite the issue. In best-efforts-sales the bank does not guarantee that the securities will be sold or that the company will get the cash it needs only that it will put forth its best efforts to sell the issue. On an underwritten issue, the company does get a guarantee because the bank agrees to buy the entire issue and then resell the stock to its customers. Therefore, the bank bears significant risks in underwritten offerings. On an underwritten offering the firm receives the price that as agreed upon so the bank must absorb any losses that are incurred. Because they are exposed to large potential losses investment banks typically do not handle the purchase and distribution of issues single-handedly. If the sum of money involved is large investment banks form underwriting syndicates in an effort to minimize the risk each bank faces. The banking house that sets up the deal is called the lead or managing underwriter. Syndicated offerings are usually covered by more analysts which contributes to greater liquidity in the post-IPO secondary market. Thus syndication provides benefits to both underwriters and issuers. In addition to the underwriting syndicate on larger offerings still more investment banks are involved.

The selling group includes all members of the underwriting syndicate plus additional dealers who take relatively small percentages of the total issue from the members of the underwriting syndicate. Thus the underwriters act as wholesalers while members of the selling group act as retailers.

After the registration statement has been filed the senior management team the investment banks and the company's lawyers go on a roadshow. The management team will make three to seven presentations each day to potential institutional investors who are typically existing clients of the underwriters. The typical roadshow may last 10 to 14 days

After the presentation the investment banks ask the investor for an indication of interest based on the offering price range shown in the registration statement. The investment bank records the number o shares that each investor is willing to buy which is called book-building. As the roadshow progresses the investment bank's book shows how demand for the offering is building. Many IPOs are oversubscribed with investors wishing to purchase more shares than are available. In such a case the investment bank will allocate shares to the investors by a making use of an option called overallotment. This option permits the underwriter to purchase additional shares up to 15% of the issue size to cover promises made to potential buyers. Sometimes low demand then they will either reduce the offering price or withdraw the IPO. Sometimes how demand is specifically due to concern over the company's futures prospects or the general trend of the market. Thus timing of the roadshow and offering date are very important.

1.4. LIFE AS A PUBLIC COMPANY

Public companies must proactively manage their reputations by communicating regularly with investors, analysts, and the financial media to maintain a positive image and make sure their story is being told accurately. The public's perception of a company has a direct effect on the value of its stock. Do not underestimate it. Life as a public company also means getting comfortable with the rhythm of quarterly and

annual reporting requirements, their content, and costs. Once a company is public, considerable effort must be expended to

maintain its market position. If investor enthusiasm for a company is not maintained, trading will decline. If a company's shares are thinly traded, the benefits sought from the IPO (such as liquidity through a future secondary offering) will not be realized. Thus, effective distribution and support of the stock, as well as continuing security analyst interest, is necessary after the IPO. A strategy for after-market support can be created with the assistance of a financial public relations firm. This strategy usually includes choosing an individual within a company to handle shareholder relations. This ensures that a company will release information that is uniform and accurate. A public company's performance, as perceived by the market, is reflected in the value of its stock. Management faces the pressure of balancing

short-term productivity with long-term goals. Negative developments, such as the release of lower-than-expected earnings, may adversely affect the stock's value. Management will need to ensure that all communications with external parties explain fully the results of the company. This transparency in reporting will in turn create greater market trust. Once listed,

a company will be under far greater public scrutiny and will have a range of continuing obligations with which to comply. Any weakness in systems or failure to comply with regulations could cause management public embarrassment, reputational damage, and the potential for company and personal fines. The benefits of careful preparation and planning are realized within the first year of the IPO

1.5. THE COST OF GOING PUBLIC

Apart from the spread that investment banks charge issuers for the underwriting of the issue and which is 7% , this is the price they pay the issuing company to buy their stocks and the price at which they sell shares to the public, and other direct costs, such as lawyer's fees, accountant's costs, printing, engraving and so on which can easily amount to several hundred thousand dollars, there are also indirect costs. The money left on the table, which is equal to the number of shares multiplied by the difference in the closing price and the offering price can be quite large and may represent a large percentage of a small IPO.

The magnitude and scope of IPO costs can vary significantly from offering to offering based on a number of variables, such as the size of the offering, the complexity of the IPO structure, and the organization's readiness to be a public company. More specifically the factors impacting the cost of an IPO include:

- Direct costs, such as underwriter, external auditor, legal and financial reporting advisor fees
- Longer-term costs such as the need to develop external reporting, investor relations and human resource functions
- Costs to institute incentive plans for executives and employees

1.6. INFORMATION ASYMMETRIES

If a firm's current financial condition is poor its managers may be reluctant to issue new long-term debt because a new debt issue would trigger a review by the rating agencies and debt issued when a firm is in poor financial shape would probably cost more and be subject to more severe restrictive covenants than debt issued from strength. Firms are reluctant to use new common stock especially when this might be taken as a negative signal. Thus a firm that is in a weakened condition but whose internal forecasts indicate greater financial strength in the future would be inclined to delay long-term financing of any type until things improved. Such a firm would be motivated to use short-term debt even to finance long-term assets with the expectation of replacing short-term debt in the future with cheaper higher-rated long-term debt. Conversely a firm that is strong now but that forecasts a potentially bad time in the period just ahead would be motivated to finance long term now rather than to wait. Each of these scenarios implies either that the capital markets are inefficient or that investors do not have the same information regarding the firm's future as does its financial manager.

1.7. THE FIRST DAY OF TRADING

The first day of trading for many IPOs is wild and exciting. Some stocks and the day with large gains. Others have a sharp run-up and then fall back by the end of the day. A few IPOs actually end their first day with a loss. According to a study by professors

Loughran and Ritter, during the period of 1990-1998 about 27.3% of the IPOs have an offer price that is lower than the low range in their registration filing, and these stocks have an average first-day return of 4%. Even though the average return is positive, 47% of these stocks actually end the day with a loss or no gain. About 48.4% of IPOs have an offering price that is within the range of their initial filing. For such companies, the average first-day return was 10.8%. Due to indications of high demand during the roadshow, 24.3% of IPOs had a final offer price that was higher than their original range. These stocks had an average first day return of 31.9%. Overall, the average first-day return was 14.1% during 1990-1998, with 75% of all IPOs having positive return. During 1999 the average first day return was 70%. Various theories have been put forward to explain IPO underpricing. As long as issuing companies don't complain, investment banks have strong incentives to underprice the issue. First underpricing increases the likelihood to oversubscription, which reduces the risk to underwriters. Second, most investors who get to purchase the IPO at its offering price are preferred customers of the investment bank and they become preferred customers because they generated lots of commissions in the investment's bank brokerage company. Therefore, the IPO is an easy way for the underwriter to reward customers for past and future commissions. Third the underwriter needs an honest indication of interest when building the book prior to the offering and underpricing is a possible way to secure this information from the institutional investors. Most of the companies seem content to leave some money on the table. The best explanation seems to be that, the company wants to create excitement and a price run-up on the first day, only a small percentage of the company's stock is generally offered to the public so current stockholders give away less due to underpricing than appears and another reason is that IPO companies generally plan to have further offerings in the future and the best way to ensure future success is to have a successful IPO which underpricing guarantees.

Although IPOs on average provide large first-day returns, their long-term returns over the following 3 years are below average. For example if somebody could not get in an at the IPO price but purchased a portfolio of IPO stocks on their second trading day the 3-year return would have been lower than the return on a portfolio on similar but seasoned stock.

2. LITERATURE REVIEW

In the previous chapter we presented basic concepts of the Initial public offering of firms' procedures, regulations, and considerations on the part of the firms. In this chapter we will attempt to present some of the most significant reasons and explanations documented in the literature for IPOs for one widely observed phenomenon often characterized as "puzzle", long run performance of IPOs.

Numerous studies have documented the abovementioned anomaly of IPOs. Below we provide a brief review based on the study of Ritter and Welch (2002).

In the study of Ritter and Welch (2002) a review of IPO activity is documented briefly presenting the various reasons for the post-IPO underperformance and their explanations as explained thought the literature.

As far as long-run underperformance is concerned two explanations for the long-run semi-rational explanations have been proposed. Miller (1977) assumes that there are constraints on shorting IPOs, and that investors have heterogeneous expectations regarding the valuation of a firm. The most optimistic investors buy the IPO. Over time, as the variance of opinions decreases, the marginal investor's valuation will converge towards the mean valuation, and its price will fall. This is consistent with the drop in share price at the end of the lockup period (when more public shares become available to the public), as documented by Bradley, Jordan, Roten, and Yi (2001), Field and Hanka (2001), and Brav and Gompers (2002).

Bradley shows that the negative effect is much more pronounced for venture capital-backed IPOs. Typically with these IPOs, the VCs distribute shares to their limited partners on the lockup expiration date, and many limited partners immediate sell. This shows up not only in negative returns, but exceptionally high volume. Schultz (2001) offers a second explanation: he argues that more IPOs follow successful IPOs. Thus, the last large group of IPOs would underperform and be a relatively large fraction of the sample. If underperformance is being measured weighting each IPO equally, the high-volume periods carry a larger weight, resulting in underperformance, on average Although this is a logical argument, it cannot predict underperformance when each time period is weighted equally something that has been

proven by the studies of Loughran, Ritter, and Rydqvist (1994) and Baker and Wurgler (2000) and Ritter and Welch (2002).

Jain and Kini (1994) and Mikkelson, Partch, and Shah (1997) document that long-run return performance is also accompanied by poor financial accounting performance post-IPO relative to pre-IPO performance and/or industry conditions. Heaton (2001) argues that managers tend to be overoptimistic, and thus prone to overinvestment if the funds are available. Teoh, Welch, and Wong (1998) attribute some of the poor post-IPO stock performance to "optimistic" accounting early in the life of the firm. This is consistent with the fact that firms tend to look good when they conduct their IPO and that the market has difficulties in recognizing cases where earnings have been manipulated and thus investors being misled. This suggests that a part of the poor long-run performance is due to a market that is overly optimistic and unable to forecast properly the future operating performance of the company going public. In line with the results of Loughran and Ritter (1991) that firms time their IPO in order to take advantage of transitory windows of opportunity, Purnanandam and Swaminathan (2004) find IPOs to be overvalued at the offer price. Correspondingly, they argue that the poor long-term performance of IPOs is mainly due to the fact that on average the high growth expectations implicit in the initial valuation fail to materialize.

Other studies have attributed long-run underperformance of IPOs to pre-IPO characteristics such as underpricing, though this argument is questioned in the paper of Ritter and Welch (2002) on the argument that the aforementioned reason for the underperformance of IPOs is sensitive to whether penny-stock IPOs are included in the sample used to perform the tests. Penny-stocks tend to have high first-day returns and substantial long-run underperformance and many of these stocks involved stock price manipulation.

Some of the already mentioned reasons as well as others will be presented in further detail in the literature review section of this dissertation. The literature of the long-run performance of IPOs is vast and this phenomenon has been widely documented throughout the previous decades. Various explanations have been proposed while others have been rejected or considered outdated as new evidence from newer research came to light. It is true that this puzzle has not yet been solved and researchers many times contradict each other with their findings. Since no asset-

pricing model for the measurement of underperformance of IPOs has been proposed from literature it lies within the researcher's ability, knowledge of previous work, and perception to establish a model in order to measure and interpret the findings of his own research. For evaluating the long run performance of IPOs it is not at all clear what constitutes the appropriate benchmark portfolio

In the literature review following, papers proposing the most important determinants of post-IPO long-run performance according to my view have been analyzed. Each paper is separately analyzed.

2.1. EARLIER STUDIES

Ritter (1991) states that while a significant number of studies have documented two anomalies related to initial public offerings (underpricing, hot issue market phenomenon) he documents one more which is the overpricing of IPO in the long-run. Using a sample of 1,526 IPOs that went public in the U.S. in the 1975-1984 period he finds that in the 3 years after going public these firms significantly underperform. The benchmark set for measuring the aforementioned underperformance is a set of firms matched by size and industry, the CRSP value weighted NASDAQ index The CRSP value weighted Amex-NYSE. Benchmark adjusted returns are calculated as the monthly raw return on a stock minus the benchmark return for the corresponding trading period. In general the quantitative measurement of the long-run performance of IPOs is treacherous and it is very sensitive to the benchmark employed. Given that the majority of the IPOs trade on the NASDAQ this index could be the most probable candidate for the measurement of the long-run performance of these firms.

According to Ritter (1991) there are several reasons why the long-run underperformance of initial public offerings is of interest. First, from an investor's point of view, the existence of price patterns allows for opportunities of active trading strategies in order to produce superior returns. Second the evidence of non-zero aftermarket performance calls into question the informational efficiency of IPO market. Third, the volume of IPOs displays large fluctuations over time. In the case that high volume periods are associated with the long-run underperformance, this

might mean that the issuers are timing the IPOs in order to take advantage of transitory windows of opportunity. Furthermore, the cost of external equity consists not only of transaction costs incurred for the IPO to take place but also of the returns that investors receive. Low returns mean lowered cost of external equity for the issuing firms.

The results of the study show that the portfolio of matching firms produces for the 3 years period of buying and holding an average return of 61.86% compared to an average return of 34.47% produced by the IPO firms.

The possible explanations set forth by Ritter are the risk mismeasurement, bad luck or fads and over-optimism. The risk mismeasurement explanation is tested by using the various aforementioned benchmarks. To separate between fads and bad luck various cross-section and time-series patters are investigated. The results documented present that the underperformance is concentrated among young growth firms, especially those that went public during high volume periods. This result is consistent with results of other various studies mentioned earlier where the underperformance is attributed to the overly optimistic expectations of investors about the future potential of issuing firms.

The paper concludes that investing in a portfolio of IPOs at the end of the first day and holding it for three years would have left the investor with 83 cents for every dollar invested in a portfolio of matching firms in terms of industry and size (market capitalization). It also presents evidence concerning the underpricing phenomenon since the first aftermarket price is too high.

Teoh, Welch, and Won (1998) study whether discretionary accounting accruals predicts the cross-sectional variation in post-IPO long-run performance.

Discretionary accounting refers to practices on which management resorts in order to present enhanced short-term earnings or when there are cash flow difficulties. These practices cannot be applied for long and are meant to last only in the short-run. Accruals are accounts on a balance sheet that represent liabilities and non-cash-based assets used in accrual-based accounting. These accounts include, among many others, accounts payable, accounts receivable, goodwill, future tax liability and future interest expense. The use of accrual accounts has greatly increased the amount of information

on accounting statements. Cash transactions don't give information about other important business activities, such as revenue based on credit and future liabilities. By using accruals, a company can measure what it owes looking forward and what cash revenue it expects to receive. It also allows a company to show assets that do not have a cash value, such as goodwill.

The proponents of the study argue that companies going public may report unusually high earnings by adapting the aforementioned practices. Most often than not investors in IPOs are guided by earnings reported by the companies without being aware of the fact that earnings are inflated by the use of discretionary accounting accruals. This can result in them paying too high a price to acquire stocks of issuing firms. Information concerning the progress of issuing company after the IPO is revealed over time by analysts, financial statements and various other sources making investors aware of the true financial condition of the company and the progress of its earnings. Realizing that earnings are not maintaining momentum investors may lose their optimism. The greater the earnings management at the time of the issue the larger the ultimate price correction.

They use as an earnings management proxy that is formed by taking into account both pre-IPO and post-IPO financial statements information which means information obtained from the first public financial statement. This procedure is adopted because earning management is highly likely to be continued several months after the IPO. Management has an incentive to act so as immediate accounting reversals may cause a company to become too transparent in order for investors to proceed to lawsuits against the company. The authors conduct their study by relating the accruals from the fiscal year financial statements of the IPO to the stock market performance from three to six months after the end of the fiscal year. They investigate the issuing firm's current working capital accruals that are unusual when compared to their industry peers. The result produced show that discretionary current accruals are good predictors of subsequent three years-stock return performance. They rank the issuing firms according to the extent of discretionary current accruals use. They find that IPOs ranked in the most "aggressive" quartile earn a cumulative abnormal return of around 20 to 30 percent less than the IPOs ranked in the "conservative" quartile. The difference of buy-and-hold returns between these two quartiles is approximately 15-30 percent. They test the robust ness of this result by controlling for market, size,

book-to-market ratio, expected return benchmark, holding period, and accumulation method effects.

The scarcity of information concerning the issuers renders investors almost totally unaware of the companies' financial history and makes the information contained in the prospectus the only financial data available to them to rely on. The specific information includes usually only three years of financial statements and performance of the company thus, in the case that investors are not capable of understanding the full extent of the earnings management, high reported earnings would translate into higher offering price. There also incentives from the firms to maintain high market price after the IPO as entrepreneurs (initial owners of the company) may want to sell some of the stocks they own to the secondary market after the end of the lock-up period. The IPO lock-up is a common lock-up period in the equities market used for newly-issued public shares. IPO lock-ups typically last anywhere from 90 to 180 days after the first day of trading, and are in place to prevent shareholders with a large proportion of ownership (such as company executives) from flooding the market with shares during the initial trading period. To keep after market price dropping below the initial offer price underwriting firms are under pressure to keep making favorable projections for the company and the company in turn is under pressure to make these projections be realized in order for every part to avoid lawsuits and damage to their reputation.

According to the proponents of the study reported earnings consist of cash flows from operations and accounting adjustments called accruals. They decompose total accruals into two components, current accruals and long-term accruals. To be exact they use four accrual variables. These are: discretionary current accruals, non-discretionary current accruals, discretionary long-term accruals and nondiscretionary long-term accruals. They focus on the variable of discretionary current accruals as is the aspect of total accruals that is more flexibly manipulated by managers. The first component includes short-term assets and liabilities. Managers can influence current accruals by advancing recognition of revenues before cash is received, by delaying recognition of expenses through assumption of low provisions for bad debts, or by differing recognition of expenses when cash is advanced to suppliers. On the other hand long term accruals can be adjusted by decreasing the depreciation effect on assets, by decreasing deferred taxes, or realizing unusual earnings.

Although companies report earnings in ways that conform to GAAP, due to the fact that alternative treatments for account events are permitted, accounting earnings can be manipulated. The study of Teoh, Welch, and Won (1998) list a number of different ways to manage earnings by adopting different accounting methods, some of them are described below.

- Accounting Method Choice. The choice of accounting methods affects the timing of the recognition of revenues and expenses. Choices that influence recognition of revenues and delay the recognition of expenses result in increased reported income. For example if input prices are falling, using the LIFO (Last In First Out) method instead of the FIFO (First In Fist Out) method results in lowering the cost of goods sold. One other example that results in increased reported earnings is the lower depreciation charge emanating from the use straight line method of depreciation used on depreciable assets instead of the charge emanating from the use of accelerated depreciation. Also another example included in this category of accounting choices is the percentage-completion method which permits the recognition of revenues during the time when the project takes place while the completed-contract method allows for revenues recognition only after the completion of the project

- Accounting Method Application. Apart from the eligibility of reporting increased revenues coming due to the availability of accounting choices, earnings manipulation can still take place by the way accounting principles are applied. For example how the useful economic life and salvage value of depreciable assets is determined, the degree of completion of a project, uncollectible rate of accounts receivable.

- Accounting Method Timing. Firms can manipulate the way and the time of recognition of accounting events and the subsequent reporting of these events in the financial statements. For example, they may use discretion over when and how much of bad loans to write off or impairments of assets to be included in the financial statements or what value should be assigned to the inventory. According to the accounting principle, inventory should be measured at the lower price between cost and liquidation price.

- Timing. The timing of the acquisition or disposition of an asset can affect accounting earnings. Firms can choose when and how much to invest in R&D, advertising, and maintenance costs, all of which are included in the income statement and recognized in the period when they incurred. Firms can also choose when to sell an asset in order to time potential losses of gains, they can also delay the delivery of shipments to costumers at the end of a period to affect the timing of revenues.

The hypothesis they base their study on is that accounting accruals predict post-IPO underperformance on condition that investors can be misled by the information they have access to and that earnings are manipulated by the firms. Both conditions are necessary for the overvaluation of the IPO and the subsequent observed negative abnormal returns. This implies market inefficiency, as in the case investors were fully rational they would adequately discount the price of IPOs to reflect the extent of earnings management. Ultimately if the IPO underperformance is not merely an ex post chance event, it is highly unlikely that any rational theory or equilibrium model could explain the low returns earned considering the illiquidity and riskiness of such investments.

The initial sample they use for their study consists of 1,973 IPOs for the 1980-1984 period and 3,197 IPOs for the 1985-1992 period. Setting as a condition for the inclusion in the sample the market price of the offer to exceed 1 dollar and the market capitalization of the firm to exceed 20 million dollars they come up with a sample of 1,649 IPO firms. By controlling for size and book-to-market ratio and using as a key objective the evaluation of the extent to which managed accruals can have an influence on the long-run performance of IPOs they conclude that the issuing companies have high discretionary accruals relative to non-issuing companies. The paper documents that issuing firms with higher discretionary accruals have poorer stock return performance in the subsequent tree years. These results are consistent with an inability of investors to fully understand managerial earnings choices. Because investors behave as if they are fixated on these high earnings, they are disappointed later.

When a company wants to go public, the first thing it does is to hire an investment bank. A company could theoretically sell its shares on its own, but realistically, an

investment bank is required. Issues usually discussed between issuers and underwriters include the amount of money a company will raise, the type of securities to be issued, and all the details in the underwriting agreement. Expressions of interest are subject to rejection or allotment, in whole or in part, and the right is reserved to close the subscription books at any time without notice by the lead of the issue.

Once all sides agree to a deal, the investment bank puts together a registration statement to be filed under the supervision of regulators. The aforementioned document contains information about the offering as well as company information such as financial statements, management background, any legal problems, where the money is to be used, and insider holdings. The regulators then require a "cooling off period," during which they investigate and make sure all material information has been disclosed. Once the regulator approves the offering, a date is set when the stock will be offered to the public. During the cooling off period the underwriter puts together an initial prospectus containing all the information about the company except for the offer price and the effective date, which are not know at that time. This is done in order to build up interest for the issue. Among other factors the price depends on the company the success of the road show, current market conditions and as well as other factors that will be discussed later with further detail.

In the study of Ibbotson (1975) he mentions that the three groups involved in the IPO are the underwriters the issuers and the investors. As mentioned earlier the underwriters are the intermediaries between the issuing firm which corresponds to the demand side for capital and the investors who correspond to the supply side of capital. Under the regulations underwriters are obliged to set a maximum filling price two weeks in advance of the actual offering, although the maximum filling price can be altered in some cases as the offering price must be set immediately before the offering. It is possible for the underwriters to break the syndicate which means that they have the ability to sell the offering at a lower price than the fixed price that was set before the offering. However in cases of strong demand for the issue it is not possible to sell the shares at a higher price than the fixed price.

Given the constraint concerning the price of the offer faced by underwriters, there are potential risks which are borne only by the underwriter. Investors make a profit in the case of the value of the new issue-this is the fixed price plus the initial performance

being greater than the fixed price while on the other had they experience losses when the value of the new issue is less or equal than the fixed price. As explained earlier the underwritings can take place in either with a 'firm commitment' or with a 'best effort' procedure. In the first case the underwriter bears all the risk since it purchases all of the company's new shares. The fixed price is equal to the price the underwriter pays to buy the new shares plus the underwriting spread. The underwriting spread is the spread between the amount underwriters pay an issuing company for its securities and the amount the underwriters receive from selling the securities in the public offering. The size of the underwriting spread depends on the negotiations and competitive bidding amongst underwriters and the company itself. The spread increases as the risks involved with the issuance increase. In the second case the underwriter receives the underwriting spread to cover his costs, but the issuer bears the risks for selling the issue at the fixed price.

Ibbotson (1975) suggests reasons for the explanation of underpricing consistent with his empirical findings though he admits that they may not be plausible. These reasons are listed below

- Regulations require underwriters to set the offering price (fixed price) below the expected value. (Regulations such as the 'Rules of Fair Practice require that issues should be offered at a fixed price thus constraining the underwriters and affecting the initial performance of the issues. Thus implicit regulations may prevent underwriters from setting the offering price above the expected value. However it is unlikely that regulations would even implicitly require underwriters to set the offering price below the expected value)

- Underpricing new issues may allow superior returns for investors thus creating potential demand for future issues that will be attractively priced. While this explanation seems more likely and is the prevalent one practice such as this definitely undermine the market efficiency.

- There is a possibility that underwriters take advantage of issuers' lack of knowledge and experience in order to favor investors

- Firm commitment underwriting spreads may not suffice to cover for the all of the risk involved in the underwriters' purchase of the issuers' shares thus the underwriters must underprice the issue to cover for the one-side risk. It is also

       possible that underwriters receive side payments as to be compensated for that risk.

- Underwriters and issuers might use the underpricing of new issues as a means of avoiding legal suits in the case of mistakes in the prospectus thus positive initial performance is likely to prevent them from such a scenario.

Ibbotson use as a sample of issues offered from 1960 to 1969. One offering is selected at random each month as well as the observation is also selected at random from a different calendar month so as to eliminate possible observational dependence of the returns. All prices are month-end bids except for the initial offering price which is observed the day on which the offering took place. Each IPO is observed for up to sixty months. The model used is associated with the empirical results of Back, Jensen, And Scholes (1972), and Fama and MacBeth (1973) and it is consistent with a positive linear tradeoff between systematic risk, β, and expected returns with no other measure of risk other than β affecting expected returns. In order to measure performance over the holding periods, that are longer than one month, and to secure observational independence a portfolio of IPOs is formed and each security is held for a specific period. At the beginning of each calendar month one security is added and one other security is sold from the portfolio so as it consists of a specific number of securities.

Although Ibbotson does not manage to solve the mystery of underpricing, he provides explanations that shed some light onto this puzzle. In the case that side payments are indeed what really determines the investors to whom the oversubscribed new issues are allocated to, then these side payments, which more likely than not are indirect payments, could erase the entire abnormal returns available to investors. Implicit in the previous conclusion is the fact that investors requesting random issues would probably receive a disproportionate quantity of undersubscribed relative to oversubscribed ones thus rendering these side payments possible.

The conclusions of Ibbotson show positive initial performance though investors do not have a far higher likelihood of extremely larger initial performance than a extremely large positive one. The results of his tests also suggest no departure from market efficiency. Taking the two aforementioned results into consideration we are led to the conclusion that IPO are underpriced. In addition to this his results showed

that the systematic risk of new issues is greater than the systematic risk of the market as well as the fact that the systematic risk of new issues diminishes as the securities become seasoned.

The study of Glezakos and Dr. Gotzageoris discusses evidence on documented underpricing of IPOs in the Athens Stock Exchange during the 1990-2003 period. They focus on the extend of underpricing in regards to Greek issues and they to investigate they validity of the various possible explanations of underpricing proposed in numerous international studies. These explanations are related to the following situations.

The winner's curse. This is a case when investors have different information about the fair value of new issues. While uninformed investors subscribe to every IPO, informed investors only buy those IPOs if the issue price is less than its fair value. This causes a winners curse for the uninformed investors. Therefore, shares must be sold at discount to hold uniformed investors in the IPO market, thus to prevent uninformed investors from losing interest for IPOs underwriters and issuers underprice new issues to secure superior returns for the informed investors. This suggestion by Rock (1986) suggests information asymmetry. Another explanation that suggests information asymmetry that leads to underpricing through signaling equilibrium. In this case firms demonstrate their quality by leaving money on the table. This is done by the undervaluation of new issues. Furthermore, the certification hypothesis formed by Affleck and Graves (1993) suggests that investors demand lower returns for IPOs listed in the markets, which meet higher trading standards. Implicit in this suggestion is the fact that high underpricing levels takes place in markets with low standards. Another explanation for underpricing has been put forward by Denveniste and Spindt (1989) and Benveniste, Busaba and Wilhelm (1996). According to their studies Investors are not likely to reveal their true demand curves for an IPO if this indication of interest is only likely to increase the offer price. Thus underpricing is the reward to investors for revealing their true demand. In addition to this a number of researchers have suggested that the book building procedure is efficient since it induces ex-ante uncertainty contrary to the fixed price procedure

Glezakos and Dr. Gotzageoris in their study use a sample of 258 IPOs listed on the Athens Stock Exchange market. For each IPO in the sample two measures are computed in order to estimate the extent of underpricing. These two measures are the "simple underpricing", defined as the percentage change in the price from the offering price to the close at the first day of trading and the "adjusted underpricing", and defined as the difference between the percentage change of the issue price on the first day and the corresponding change in the market index. The variables they use in order to measure their impact on underpricing and test the aforementioned hypotheses are: The company's listing delay, that is the number of days between oversubscription and first trading day. Higher prices for this variable suggest that investor can be better informed about the value of the company thus perceiving the risk to be smaller. The company's operating history that is the years from the foundation of the company to its listing to the stock exchange market. The Issue size, the reissue variable which represents the seasoned equity offering that might take place within two years from the IPO. Market segmentation variable which represents the listing standards of the market. Oversubscription level is a variable defined as the ration between total demand and supply. Offering strategy variable which represents the kind of procedure followed for the IPO (book-building or fixed price process).

In their article, Loughran and Ritter (1995) show that companies issuing stock during 1970 - 1990 significantly underperform relative to non-issuing firms for five years after the offering date. The average initial return for firms conducting IPOs is only 5%. Only a modest portion of the underperformance of issuing firms can be explained as a manifestation of book-to-market effects.

While the exact magnitude of the underperformance of issuing firms is dependent upon the benchmark used, in the study of Loughran and Ritter (1995) IPOs have underperformed all of the commonly used benchmarks: the CRSP equally weighted and value-weighted Amex-NYSE and Nasdaq indices, and the S&P 500. They measure the underperformance of their sample of 4,753 operating companies that went public in the United States during 1970 to 1990 by comparing their returns with the returns of similar in terms of size non issuing firms. They find that extreme winners who issue shares dramatically underperform extreme winners that do not issue shares. The average annual return during the five years after issuing is only 5% for firms conducting IPOs while investing in an equal amount at the same time in

non-issuing firms with the same market capitalization and holding it for the same period would have produced an average compound return of 12% per year.

They also document that the degree to which issuing firms underperform varies over time: firms issuing during years when there is little issuing activity do not underperform much at all, whereas firms selling stock during high-volume periods severely underperform. The magnitude of this underperformance is economically important: based upon the realized returns, an investor would have had to invest 44% more money in the issuers than in non-issuers of the same size to have the same wealth five years after the offering date. This underperformance is evident in both occasions of holding the size of the companies constant and after adjusting for book-to-to market effects, though, only a modest part of the underperformance can be explained through book to market ratio effects.

This methodology is in accordance with the one used in the research of Fama & French (1993) who document that book-to-market ratio and size (market capitalization) seem to absorb the roles of leverage and E/P in average stock returns. These two proxies represent different dimensions of risk. Specifically, the book-to-market variable can be regarded as an alternative way of obtaining information from stock prices. The economic explanation that Fama & French give for the role of book-to-market equity in average returns is that in the case of rational pricing of stocks, book-to-market, the ratio of the book value of a stock to the market's assessment of its value, should indicate the relative prospects of firms. Their inquiry suggests that there is a clear separation between high and low book-to-market firms on various measures of economic fundamentals. Low book-to-market firms are persistently strong performers, have strong prospects and high stock price relative to book value, while high book-to-market firms have persistently weak economic performance, low earnings on assets, thus firms which the market judges to have poor prospects and subsequently have higher expected stock returns (they are penalized with higher cost of capital). They state however, that book-to-market is also possible to just reflect the irrationality of fads about the prospects of firms.

As far as β is concerned, while Fama & French find that the positive simple relationship between β and average return that is found to be present as predicted by the ASSET PRICING MODEL (Black Jensen and Scholes (1972) and Fama and

MacBetch (1973) disappears during the 1963-1990 period, even when beta is used alone to explain average returns, Loughran and Jay R. Ritter (1995) show that β is slightly higher for issuing firms than non-issuers, implying that issuers should have higher not lower returns..

The evidence they came up with is consistent with a market where firms take advantage of transitory windows of opportunity by issuing equity when on average they are substantially overvalued. The evidence presented is consistent with a market where firms take advantage of transitory windows of opportunity by issuing equity when, on average, they are substantially overvalued.

For IPOs the prior rapid growth of many of the young companies makes it easy to justify high valuations by investors who want to believe that they have discovered a huge investment opportunity. This also is the reason to which the authors attribute the existence of these patterns. If the true probability that a given IPO will be the next Microsoft is 3 percent, but investors have instead estimated that it is 4 percent (resulting in a 33 percent overvaluation). In other words, investors seem to be systematically misestimating the probability of finding a big winner. More generally, issuing firms typically have had recent improvements in their operating performance. The market appears to overweight this recent improvement and underweight long-term, mean-reverting tendencies in operating performance measures. The market is systematically misestimating the autocorrelation of earnings growth. Consequently, at the time of issue, market prices reflect the capitalization of transitory operating improvements. When the transitory nature of the operating performance becomes apparent, the stocks underperform. But this underperformance does not start immediately after issuing. Loughran and Ritter (1995) report that there is no underperformance during the first six months after issuing. Because the underperformance is delayed, the connection with issuing firms is less obvious to the market. The study they have conducted discloses that the last three cohort years, 1988 to 1990, have wealth relatives close to 1.0 for IPOs suggesting that a prior inefficiency is disappearing. There are two reasons that they doubt that this is the case, however. First, there is no evidence that the first-day returns on IPOs have changed. Second, previous periods of low issuing volume produced wealth relatives close to 1.0 as well.

In general, as an explanation to the IPO underperformance phenomenon the study proposes that the time of issuance plays a vital role in outcome of the IPO performance. They argue that IPO firms might try to take advantage of transitory windows of opportunity by going public during "hot market" periods when their stock is substantially overvalued.

In the study of Hoechle and Schmid (2007) it is shown that IPO underperformance is highly dependent on the definition of "IPO firms". They analyse a sample of 7378 firms in the U.S. that went public during the period of 1975-2005. They define "IPO firms" as firms that went public during the last year. They find that there is no significant underperformance for those firms beyond two years after their first issue. They set the benchmark for the underperformance by comparing the characteristics and returns of IPO firms with those of firms whose IPO took place at least 5 years earlier. The matching algorithm relies on either market capitalization or on both market capitalization and book-to-market ration.

They address three different questions: which, why and for how long do IPO underperform. In order to do so they use a five-year-buy-and-hold abnormal returns technique as well as an analysis of the determinants of IPO performance based on Jensen's Alpha approach. (Jensen's Alpha is used to determine the abnormal return of a security or portfolio of securities over the theoretical expected return).

They use a multivariate buy-and-hold-abnormal-return analysis in order to determine *which* of the firm characteristics know by the time of the IPO are good predictors for the IPO's subsequent performance. Their results indicate that indicate that IPOs that have been predicted to have high growth prospects thus overly optimistic and highly valuated, tend to perform worse than IPOs which forecasts have been more modest. Furthermore they find that firms going public during periods of "hot market" underperform in the long-run.

In the question of *why* IPOs underperform they take into consideration a set of firm characteristics such as IPO market environment, leverage, liquidity, firm valuation, corporate diversification, and investment. They conclude that the documented IPO underperformance is mainly the result of fundamental differences in frim characteristics between IPOs and non-issuing firms. However, when the

characteristics of the issuing firms converge to those of non-issuing firms the underperformance disappears.

Aggarwal and Rivoli (2001) in their study state that the view according to which IPOs are systematically priced below their intrinsic value by underwriters, is the most widely held for the explanation of abnormal returns documented in the early research related to initial public offerings. However, a second possibility is proposed in the study is that, IPOs are subject to overvaluation or fads in early aftermarket trading, suggesting market inefficiencies. This point of market inefficiency is also supported in the study of Shleifer and Summers (1990). They present an alternative approach to the efficient market approach. According to their study market consists of two types of investors, arbitrageurs and other investors. Arbitrageurs are defined as investors who form fully rational expectations about security returns. In contrast, the opinions and trading patterns of other investors- also known as "noise traders"- may be subject to systematic biases. Their approach rests on two assumptions. First, some investors are not fully rational and their demand for risky assets is affected by their beliefs and sentiments that are not fully justified by fundamental news. Second arbitrage- defined as trading by fully rational investors not subject to sentiment- is risky and therefore limited. The two assumptions together imply that changes in investor sentiment are not fully countered by arbitrageurs and so affect security returns. With limited arbitrage, movements in investor sentiment are an important determinant of prices. The efficient market hypothesis obtained only as an extreme case of perfect riskless arbitrage that is unlikely to apply in practice.

The abnormal returns accruing to IPO investors may only be interpreted as evidence of underpricing by underwriters. If it is shown or assumed that the aftermarket is efficient. It is possible that the aftermarket is not immediately efficient in valuing newly issued securities and that the abnormal returns that accrue to IPO investors are result of temporary overvaluation by investors in early trading. This overvaluation which is temporary, is a result of the over-optimism observed on the part of investors and it is known as fad. Fads are more likely to occur if estimation of true intrinsic value is more difficult or if great uncertainty surrounds intrinsic value. Higher level of noise trading are likely for riskier securities and some forms of noise trading are the result of expectations that do not conform to standard rationality assumptions such as over-optimism. IPO investors are expected by nature to be more speculative

than other groups of investors, and there is evidence that more speculative investors will lead to higher level of price volatility, and therefore to larger deviations from intrinsic values. Taking these arguments into account we are led to the conclusion that fads imply a violation of standard rationality assumptions.

They argue that a significant tendency for investors purchasing in early aftermarket trading and holding for one year to underperform the market is present. Also there is no evidence of positive abnormal returns to investors purchasing at the initial offering and holding for one year. The gains from early price appreciation are more than lost in subsequent price declines.

Their research provides defence for investment bankers against the charge of systematic underpricing. For financial managers, the results suggest that the abnormal returns accruing to initial investors should not be interpreted as "money left on the table" in the form of underpricing by investment bankers. For investors the results show that IPOs are a profitable investment in the short term but performs quite poorly over longer periods.

The study of Lowry (2003) postulates that while one common perception regarding IPO volume is that it simply varies with business cycle as during economic expansions, companies and the economy in general tends to have higher demands for capital and therefore more firms go public, a second widely held view is that the variation in IPO volume is primarily driven by changes in investor optimism. The author argues that investor sentiment among other reasons, is shown to provide explanation for the fluctuation of IPO volume. Results of the research indicate that all three factors, aggregate capital demands, adverse-selection costs of issuing equity and the lever of investor optimism, contribute to the fluctuations in the number of firms going public, with capital demands and investor sentiment being the most important. The investor sentiment hypothesis postulates that variation in the level of investor optimism causes the costs of issuing equity and therefore IPO volume to fluctuate over time. In periods of over-optimism investors may be driven more by irrationality than by fundamental values. In this case they are prepared to pay more money for stocks which have a high P/E ratio. P/E ratio is a ratio for valuing a company that measures its current share price relative to its per-share-earnings. In essence, the price-earnings ratio indicates the dollar amount an investor can expect to

invest in a company in order to receive one dollar of that company's earnings. This is why the P/E is sometimes referred to as the multiple because it shows how much investors are willing to pay per dollar of earnings. In general, a high P/E suggests that investors are expecting higher earnings growth in the future compared to companies with lower P/E. The study also focuses on post-IPO returns and examines whether the number of IPOs is affected by changes in the level of investor sentiment, and consequently post-IPO returns are lower due to the high optimism, high IPO volume periods, when investors overpay the most. It concludes that while no significant relation between abnormal IPO returns and IPO volume is found, results show that IPO volume is significantly negatively related to both raw IPO post-issue returns and post-issue market returns.

Firms seem to successfully go public when the industry they belong or/and the market in general is valued highly. In such periods, the IPO costs for a firm are substantially reduced thus more firms find it optimal to go public during such periods. On the other hand, this is not the case during periods when the economy-wide sentiment is of low optimism. Pagano (1998) in his research states that the crowding of IPOs is a result of mispricing in the market.

Purnanadam and Swaminathan (2001) find that IPOs that are more overvalued at the offer price earn especially high initial returns and especially low returns in the aftermarket and during the next five years

Once again the investor sentiment hypothesis presented in the research of Lowry (2003) assumes market inefficiency.

In their article Ritter and Welch 2002 they review the theory and evidence on IPO activity. Their research expands over the issues of why firms go public, why they reward first-day investors with considerable underpricing and how IPOs perform in the long-run. As far as long-run performance is concerned they argue that asymmetric information is not the primary driver of many IPO phenomena.

They draw their sample from the IPOs of 1980 to 2001 IPOs and document that on the first day of trading the shares of these IPOs averaged at 18.8 percent above the price at which the company sold them. They document that for an investor buying shares at the first-day closing price and holding them for three years, IPOs returned 22.6

percent but over three year, the average IPO underperformed The CRSP vale weighted market index by 23.4 percent and also underperformed seasoned companies with the same capitalization and book-to-market ratio by 5.1 percent.

Averages hide the time trends and year-by-year variation in these phenomena for example by taking each decade separately they document the following results: The 1980s saw modest IPO activity about $8 billion in issuing activity per year. In the 1990s, issuing volume roughly doubled to $20 billion per year during 1990-1994, doubled again from 1995 to 1998 ($35 billion per year), and then doubled again from 1999 to 2000 ($65 billion per year), before falling to $34 billion in 2001. The long-run performance of IPOs also varies over time. Three-year market-adjusted buy-and-hold returns are negative in every sub-period, but not for every cohort year. Style-adjusted buy-and-hold returns are not as reliably negative with many cohort years and some sub periods, having positive style-adjusted buy and hold returns

They argue that time-variation in the aforementioned phenomena deserves more emphasis. For example, the long-run performance of IPOs is not only sensitive to the widely debated choice of econometric methodology but also to the choice of sample period. Furthermore they postulate that asymmetric information is not the primary purpose of fluctuations in IPO activity but reasons such as agency problems and non-rational explanations play a greater role.

The result of the tests they perform show that investing in an equal-weighted portfolio of IPOs over a three-year horizon did not lose money, but an investment in the value-weighted market portfolio would have yielded about twice the return, resulting in a three-year market-adjusted return of –23.4 percent. They believe that apart from the sample used both in terms of sample period and sample selection criteria is also an important determinant of the difference in findings among studies there is also differences regarding the proper measurement technique. In measuring long-run performance, one can focus either on raw performance (absolute), or performance relative to a benchmark (abnormal returns). One important issue in long-run performance of IPOs literature they point at is the fact that when publicly traded firms similar in market capitalization and book-to-market values are used as a benchmark, it becomes clear that the poor long-run performance of firms "similar to IPO firms"

extends beyond the IPO market. IPOs are commonly small growth firms and this has been the worst-performing style category of the last several decades. In table 1 of their paper the three-year average market-adjusted return on IPOs is –23.4%, whereas the average style-adjusted return is –5.1% this means that seasoned equity firms matched by market capitalization and book-to-market underperform the market by almost as much as the IPOs.

In table 5 of the study the rows 5 to 8 separate the sample into different time periods. There we can see that the estimates are very sensitive to the ending date. While the internet bubble was inflating in the late 1990s, post-IPO returns were exceptionally good. If the sample is extended by just one year, from December 1999 to December 2000, the row 6 intercept of –14 basis points for 1990-1999 changes in row 7 to –48 basis points for 1990-2000. These results demonstrate the significance that the role of the selected the period for the measurement of abnormal returns plays. Another example which demonstrates this phenomenon as well as the role of the methodology use for the measurement of IPO performance is that Table 1 shows that IPOs from 1999 and 2000 performed poorly by any measure during the well-known collapse of the internet bubble. In Table 5, they report time-series regression results using the Fama-French (1993) 3-factor model.

Table 1: Tables 1 & 5 of Ritter and Welch, A Review (2002) of IPO Activity and Allocations respectively

Year	Number of IPOs	Average First-day Return	Aggregate Gross Proceeds, millions	Aggregate Money Left on the Table, millions	Average 3-year Buy-and-hold Return IPOs	Market-adjusted	Style-adjusted
1980	70	14.5%	$2,020	$408	88.2%	35.5%	17.1%
1981	191	5.9%	$4,613	$264	12.8%	-26.2%	-7.4%
1982	77	11.4%	$1,839	$245	32.2%	-36.5%	-48.7%
1983	442	10.1%	$15,348	$1,479	15.4%	-38.7%	2.5%
1984	172	3.6%	$3,543	$86	27.7%	-51.3%	3.0%
1985	179	6.3%	$6,963	$354	7.6%	-39.5%	7.3%
1986	378	6.3%	$19,653	$1,030	18.6%	-20.4%	14.3%
1987	271	6.0%	$16,299	$1,019	-1.8%	-18.9%	4.5%
1988	97	5.4%	$5,324	$186	55.7%	8.3%	51.3%
1989	105	8.1%	$6,773	$336	51.1%	16.8%	32.5%
1990	104	10.8%	$5,611	$454	12.2%	-34.1%	-32.4%
1991	273	12.1%	$15,923	$1,788	31.5%	-1.7%	5.8%
1992	385	10.2%	$26,373	$2,148	34.8%	-2.3%	-19.4%
1993	483	12.8%	$34,422	$3,915	44.9%	-7.8%	-23.9%
1994	387	9.8%	$19,323	$1,650	74.1%	-8.3%	1.0%
1995	432	21.5%	$28,347	$5,033	24.8%	-62.3%	-14.1%
1996	621	16.7%	$45,940	$7,383	25.6%	-57.0%	8.6%
1997	432	13.8%	$31,701	$4,664	67.7%	6.8%	41.0%
1998	267	22.3%	$34,628	$5,352	27.1%	9.1%	12.2%
1999	457	71.7%	$66,770	$37,943	-46.2%	-32.9%	-74.2%
2000	346	56.1%	$62,593	$27,682	-64.7%	-36.4%	-42.6%
2001	80	14.0%	$34,344	$2,973	n.a.	n.a.	n.a.
1980-1989	1,982	7.4%	$82,476	$5,409	20.8%	-24.7%	6.9%
1990-1994	1,632	11.2%	$101,652	$9,954	44.7%	-7.2%	-12.7%
1995-1998	1,752	18.1%	$140,613	$22,436	36.0%	-32.3%	11.6%
1999-2000	803	65.0%	$129,363	$65,625	-53.8%	-34.3%	-61.2%
2001	80	14.0%	$34,344	$2,973	n.a.	n.a.	n.a.
1980-2001	6,249	18.8%	$488,448	$106,397	22.6%	-23.4%	-5.1%

	a	b_t	b_{t-1}	s_t	s_{t-1}	v_t	v_{t-1}	R^2_{adj}
Panel A: Sensitivity of intercepts to expanding the number of factors								
(1) Jan 73-Sept 01	-0.32 (-1.17)	1.40 (24.25)						63.1%
(2) Jan 73-Sept 01	-0.47 (-1.82)	1.39 (25.22)	0.34 (6.08)					66.6%
(3) Jan 73-Sept 01	-0.21 (-1.23)	1.11 (27.01)		1.16 (22.16)		-0.23 (-3.76)		86.1%
(4) Jan 73-Sept 01	-0.20 (-1.22)	1.10 (28.12)	0.11 (2.85)	1.13 (22.07)	0.10 (2.01)	-0.22 (-3.80)	-0.15 (-2.50)	87.5%
Panel B: Sensitivity of the intercepts to different sample periods								
(5) Jan 73-Dec 89	-0.15 (-0.83)	1.02 (23.83)		1.33 (20.20)		-0.17 (-2.36)		89.7%
(6) Jan 90-Dec 99	-0.14 (-0.77)	1.11 (20.79)		1.23 (18.88)		-0.17 (-2.24)		91.3%
(7) Jan 90-Dec 00	-0.48 (-2.01)	1.17 (17.39)		0.96 (13.80)		-0.25 (-2.76)		88.2%
(8) Jan 00-Sept 01	0.62 (0.29)	1.45 (3.13)		0.60 (1.59)		-0.68 (-2.24)		75.9%

(The second half of the 1990s marked the sudden rise of a new sort of economy, one in which stock markets experienced high growth rates under the influence of venture capital and IPO-funded companies in the Internet sector and related fields. Hence, the

name 'Dot-com Economy,' which refers to the commercial websites that characterized so many of these companies, was born as a term to identify companies featuring internet domain names ending with ".com." High volume stock speculation was fueled by the fact that this was a novel industry with high potential, but also one where companies were difficult to value. Investors looking for the new 'hot' stocks triggered high demand for tech stocks in general, as well as causing the overvaluation of many companies in this field. At its peak, even companies which had never made any revenue were pushed onto the stock exchange and were trading at extremely high values when one looked at the bottom lines of these companies—which were extremely negative in most cases. As early as 1996, Alan Greenspan, the chairman of the Fed at the time, warned against 'irrational exuberance,' where rational investing was replaced by momentum investing. On March 10, 2000, the technology stock index Nasdaq peaked at over 5,000 points, the day after a fire sale of tech stocks started marking the end of the rise of the 'new economy'). In Table 5, they report time-series regression results using the Fama-French (1993) 3-factor model. The in Row 1 reports the results of simple one-factor regression, with the market excess return as the explanatory variable. Rows 3, 4 return to a value of about -2.5% per year. They point out that Brav and Gompers have noticed that Fama and French 3 factor regressions tend to have negative intercepts for portfolios of small growth firms whether or not the portfolio is composed by IPOs. They also show that a large fraction of IPOs fall in the extreme small growth category so this is an important concern. Thus taking this into consideration Ritter and Welch (2002) excluded from their sample most of the small firms by selecting only firms with an offer price higher than 5 dollars per share.

Another bias concerning the right-hand side variable (the Fama-French factor returns) which is partly composed of the return on IPOs documented by Loughran and Ritter is as well pointed out. Due to the fact that IPOs tend to be small growth stocks a small firm portfolio will have more IPOs than a larger firm portfolio especially after periods of heavy issuing volume. Similarly, a portfolio of value stocks will have fewer IPOs than a portfolio of growth stocks. Thus, SMB will have a low return and VMG will have a high return following heavy IPO issuance if IPOs underperform. For IPOs from calendar year 2000, the average return from the closing price on its first day of trading until September 2001was −64.7 percent. From January 2000 to September 2001, the dependent variable in Table 5, the equally weighted portfolio of IPOs from

the prior 36 months, had an average monthly return of −355 basis points. However row 8 of table 5 shows a positive intercept of 62 basis point per month. The reason for this according to their explanation is that the regression attributes the collapse to the negative market returns and simultaneous collapse of technology stocks, which is reflected in positive realizations on VMG. (VMGt is the return on a portfolio of Value stocks Minus the return on a portfolio of Growth stocks in period t. and is one of the dependent variables used in their model Value and growth are measured using book to market ratios, and VMG is denoted HML in the literature High book-to-market (value) Minus Low book-to-market (growth) stocks).

They argue that since no accepted model of risk-adjusted performance can measure post-IPO performance has been provided by the asset-pricing literature it remains unclear how abnormally poor post-IPO performance is. Relative to similar in terms of size and book-to-market firms IPOs have had very modest underperformance independently of the method (buy-and-hold or Fama-French regressions.) used to measure it. In addition to this it is clear that both IPO firms and matching firms had rather unlikable performance at a time when the stock market performed exceptionally well and as far as equally weighted post-IPO returns are concerned they have been low relative to broad market indices during recent decades.

They suggest that the aforementioned evidences should make one cautious in case of comparing papers which attribute a weakening of disappearance of IPO effect to novel measurement techniques and that the sample period may be responsible for same of the conclusions. Nevertheless it still remains unclear how abnormally poor post-IPO performance is since asset-pricing literature has not provided an accepted model of risk-adjusted performance against which one can measure post-IPO performance. They claim that Relative to other firms with similar size and book-to-market characteristics, IPOs have had very modest underperformance, whether one uses buy-and-hold returns or Fama-French regressions.

In the study of Schultz (2003) he presents a theory in which shows that underperformance is very likely to be observed ex-post in an efficient market. He makes the assumption that more firms issue equity at higher stock prices even though the cannot predict future returns. Ex-post issuers seem to time the market because offerings cluster at market peaks. Based on a sample of IPOs from 1973 to 199, data reveal that when ex-ante expected abnormal returns are zero median ex-post

underperformance for firms issuing public shares will be significantly negative in event time but by using calendar-time returns the problem is solved.

A significant amount of research studying the performance behavior of IPOs attribute poor performance subsequent to offerings to behavioral reasons by suggesting that stock prices periodically diverge from fundamental values and that managers and investment bankers take advantage of this fact and sell shares to overly optimistic investors something which is consistent with the evidence. On the other hand though the proponents of efficient market hypothesis are in complete puzzlement. Others suggest that when excess returns are properly measured the evidence for long-run underperformance of IPOs disappears, whereas, other studies suggest that post IPO returns of similar to those of firms with similar in terms of market capitalization and book-to-market characteristic.

The author argues that much of the empirical work on long-run performance of IPOs is based on event-time returns. Event-time returns is the performance statistics calculated across stocks for periods of time following offerings even though the offerings took place at different times. This technique weights offerings equally and tests a strategy of investing the same amounts in each IPO. An alternative technique is the calendar-time technique according to which performance is calculated for recent equity offerings for calendar months which means that months instead of offerings are equally weighted and equal amounts are invested each calendar month. It is documented in the broader IPO literature that under performance is much greater when calculated in event-time. This is what behaviorists consider a key piece of evidence for providing their explanation for the documented underperformance. Thus if managers can time the market, offerings should cluster when stock prices are particularly high and returns should be significantly poor following periods of heavy issuance.

Schultz (2002) argues that the phenomenon he examines and refers to as *pseudo market timing can explain the poor event-time performance of stocks that have recently issued equity.* He bases his pseudo market timing hypothesis on the fact that the more firms can receive for equity the more likely they are to issue stock even if the market is efficient and managers have not timing abilities. In this case sales will be concentrated at peak prices ex-post even though companies cannot determine

market peaks ex-ante. As a result of this pseudo market timing, the probability of observing long-run underperformance ex-post in event-time may far exceed 50%. By using simulations and the relation between the number of offerings and market levels over the period of 1973-1997 the author reveals that underperformance of more that 25% in the five years following an offering is neither surprising nor unusual in an efficient market.

What is important for pseudo market timing is that managers in effect use trigger prices to determine when to issue equity. He supports his claim by providing the following example.

He examines one-period returns following offerings rather than multi-period returns, he assumes that the market earns return of zero and the aftermarket return of IPOs is equal to the market return plus an excess return of either +10% or -10%. Positive and negative excess returns are equally likely and are unpredictable. Private firms that are potential IPOs are assumed to earn the same returns as recent IPOs. He also assumes equal prices of all recent IPOs and the per share value that private firms could get for an IPO is the same. At time 0 is 100 dollars. He assumes that no companies go public if stock prices for potential IPOs are less than 95 dollars there is an IPO if prices are between 95 dollars and 105 dollars and three IPOs if prices exceed 105 dollars. The number of IPOs is considered for the periods 0, 1 and their single-period aftermarket excess returns are examined. With two possible IPO excess returns each period there are 4 equally likely possible path-offerings and excess returns. Each row of the following table corresponds to one of these paths.

Looking at the first row of the table it can be noticed that this path is the one IPOs earn positive excess returns each period. At time 0 IPO stock prices are 100 and one firm goes public according to the aforementioned assumptions. At time 1 with an IPO price of 110 three additional IPO take place. Each of these IPOs earns an excess return of 10 percent. In this path we have a total of 4 IPOs . If event-time strategy is used average excess returns for each individual IPO must be equally weighted resulting in 10% excess return. Considering all possible paths by using event-time strategy, which means weighting each IPO equally, the average aftermarket return is positive only in the first path and negative for the rest 3 paths. Thus even though the expected aftermarket return for any individual IPO is zero, there is a 75% probability

that the observed mean aftermarket return will be negative. This, according to Schultz occurs because of pseudo market timing. This means that there are more offerings when IPO prices are at peaks ex-post. If however excess returns are calculated using calendar-time strategy that is weighting each month equally the mean excess returns of the IPO would be zero.

Table 2: Table I of Schultz (2002), An example of pseudo market timing

Price at 0	Issued at 0	Excess Return 0 to 1	Price at 1	Issued at 1	Excess Return 1 to 2	Number of IPOs	No. of IPOs Followed by +/- Excess Return	Mean Excess Return
100	1	0.10	110	3	0.10	4	4/0	0.10
100	1	0.10	110	3	-0.10	4	4/1	-0.05
100	1	-0.10	90	0	0.10	1	0/1	-0.10
100	1	-0.10	90	0	-0.10	1	0/1	-0.10

Another characteristic of IPO performance mentioned by Schultz (2002) is that offerings that occur during heavy offering periods are more likely to underperform than offerings that take place during periods of light offering activity. Again looking at the table above it is clear that the heavy offering periods is 1 for the first two paths and 0 for the two last paths. In three of the four cases the heavy offering period is followed by poor returns. This result comes about because heavy issuing periods are defined ex-post. As far as the decision to go public is concerned Schultz (2002) argues that it is a response to current price levels and not a matter of the ability to predict future returns.

Emphasis is given to the fact that although the probability of observing a price path where equal weighted aftermarket returns are negative is 75% an IPO is never a bad investment ex-ante since if one weights each of the four price paths by the number of IPOs on it the expected return is zero.

Pseudo market timing is based upon two assumptions.

1. It is assumed that at higher market levels of stock prices more firms will go public
2. It is assumed that excess returns of IPOs are positively correlated cross sectional.

Regarding pseudo market timing and expected long-run abnormal returns Schulz (2002) uses the following equation in order to estimate average long-run cumulative abnormal returns

$$\overline{CAR} = \sum_{e=1}^{E} \frac{\left[\sum_{j=1}^{N}(r_{j,e} - r_{m,e})\right]}{N}$$

He argues that N the number of offerings is not an exogenously determined constant as previous researchers have assumed but rather a random variable that is correlated with excess returns. Thus expected cumulative abnormal return is the expectation of the product of the total abnormal return that is the numerator of the above equation and 1/N. The expectation of a product is the product of the expectation plus the covariance

$$E(\overline{CAR}) = E\left(\frac{1}{N}\right) E\left[\sum_{e=1}^{E}\sum_{n=1}^{N}(r_{j,e} - r_{m,e})\right] + Cov\left(\left(\frac{1}{N}\right)\left[\sum_{e=1}^{E}\sum_{n=1}^{N}(r_{j,e} - r_{m,e})\right]\right).$$

Because the number of offerings over the sample period is positively related to earlier abnormal returns there is a positive covariance between the excess returns and the raly part of the sample period and the total number of offerings N or equivalently, there is a negative correlation between the excess returns and 1/N. In an efficient market where the expected return of the IPO firms is equal to the expected return of the market or matching firm the first term of the second equation is zero and there is no real market timing. Thus it is the second term of the second equation, the covariance between the returns and the inverse of the number of offerings that leads to a negative expected value for the cumulative abnormal returns. This is the effect of pseudo market timing on ex-post returns.

Schultz (2002) argues that two are the factors that determine the expected level of abnormal returns from pseudo market timing. The first is that the variance of the excess returns. If the variance of the excess returns was zero, or equivalently if the IPO returns were perfectly correlated with the benchmark returns, ex-post IPOs would cluster when the prices received by companies going public would be highest. Thus if these prices were perfectly correlated with a benchmark then it would appear that IPOs time the benchmark and excess returns would be zero. The greater the variance

of the excess returns the more the issuing firms will appear to underperform the benchmark. The second is sensitivity of the number of offerings to the IPO index level. The more sensitive the number of offerings is, the greater the reduction in offerings will be, following a decline in the IPO index.

Miller 1977 proposed the hypothesis of divergence of opinion Miller contends that in markets with restricted short selling, such as with IPOs, market prices are determined by the optimistic investors "who think highly enough of the investment merits of the new issue to include it in their portfolio. Pessimistic investors must wait until short sale is allowed. Consequently, early aftermarket prices may exceed the aggregate value predicted across all potential investors. Over time, as short sale restrictions are lifted and additional information about the firm becomes available, prices are able to approach their fundamental value. Miller proposes that a greater divergence of opinion among IPO investors will result into greater short-run overvaluation, which in turn will result in greater long-run underperformance.

Furthermore as Houge, Loughran, Suchanek and Yan propose in their study another series of restrictions like the requirement from brokers to guarantee delivery of borrowed shares before allowing customers to sell short. In addition the SEC prohibits the underwriting syndicate from loaning allocated shares until 30 days after the IPO. Furthermore since short selling is not allowed arbitrageurs are prevented from proceeding to any transactions. All these restrictions in regards to short selling result in limiting the initial aftermarket performance and prices may not reflect the sentiment of the pessimistic investors.

One major problem in testing the divergence of opinion hypothesis is that the variance of beliefs among investors cannot be calculated. In the study of Houge, Loughran, Suchanek and Yan use three-day opening proxies for the divergence of opinion hypothesis.

1. The percentage opening bid-ask spread,
2. The time of the first trade
3. The flipping ratio

They argue that IPOs with a wide initial spread a late opening trade or high proportion of institutional flipping will exhibit poor long-run returns.

Market makers widen the opening bid-ask spread when faced with greater uncertainty. Therefore this spread provides an early indication of the divergence of opinion among investors.

As far as time of first trade is concerned the lead underwriter decides the time an IPO stars trading. This provides flexibility to observe the market and delay the open if necessary. The delay of the opening has more value when uncertainty about an offering is high.

The flipping ratio defined as the proportion of sell-signed large block volume (trades of 10,000 shares or more) is the final proxy they use for investigating the divergence of opinion hypothesis.

The sample they use consists of 2,205 IPOs from 1993-1996 and they to relate the opening spread and its predictive power, the time of first trade or a high proportion of flipping with long-run performance of up to three years of the IPO and document the results

Their study is related to several previous studies which relate uncertainty to underpricing and the expected initial return of IPOs to the ex-ante uncertainty about their value. Furthermore they prove that the opening spread, time of the first trade and the flipping ratio are proxies for the divergence of opinion hypothesis. Moreover they show that wider divergence of opinion leads to greater long-run underperformance something which is in consistence with Miller's (1977) findings.

In the article of Beatty and Ritter (1985) they argue that there is an equilibrium relation between the expected underpricing of an IPO and the ex-ante uncertainty about its value. This underpricing equilibrium according to their arguments presented in the paper is enforced by investment bankers. The results providing grounds for their theory are highly dependent on the fact that, while many initial public offering record high prices in their first day of trading, many others decline in price once they start trading. As a result initial while public offerings are underpriced an investor submitting a purchase order cannot be certain about an offering's value once it starts trading publicly. This uncertainty is what they call "ex ante uncertainty". The fact that an equilibrium is enforced by the investment banker (underwriter) is based on the grounds that the underwriter will be involved in many initial public offerings over

time. They argue that an investment banker who does not follow the rules of the game, by enforcing the equilibrium relation, by either pricing too much or pricing too low the issue will be penalized by the marketplace.

Numerous studies have proven that on average initial public offerings are underpriced. The magnitude of this underpricing is substantially greater than that found on firms that are already public.

The major feature of initial public offering market is that once the issuing firm and its managing underwriter set an offering price any excess demand for the issue creates a situation of quantity rationing rather than further adjustment of the offering price. Quantity rationing is the artificial restriction of the number of shares allocated to investors. It does not matter how much an investor is willing or can afford to pay for the acquisition of a share of the issuing firm; investors are only allowed to purchase a limited amount of shares.

IPOs on average have positive initial returns but there is also a considerable number of IPOs that the price of their shares decline after the beginning of trading. It is also a fact that the offerings that their prices significantly increases once they start trading are the ones which are more commonly oversubscribed contrary to those which prices declines. As a result a representative investor (representative investor is the one attempting a free ride) submitting purchase orders for all the issues will find that he is allocated shares that go up less frequently than shares that go down. This means that the average return an investors realizes from the offers he was allocated is lower than the average return he would have realized provided that we had been allocated shares from all of his purchase orders. In other words an investor faces a "winner's curse" and thus has an incentive to incur costs in order to identify, via securities analysis, which shares are more likely to go up. In equilibrium, the investor will be compensated for the costs he incurred by earning sufficient profits provided that the issues are underpriced. In reality though this is what causes the winner's curse for the representative investor and creates the need for underpricing.

The magnitude of the difference between the conditional returns and thus the degree of underpricing is directly related to the ex-ante uncertainty about the value of an issue. As a result in order for an investor to be willing to submit a purchase order for shares with greater ex ante uncertainty, more money left on the table are required via

underpricing. This argument leads the first proposition of theirs which is "the greater is the ex-ante uncertainty about the value of an issue, the greater is the expected underpricing".

The intermediary between the issuing firm and the investor which is the investment banker guarantees that there won't be a lemons problem on the IPO market as the issuing firm that goes public only once has no incentive on leaving money on the table. On the other hand the underwriter underwrites many offering over time and thus the lemons problem can be addressed. Due to the repeat of business with potential purchasers, an investment banker-underwriter can develop a reputation and earn a return on this reputation, thus it is an investment banker's interest to enforce the underwriting equilibrium when setting an offering price.

There are three conditions that guarantee the underpricing of an offer.

1. The investment banker is uncertain what the market price of the stock once it starts trading will be, as otherwise the underwriter could perfectly price each and every issue and thus there wouldn't be the winner's curse.
2. The investment banker has non-salvage reputation at stake, on which it can earn a return.
3. The investment banker's ability to earn a return on this non-salvage reputation mitigates if he underprice too much or too little.

The second and third condition refer to the fact that the net present value of proceeds an investment banker can expect to earn by several underwritings over time exceed the short-term benefits he could earn from opportunistic behavior. This willingness not to behave opportunistically is how the proponents perceive the so called good reputation. If the underpricing equilibrium is enforced by investment bankers with reputation at stake, any investment banker that underprices too much or too little should lose customers, for otherwise there wouldn't be any incentive not to cheat. If on average an investment banker does not underprices its offering too much then investors would not earn sufficient returns and they would be subject to winner's curse and this would result in their ceasing doing business with the specific underwriter. On the other hand if an investment banker underprices its offerings too much this would mean too much money left on table by the issuing firms and this would motivate other issuing firms not to do business with the specific underwriter.

Based on this argument the authors produced their second proposition which is: Underwriters whose offerings have average initial returns that are not commensurate with their ex-ante uncertainty lose subsequent market share".

They prove that there is a positive relation between the ex-ante uncertainty about an IPO's value and its expected initial return. They have also argued that underpricing is enforced by investment banks. It is in the interest of investment banks to maintain the underpricing equilibrium which is achieved if three conditions are fulfilled: the underwriters are not perfect forecasters of the aftermarket price, each underwriter must have non-salvageable reputation capital at stake on which it is earning a return, and any underwriter who cheats by, on average, pricing 'off the line' must lose clients.

In the study of Glezakos and Gotzageorgis the long-run performance of IPOs in examined over a seven year period of 1994-2000. Their sample consists of 176 firms that went public during these years. In their attempt to identify the sources of the underperformance of IPOs they use proxies such as initial return between the offer price and the price of the fifth day of trading, the age, gross proceeds and price volatility are sued as proxies to validate for the uncertainty and divergence of opinion hypothesis. Furthermore they use a dummy taking on values 0,1 to denote for the cold and hot market period in order to identify the windows of opportunity hypothesis.

They use two alternative methods for the calculation of aftermarket performance of IPOs. Along with the buy and hold strategy they also use the cumulative abnormal returns in order to address problems associated with the choice of measurement. This problem has been pointed out on several earlier studies as a possible reason that biases results in regards to the underperformance of IPOs.

Their results are mostly in consistence with the findings of earlier studies and they suggest that the performance of IPOs in the Greek market during the period of 1994-2000 is greatly influenced by factors such as the initial return, issue period issue size and price volatility. These results provide evidence that the three hypotheses under investigation do hold

3. METHODOLOGY

This chapter will explain the research methods and the data used to carry out the investigation into IPO aftermarket performance in the U.S market. Furthermore the empirical findings of this dissertation's research for IPOs will be presented along with comparisons to the research and results of earlier studies.

My research model is based on the model and methodology used in the study of Jay R. Ritter published by the Journal of Finance in 1991. According to my view this paper conducts satisfactory formal statistical tests. In addition to this, the paper documents various cross-sectional and time-series patterns with the purpose to investigate possible explanations for the long run underperformance of initial public offerings. In many cases throughout the empirical part of my study I compare and contrast my findings with the findings documented in his research.

To account for the long-run performance of IPOs I use the buy-and-hold technique and different measures. Furthermore in many cases I use the financial crisis of 2008 as a time benchmark to compare and contrast the results of long-run performance and of other features of the study among different periods

In the literature for IPOs there is an ongoing debate among academics on whether or not the stocks of IPO firms underperform in the long-term. Most studies have documented the aforementioned underperformance while others provide empirical evidence with the exact opposite findings.

This part of the dissertation will attempt to contribute to either one of these two sides of the debate.

3.1 DATA OF THE SAMPLE AND METHODOLOGY

The sample used in this dissertation is comprised by 419 firms that went public in the United States during the period of 2005-2012. The criteria used to result to this sample were the following:

1. Only firms based in the United States were included
2. Restriction in terms of gross proceeds above $ 100 million has been set.
3. Companies from all industries were included in the set apart from Insurance companies and Real Estate Investment Trusts.
4. The company should be listed either on NASDAQ Composite or on NYSE Composite

No restrictions in regards to the offer price and the type of underwriting commitment have been set, nor in regards to the type of underwriter.

Returns are calculated only for one interval. A second interval could have been the calculation of initial returns which is defined as the percentage change of the offering price to the closing price of the first day of trading. Since the scope of this research is to provide evidence for the aftermarket performance of the initial public offerings no initial returns have been calculated.

The aftermarket return is defined as the return one two and three years after the initial offering excluding the initial period which is normally one day. The aftermarket period includes the 36 months following the IPO month. Each month during the aftermarket period is defined as twenty-one trading days starting from the month next to the one during which the IPO took place. For the IPOs which have been delisted before their third anniversary the 1-year, 2-year, and 3-year buy and hold return as well as the average market-adjusted and the average cumulative market-adjusted return are calculated by taking into account the last price before their delisting.

Monthly benchmark adjusted returns are calculated as the total of the monthly return on a stock plus one, minus, the total of the monthly benchmark return for the corresponding 21-trading-day period plus one. The benchmarks used are the NASDAQ Composite and NYSE Composite index. Each company in the IPO portfolio is benchmarked on the index which is traded on. More specifically the methodology used is as follows:

The benchmark-adjusted return for stock i in event month t is defined as

$$ar_{it} = r_{it} - r_{mt} \qquad (1)$$

Where r_{it} is the raw return of an IPO in event month t and r_{mt} is the raw return of the index used as benchmark for the corresponding month.

The average benchmark-adjusted return on a portfolio of n stocks for event month t is the equally-weighted arithmetic average of the benchmark-adjusted returns:

$$AR_t = \frac{1}{n} \sum_{i=1}^{n} ar_{it} \qquad (2)$$

The cumulative benchmark-adjusted aftermarket performance from event month q to event month s is the summation of the average benchmark-adjusted returns:

$$CAR_{q,s} = \sum_{t=q}^{s} AR_t \qquad (3)$$

When the firm in portfolio is delisted from the CRSP data, the portfolio return for the next month is an equally-weighted average of the remaining firms in the portfolio. The cumulative market-return for months 1 to 36, $CAR_{1,36}$, thus involves monthly rebalancing, with the proceeds of a delisted firm equally allocated among the surviving members of the portfolio p in each subsequent month. For the month in which an IPO is delisted, the return for both the IPO and the benchmark includes just the days from the start of the month until the delisting.

As an alternative to the use of cumulative average benchmark-adjusted returns, which implicitly assumes monthly portfolio rebalancing, I also compute 1-year, 2-year, and 3-year holding period returns, defined as

$$R_i = \prod_{t=1}^{N}(1 + r_{it}) \qquad (4)$$

Where r_{it} is the raw return on firm i in event month t and N represents the months of holding the stock (12, 24, 36 months). This measures the total return from a buy-and-hold strategy where a stock is purchased at the first closing market price after the month during which the firm went public and held until the earlier of (i) its 3 year anniversary, or (ii) its delisting.

To calculate the benchmark-adjusted buy-and-hold return for a single stock the following equation is used:

$$R_{it} - R_{It} \qquad\qquad (5)$$

Where $R_I = \prod_{t=1}^{N}(1 + r_{It})$, and r_{It} is the raw return on the index in event month t.

In order to reach a result for the benchmark-adjusted return for the IPO-portfolio using the buy-and-hold technique I use the average market-adjusted return defined as:

$$\frac{1}{M} \sum_{m=1}^{M}(Ri - RI)$$

Where M is the total number of firms included in the portfolio. I calculate the average market-adjusted return for the portfolio with the buy-and-hold technique for 1, 2 and 3 years

In addition to the average market-adjusted return for the buy-and-hold technique I also compute the median market-adjusted return as an alternative way to derive at a central the tendency for the long-run performance of the portfolio.

4. EMPIRICAL FINDINGS

In the following table the number of total offers is reported by exchange of trade and by year of issuance. Gross proceeds are also reported according to the amount sold worldwide. Furthermore, the proceeds from overallotment options if exercised are also included. Excluded from the sample are insurance companies and REITs (Real Estate Investment Trusts).

Table 1: Distribution of Initial Public Offerings by year of issuance and by exchange of trade

	NASDAQ Composite		NYSE Composite		IPO Portfolio	
Year	No. of IPOs	Gross Proceeds (million $)	No. of IPOs	Gross Proceeds (million $)	No. of IPOs	Gross Proceeds (million $)
2005	25	$4.271,9	41	$14.362,3	66	$18.634,2
2006	39	$6.446,8	32	$14.772,7	71	$21.219,5
2007	34	$7.448,1	30	$14.723,6	64	$22.171,7
2008	3	$434,0	11	$21.941,3	14	$22.375,3
2009	11	$4.513,9	19	$7.256,3	30	$11.770,3
2010	21	$4.356,1	28	$22.666,9	49	$27.023,0
2011	23	$4.271,7	42	$20.569,9	65	$24.841,6
2012	15	$20.822,4	45	$12.181,0	60	$33.003,4
Total	171	$52.564,9	248	$128.474,1	419	$181.039,0

In table 1 above we can observe the volume of the issuance during the period under investigation. As we can see initial public offerings are not evenly distributed during the period of 2005-2012. It is interesting that during the years before and after the financial crisis of 2008 issuing volume is high while during the period of 2008 only 14 out of the total of 419 firms went public. During the years 2005-2007 201 firms, 48% of the sample went public while during March 2009 until the end of 2012 207 firms, another 48% of the sample went public.

During the period 2008-2009 when issuing activity was at its bottom,-14 firms from my sample went public in 2008 and 30 on 2009-(3 went public on NASDAQ composite and 11 on NYSE composite for 2008. For 2009, 11 firms on NASDAQ composite and 19 firms on NYSE Composite went public.)

While 2008 was the lowest year in terms of issuance we can observe that gross proceeds were much greater even for years of heavy issuance like the years preceding 2008. This is attributable to Visa Inc., the world's largest credit card network, which raised $17.9 billion in its initial public offering, the largest ever in the United States.

Visa, which is based in San Francisco, sold 406 million shares of class A common stock for $44 per share, compared with a forecast range of $37 to $42, according to an underwriter. Underwriting was led by JPMorgan Chase and Goldman Sachs

One may wonder why Visa chose that particular period of time to launch its IPO. There are two possible explanations for this. One is because Visa makes its profits from transaction fees, not lending, so it doesn't have to worry as banks do about people making their credit-card payments. (Visa made a $424 million profit in the last quarter of 2007, up 70% from a year earlier). Another explanation could be that the banks that own Visa could make more than $10 billion from the IPO. JPMorgan Chase alone is estimated to have earned about $1 billion and during those hard times banks were in dire need of money.

4.1 MEASURING LONG-RUN PERFORMANCE; BUY-AND-HOLD TECHNIQUE

Buy and hold is a passive investment strategy in which an investor buys stocks and holds them for a long period of time, regardless of fluctuations in the market. An investor who employs a buy-and-hold strategy actively selects stocks, but once in a position, is not concerned with short-term price movements. Conventional investing wisdom tells us that with a long time horizon, equities render a higher return than other asset classes such as bonds.

Using the buy-and-hold technique I have calculated the long-run performance of IPO firms for the sample period of 2005-2012. The measures used are the average market-adjusted return and the median market-adjusted return. The purpose for using these two different measures (average and median) is based on the idea that the average affects the result when trying to find a tendency in a sample as it is influenced by extreme low or extreme high prices. Speaking more specifically average

and median are statistical terms that have a somewhat similar role in terms of understanding the central tendency of a statistical set. While an average has traditionally been a popular measure of a mid-point in a sample, it has the disadvantage of being affected by any single value being too high or too low compared to the rest of the sample. This is why I have chosen the median as a better measure of a midpoint. In my opinion, the mean is not a robust tool since it is largely influenced by extreme returns (there are cases when a single return of +100%, +200%, +400% affects the resulting performance, while the vast majority of the rest of returns are negative). Thus I consider the median-adjusted return a better suited measure to derive at central tendency for the long-run performance since it is much more robust and sensible and throughout my study I focus mostly on it.

4.1.1. LONG-RUN PERFORMANCE BY INDEX

Table 2 presents the results of the long-run performance of the sample of 419 IPOs by market of trade, year of seasoning and performance measures. IPOs have been categorized by the exchange they are traded on and that index is used as a benchmark for the measurement of their performance. As we can see in the table above, the measures used to account for the performance of the IPO-portfolio, demonstrate mixed conclusions. The average market-adjusted return for the IPO-portfolio is 4.41%, 3.27% and 2.56% for the 1st, 2nd, and. 3rd year of seasoning, with p values of 0.076, 0.181, 0.292 respectively for each year suggesting that there is not statistical significance in the outperformance indicated by this measure. On the other hand though the median market-adjusted return gives evidence of -3.18%, -9.28%, -14.04% for the 1st, 2nd, and. 3rd year of seasoning with p-values of 0.039, 0.002 and 0.001 respectively for each year presenting a statistical significance in the underperformance of IPOs.

Table 2: Distribution of Initial Public Offerings and their corresponding aftermarket benchmark-adjusted returns by year of seasoning; performance measures are Average market-adjusted return and Median market- adjusted return

	Buy & Hold All IPOs			
Year of seasoning	Average adjusted Return	p-value Average	Median adjusted Return	p-value Median
1st	4.41%	0.076094	-3.18%	0.0393
2nd	3.27%	0.181719	-9.28%	0.0021
3rd	2.56%	0.292203	-14.04%	0.0017

The average adjusted return provides evidence for an outperformance of the IPO-portfolio in regards to the two indices used as benchmark. The median adjusted return provides a result which is consistent with the findings of previous work and studies and fulfils the pattern of IPO firms that severely underperform benchmarks set. As mentioned earlier median market-adjusted return are considered throughout this study as a more robust measure for calculating the long-run performance of IPOs.

Taking a closer look at these results by digging into the specific components of the sample we can observe at table 3 that there is also a difference between the results of the performance of the IPOs traded on NASDAQ Composite and those traded on NYSE Composite.

Table 3: Distribution of Initial Public Offerings and their corresponding aftermarket benchmark-adjusted returns by year of seasoning and market of Trade; performance measures are Average market-adjusted return and Median market- adjusted return

	Buy & Hold							
	NYSE IPOs				NASDAQ IPOs			
Year of Seasoning	Average adjusted Return	p-value Average	Median adjusted Return	p-value Median	Average adjusted Return	p-value Average	Median adjusted Return	p-value Median
1st	8.47%	0.0078	-1.68%	0.2425	-1.12%	0.420198	-5.62%	0.0461
2nd	12.58%	0.0042	0.25%	0.5253	-10.24%	0.02898	-21.13%	0.0000
3rd	13.67%	0.0128	-3.29%	0.3755	-13.60%	0.028822	-30.66%	0.0000

The NYSE-traded IPOs have an average market-adjusted return of 8.47% for the first year of seasoning, 12.58% for the 2nd year of seasoning and 13.67% for the 3rd with the p-values of all years being lower than 0.05, giving evidence of a statistically significant outperformance of the IPOs relative to the Index. On the other hand when excluding for extreme prices the pattern of underperformance is once more present for the 1st and the 3nd year of seasoning while it is marginally positive by 0.25% for the 2nd. In this case though p-values are high, not supporting the underperformance phenomenon In the case of NASDAQ Composite results are in complete order with the documented pattern of the long run underperformance of IPOs which escalates as the stocks continue to season. Ritter (1991) reports wealth relatives of below 1 which is a sign of underperformance. In his paper to interpret 3-year total return he computes wealth relatives as a performance measure, defined as

$$WR = \frac{1 + average\ 3-year\ total\ return\ on\ IPOs}{1 + average\ 3-year\ total\ reurn\ on\ matching\ firms}.$$

A wealth relative of greater than 1.00 can be interpreted as IPOs outperforming a portfolio of matching firms; a wealth relative of less than 1.00 indicates that IPOs underperformed.

Both average market-adjusted return and median market-adjusted return, the measures of long-run performance, report negative performance for all 3 years of seasoning. Average market-adjusted return is -1.12%, -10.24%, -13.60% for years one, two, and three of seasoning respectively. P-values for the average market-adjusted return are 0.420, 0.028, and 0.028 for the 3 years of seasoning respectively. While the p-value for the first year is not statistically significant putting into question the underperformance of IPOs for the 1st year of seasoning, the median marker-adjusted return for this year is -5.62% with a p-value of 0.046 proving the underperformance phenomenon to hold. For the 2nd and 3rd years of seasoning the median market-adjusted is -21.13%, -30.66% with p-values of 0.00 and 0.00 respectively once again supporting the underperformance phenomenon widely documented in earlier researches and studies.

Considering all the above a possible explanation for the positive average market-adjusted returns reported in the case of all IPOs might be attributed to the influence of the positive average market-adjusted returns reported for NYSE-traded IPOs and

the fact that these IPOs represent 60% of the IPO sample. Nevertheless we can observe that this positive average market-adjusted performance reported for all the IPOs is diminishing from 4.41% in the 1st year to 3.27% for the 2nd year and 2.56% in the last year of seasoning.

4.1.2. LONG-RUN PERFORMANCE BY PERIOD OF ISSUANCE

In an attempt to identify and compare the performance of initial public offerings relative to the period firms chose to go public, I have categorized the IPOs in three different periods. The first is the pre-financial crisis period expanding from 2005 to 2007, the second one is the period during which the U.S. economy fell into a recession; this period expands over 2008 to 2009. The last one is the period when the U.S. rebound and starting growing again, it expands over the years 2010 to 2012.

Table 4 reports the average market-adjusted return of all the IPOs for each of the aforementioned periods for each of the three years of seasoning. As we can, see during the first period of 2005-2007, average market-adjusted returns is positive throughout the 3 years of holding the firms' stocks with the first year's p-value of 0.045 showing statistical significance for the outperformance of these firms. The rest years of seasoning for this period while in accordance with the first year in terms of performance they are not statistically significant. The same applies for the rest of the periods and their corresponding years of seasoning. They show an outperformance of the IPO firms relative to the indices used as benchmarks with their p-values not dropping below the level of statistical significance of 0.05

Table 4: Aftermarket Performance of IPOs categorized by period relative to the 2008 financial crisis, measuring technique is buy-and-hold, measures used are average market-adjusted return

	Buy & Hold					
Year of Seasoning	1st Year		2nd Year		3rd Year	
Period	Average adjusted Return	p-value	Average adjusted Return	p-value	Average adjusted Return	p-value
2005-2007	8.78%	0.0458	4.35%	0.2056	6.21%	0.1824
2008-2009	0.55%	0.4662	5.38%	0.2672	11.10%	0.1923
2010-2012	0.33%	0.4676	1.49%	0.3983	-3.83%	0.3013

The next table presents the long-run performance of IPOs using as a measure the median market-adjusted return. 1st year ends with a median market-adjusted return of -1.69%, for the 2nd year and 3rd year median market-adjusted return is -11.62% and -14.97% respectively with the underperformance of the second and third year being statistically significant. During the 2nd period of 2008-2009 when the financial crisis was at its pick the IPOs performed outstandingly well considering the macro-environment and the circumstances that the crisis brought about. The sample of the IPOs outperformed the two indices set as benchmark. During the 1st year of seasoning the median market-adjusted return is 3.11% for the 2nd year and the 3rd year of seasoning the market-adjusted return is 5.31% and 7.94% respectively. While this being said the statistical significance of the results of the second period was not supported as the p-values for all three years of seasoning were under the level of 0.05

Finally the last period of the investigation, the period of 2010-2012, shows that for all three years of seasoning the IPOs underperformed the benchmarks by -9.74%, -8.71% and -17.04%.The p-values for this period are 0.928, 0.045 and 0.001 giving evidence of statistical significance for the underperformance observed during the period of 2010-2012

Table 5: Aftermarket Performance of IPOs categorized by period relative to the 2008 financial crisis, measuring technique is buy-and-hold, measures used are Median market-adjusted return

	Buy & Hold					
Year of Seasoning	1st Year		2nd Year		3rd Year	
Period	Median adjusted Return	p-value	Median adjusted Return	p-value	Median adjusted Return	p-value
2005-2007	-1.69%	0.1987	-11.62%	0.0023	-14.97%	0.0332
2008-2009	3.11%	0.4402	5.31%	0.3258	7.94%	0.2257
2010-2012	-9.74%	0.0289	-8.71%	0.0405	-17.04%	0.0015

These observations along with the ones presented in table 1 are in consistence with the theory of the windows of opportunity mention by Loughran and Ritter (1995). Their results indicate that the stocks of firms going public in so-called 'hot' markets (i.e., in periods of particularly high IPO activity) tend to perform substantially worse than the stocks of companies going public in 'cold' markets (i.e., in periods with low IPO activity). They argue that IPO firms might try to take advantage of transitory

windows of opportunity by going public during hot issue markets when their stock is substantially overvalued. According to their study firms issuing during years when there is little issuing activity do not underperform much at all, whereas firms selling stock during high-volume periods severely underperform. In fact this is the case in my study too.

4.1.3. LONG-RUN PERFORMANCE BY INDUSTRY

In this section I have calculated the long-run performance of IPOs using once more the buy-and-hold technique for each industry separately. It is clear by looking at the table below that the long-run performance varies widely among the different industries.

Table 6: Distribution of Initial Public Offerings by industry using the buy-and-hold technique; measure used is average market-adjusted return

	Buy & Hold					
Year of Seasoning	1st year		2nd year		3rd year	
Industry	Average adjusted Return	p-value	Average adjusted Return	p-value	Average adjusted Return	p-value
Basic Materials	13.30%	0.217438	17.26%	0.151616	25.98%	0.233451
Cyclical Cons. Goods & Services	-1.16%	0.415094	-15.43%	0.007723	-17.15%	0.057933
Energy	20.47%	0.027061	13.12%	0.082614	11.74%	0.174904
Financials	0.66%	0.457355	4.60%	0.33665	-2.11%	0.416861
Healthcare	5.89%	0.346303	-1.06%	0.475806	3.10%	0.424365
Industrials	0.77%	0.454642	2.06%	0.401302	5.21%	0.302844
Non-Cyclical Cons. Goods & Services	-2.94%	0.376968	6.14%	0.276554	-6.11%	0.356831
Technology	-1.76%	0.385155	3.92%	0.323713	7.23%	0.240569
Telecommunications Services	-1.89%	0.064176	-23.92%	0.092013	-24.32%	0.154685
Utilities	14.97%	0.136502	34.69%	0.174672	15.64%	0.314836

As we can observe, the statistical significance of the most industries is far above the level of 0.05. According to this measure Utilities was the industry which had the best long run performance, while Telecommunication Services was the industry which had the worst long-run performance. At the end of the third year of holding the stocks of IPO firms only four industries had underperformed the indices with the underperformance being statistically not significant in all these cases.

As far as the median market-adjusted returns are concerned the following table demonstrates the long-run performance of IPOs and their corresponding p-values.

Table 7: Distribution of Initial Public Offerings by industry using the buy-and-hold technique; measure used is average median market-adjusted return

	Buy & Hold					
Year of Seasoning	1st year		2nd year		3rd year	
Industry	Median adjusted Return	p-value	Median adjusted Return	p-value	Median adjusted Return	p-value
Basic Materials	1.26%	0.5775	11.23%	0.2786	-3.43%	0.4225
Cyclical Cons. Goods & Services	-7.18%	0.2595	-20.03%	0.0031	-26.87%	0.0137
Energy	11.08%	0.0444	-10.13%	0.1063	-2.61%	0.4550
Financials	-5.11%	0.2250	-8.61%	0.1037	-19.61%	0.0385
Healthcare	-6.17%	0.1239	-14.11%	0.2210	-15.16%	0.2210
Industrials	-1.69%	0.1358	-12.64%	0.2916	-4.66%	0.3919
Non-Cyclical Cons. Goods & Services	-14.71%	0.1917	13.28%	0.5000	-14.80%	0.5000
Technology	-13.72%	0.0302	-4.50%	0.2414	-7.48%	0.2414
Telecommunications Services	-12.59%	0.0547	-29.53%	0.0107	-33.67%	0.0107
Utilities	18.08%	0.1445	13.93%	0.1445	1.03%	0.6367

Most of the industries during all years of seasoning recorded a negative median market-adjusted return. Some firms marginally underperformed the benchmark while others underperformed to a greater extent. At the end of the third year of seasoning all industries with the exception of Utilities firms severely underperformed the benchmark. The p-value of the median market-adjusted return was statistically significant at the level of 0.05 only in the case of Cyclical Consumer Goods & Services firms, Financial firms, and Telecommunication Services firms. Moreover these firms recorded the greater underperformance in comparison to the firms of other industries. Furthermore the underperformance of Cyclical Consumer Goods & Services firms as well as the Telecommunication Services firms was statistically significant in the 2nd year of seasoning. Basic Materials firms recorded the best long-run performance reaching a –3.43% median market-adjusted return at the end of the 3-year holding period while during the previous two years they recorded a 11.23% and a 1.26% median benchmark-adjusted return, specifically for years one and two respectively. On the other hand Telecommunication Services firms were the worst

long-run performer recording a -33.67% median market-adjusted return by the end of the 3-year holding period. This industry also recorded negative median market-adjusted returns for years one and two of seasoning (-12.59% and -29.53% respectively).

4.1.4. LONG-RUN PERFORMANCE BY GROSS PROCEEDS

In this part of the dissertation I have categorized the long run-performance of firms that went public during the period of 2005-2012 by the amount of gross proceeds each one generated by the IPO. Firms have been classified among 4 classes of proceeds with each class representing the 25% of the sample of IPOs in terms of Gross Proceeds. The long-run performance is measured for all 3 years of seasoning by the measures of average market adjusted return and median market-adjusted return.

Table 8: Distribution of IPOs by proceeds generated; Measure used: average market adjusted return; gross proceeds are measured in millions of dollars

Buy & Hold					
Years of Seasoning	1st Year		2nd Year		3rd Year	
Gross Proceeds (in $ Million)	Average adjusted Return	p-value	Average adjusted Return	p-value	Average adjusted Return	p-value
100-139	0.26%	0.475071	-2.52%	0.347184	-0.88%	0.451914
140-199	3.76%	0.225456	-0.24%	0.485726	-10.37%	0.101085
200-360	4.71%	0.163391	5.89%	0.196293	5.91%	0.275814
360-17,864	8.98%	0.171009	10.09%	0.124007	15.75%	0.088239

The one, two and three-year benchmark-adjusted return on IPOs have been calculated by taking into account only the capital gains and not the gains from dividends.

The results of the long-run performance of IPOs using the average market-adjusted return produces mixed results. The two lowest quartiles in terms of proceeds give evidence of a slight underperformance of IPOs in the years two and three with their adjusted returns being statistically not significant at the level of 0.05. On the other hand the firms included in the largest two quartiles in terms of proceeds did not underperformed the indices set as benchmarks during three-year holding period. Measuring the long-run performance based on the average market adjusted return the results are mixed for all gross proceeds quartiles during the 3 years of seasoning. The

results indicate both underperformance and outperformance of the IPO firms relative to the benchmarks not allowing reaching a conclusion for the central tendency of the performance of IPO firms.

As can be seen in table 9 below, when measuring the long-run performance of firms using the median market-adjusted return, all gross proceeds quartiles underperformed during all three years of seasoning.

Table 9: Distribution of IPOs by proceeds generated; Measure used: median market-adjusted return; gross proceeds are measured in millions of dollars

Buy & Hold						
Years of Seasoning	1st Year		2nd Year		3rd Year	
Gross Proceeds (in $ Million)	Median adjusted Return	p-value	Median adjusted Return	p-value	Median adjusted Return	p-value
100-139	-3.64%	0.1032	-12.76%	0.0125	-15.72%	0.0322
140-199	-1.27%	0.3482	-11.16%	0.0392	-17.64%	0.0858
200-360	-0.61%	0.4610	-10.50%	0.0705	-14.30%	0.0475
360-17,864	-6.30%	0.0705	-1.76%	0.4610	-8.58%	0.2463

During the 1st year of seasoning the largest quartile underperformed the most, while during the second year the smallest quartile was the one which gave evidence for the largest underperformance. The first and second quartiles had the largest underperformance during the second year of seasoning which was also statistical significant. The p-value for the first quartile is 0.012 and the p-value for the second quartile is 0.039 for the second year of seasoning.

For the third year of seasoning the second quartile underperformed the most while the p-value was higher than the threshold of statistical significance. Conversely the first quartile and the third with an underperformance of -15.72% and -14.30% respectively, were statistically significant with p-values of 0.032 for the first quartile and 0.047 for the third. The   When measuring the long-run performance based on the average market adjusted return the results are mixed for all gross proceeds classes during the 3 years of seasoning. The results indicate both underperformance and outperformance of the IPO firms relative to the benchmark not allowing the reaching of a conclusion for the central tendency of the performance of IPO firms.

4.1.5 LON-RUN PERFORMANCE BY THE AGE OF ISSUING FIRM

In the following table firms have been segmented based on their age at the time of going public. Their age is calculated as the year of the offer minus the year of founding. For firms that were founded before 1901 is assumed that they were founded in 1901.

Table 10: Distribution of IPOs by age. of issuing firm. Aftermarket performance by year of seasoning is presented; Measure used: Average market-adjusted Return.

		Buy & Hold					
Year of Seasoning		1st year		2nd year		3rd year	
Age	Sample size	Average adjusted Return	p-value	Average adjusted Return	p-value	Average adjusted Return	p-value
0-1	51	6.88%	0.2381	1.71%	0.4348	-8.89%	0.2767
2-4	47	2.94%	0.3191	13.55%	0.1393	1.83%	0.4355
5-9	91	-3.71%	0.2801	-2.39%	0.3679	-1.27%	0.4488
10-19	86	10.39%	0.1352	3.01%	0.3420	5.78%	0.2865
20-up	144	5.56%	0.0906	4.20%	0.2562	7.34%	0.1881

Table 10 includes all 419 IPOs of the sample and the long-run performance of IPOs according to the measure of average market-adjusted return. As can be observed, the lowest performance is present for the firms of age 5-9 which underperformed during all three years of seasoning. The rest age classes show a outperformance of IPOs relative to the indices. Nevertheless the underperformance is not statistically significant for any of the age classes as well as for any of the years of seasoning. This result is not in consistence with the findings of Ritter (1991) according which the strongest underperformance is found among the youngest firms. Moreover Ritter finds all age classes to underperform.

The following table, table 11 reports the aftermarket performance of IPOs using the median market-adjusted return as measure for accounting for the long-run performance of IPOs. According to this measure we can observe that all age classes indicate an underperformance of IPOs. Firms that belong to age class of 5-9 years are the worst performers while the youngest firms underperform severely.

Table 11: Distribution of IPOs by age. of issuing firm. Aftermarket performance by year of seasoning is presented; Measure used: Median market-adjusted Return

		Buy & Hold					
Year of Seasoning		1st year		2nd year		3rd year	
Age	Sample size	Median adjusted Return	p-value	Median adjusted Return	p-value	Median adjusted Return	p-value
0-1	51	-5.17%	0.2879	-5.40%	0.2879	-14.30%	0.2879
2-4	47	-6.24%	0.2800	-5.72%	0.2800	-7.14%	0.2800
5-9	91	-12.48%	0.0057	-18.55%	0.0031	-27.19%	0.0031
10-19	86	3.33%	0.4571	-7.64%	0.0803	-9.05%	0.1659
20-up	144	-0.40%	0.4013	-9.45%	0.2267	-12.53%	0.1393

In addition to this, the aforementioned class was statistically significant at the level of 0.05 and even the level of 0.01 during all three years of seasoning. The long-run performance of all the other classes was not statistically significant with the exception of the fourth class which showed an underperformance of -7.64% during the second year of seasoning which was statistically significant at the level of 0.10. It is documented in previous studies that the youngest firms are the ones which underperform the most in comparison with the firms that belong to other age classes. In this case the pattern is not repeated

4.2. MEASURING LONG-RUN PERFORMANCE; CUMULATIVE AVERAGE RETURNS

Along with buy-and-hold technique for the measurement of long-run performance I have calculated the cumulative benchmark-adjusted return. (CAR) for months 1 to 36. This method requires monthly rebalancing. For a month in which one or more firms are delisted, the return for both the IPOs and the benchmark includes just the days from the start of the month until the delisting. Moreover, apart from the measurement of long-run performance of the IPOs I have also calculated the performance of IPOs traded on NASDAQ Composite and NYSE Composite separately and used the corresponding indices as benchmarks. Digging deeper into the components that form the sample and the benchmark may provide an insight to the result of cumulative benchmark-adjusted return of the whole sample

Table 5 reports the average market-adjusted returns (AR), the cumulative benchmark-adjusted return (CAR) for months 1-36 of seasoning as well as a count of the remaining firms in the portfolio which starts with 419 firms and ends with 383 firms-36 firms less. In addition to this the long-run performance of IPOs traded on NYSE and on NASDAQ is reported. Furthermore p-values for each of the aforementioned underperformance has been calculated.

As we can observe in regards to all IPOs the average benchmark-adjusted returns (AR) have mixed signs during the 36 months. The abnormal return has a positive sign giving evidence of an outperformance of IPOs and was significant at the level of 0.10 rather than the typical level of 0.05 for these 36 months. As a result the cumulative benchmark-adjusted return (CAR) in month 36 is a positive number which means that the sample of IPOs outperformed the market. However when calculating the performance of the IPOs traded on NYSE and NASDAQ separately, we can identify two diametrically contradictory results. While IPOs traded on NYSE have a positive cumulative benchmark-adjusted return reflecting an outperformance relative to the benchmark, the returns of the IPOs traded on NASDAQ start positive with a slight increase during the first months of seasoning

Table 12: Abnormal return for IPOs in the period of 2005-2012; average benchmark-adjusted return (AR$_t$) and cumulative benchmark-adjusted return (CAR$_t$) for the 36 months after the firm went public.

| Month of Seasoning	CAR NYSE IPOs	CAR NASDAQ IPOs	AR All IPOs	p-value	CAR All IPOs	No of Remaining IPOs
1	1.46%	1.21%	1.36%	0.0122	1.36%	419
2	1.65%	1.73%	0.32%	0.3184	1.68%	419
3	2.12%	2.54%	0.61%	0.1596	2.29%	419
4	2.10%	2.76%	0.08%	0.4490	2.37%	419
5	1.99%	1.42%	-0.62%	0.1793	1.76%	419
6	2.81%	-0.36%	-0.24%	0.3628	1.52%	419
7	3.34%	-1.45%	-0.13%	0.4085	1.38%	419
8	4.81%	-2.18%	0.57%	0.2156	1.96%	419
9	4.54%	-2.73%	-0.38%	0.2564	1.57%	419
10	4.75%	-4.13%	-0.45%	0.2467	1.13%	419
11	5.25%	-3.56%	0.53%	0.2186	1.65%	419
12	6.02%	-4.41%	0.12%	0.4252	1.78%	418
13	5.90%	-4.96%	-0.30%	0.3064	1.48%	418
14	7.25%	-5.63%	0.47%	0.2200	1.95%	416
15	8.32%	-4.33%	1.19%	0.0305	3.14%	415
16	9.11%	-6.12%	-0.27%	0.3427	2.87%	414
17	10.88%	-7.13%	0.64%	0.1953	3.51%	414
18	11.79%	-7.55%	0.35%	0.3219	3.87%	412
19	13.15%	-7.92%	0.62%	0.1897	4.49%	412
20	13.23%	-6.20%	0.75%	0.1719	5.23%	410
21	13.17%	-7.51%	-0.66%	0.1954	4.57%	409
22	13.03%	-7.05%	0.02%	0.4483	4.59%	408
23	13.38%	-6.88%	0.10%	0.3555	4.69%	406
24	12.21%	-7.95%	-1.15%	0.0704	3.55%	404
25	13.63%	-7.40%	1.21%	0.0867	4.76%	404
26	14.36%	-8.82%	-0.22%	0.4185	4.53%	401
27	13.77%	-9.08%	-0.37%	0.2644	4.16%	400
28	13.68%	-9.61%	-0.13%	0.3647	4.04%	399
29	13.77%	-9.92%	0.44%	0.3368	4.48%	397
30	14.77%	-9.71%	0.64%	0.1668	5.12%	395
31	17.00%	-9.53%	1.38%	0.0919	6.50%	389
32	17.64%	-9.57%	0.52%	0.2885	7.01%	387
33	16.60%	-12.21%	-1.53%	0.0074	5.48%	385
34	16.44%	-11.91%	0.04%	0.4856	5.52%	384
35	16.54%	-11.65%	0.24%	0.4259	5.76%	384
36	17.24%	-11.08%	0.89%	0.2109	6.65%	383

and in month 5 the negative average benchmark-adjusted returns are reflected on the cumulative benchmark adjusted returns.

By month 36 the cumulative benchmark-adjusted return of the IPOs traded on NASDAQ is -11.08% while first peaking at -12.21% in month 33, which confirms the result of the long-run underperformance.

As far as the p-values for the IPOs traded on NASDAQ and on NYSE is concerned, the statistical significance lies within the level of 0.10 for the some months while only a very small number of months is statistically significant at the level of 0.05.

In figure 1 below we can observe four cumulative (adjusted) returns series which are plotted for the 36 months after the IPO date. In this figure I have plotted the average cumulative market-adjusted returns from month 0-36 as well as the raw IPO portfolio returns. Initial returns are not included in this chart. The four series plotted in the order they appear are from top to bottom:

Figure 1: Cumulative average adjusted returns for an equally-weighted portfolio of 419 initial public offerings in 2005-2012 with monthly rebalancing
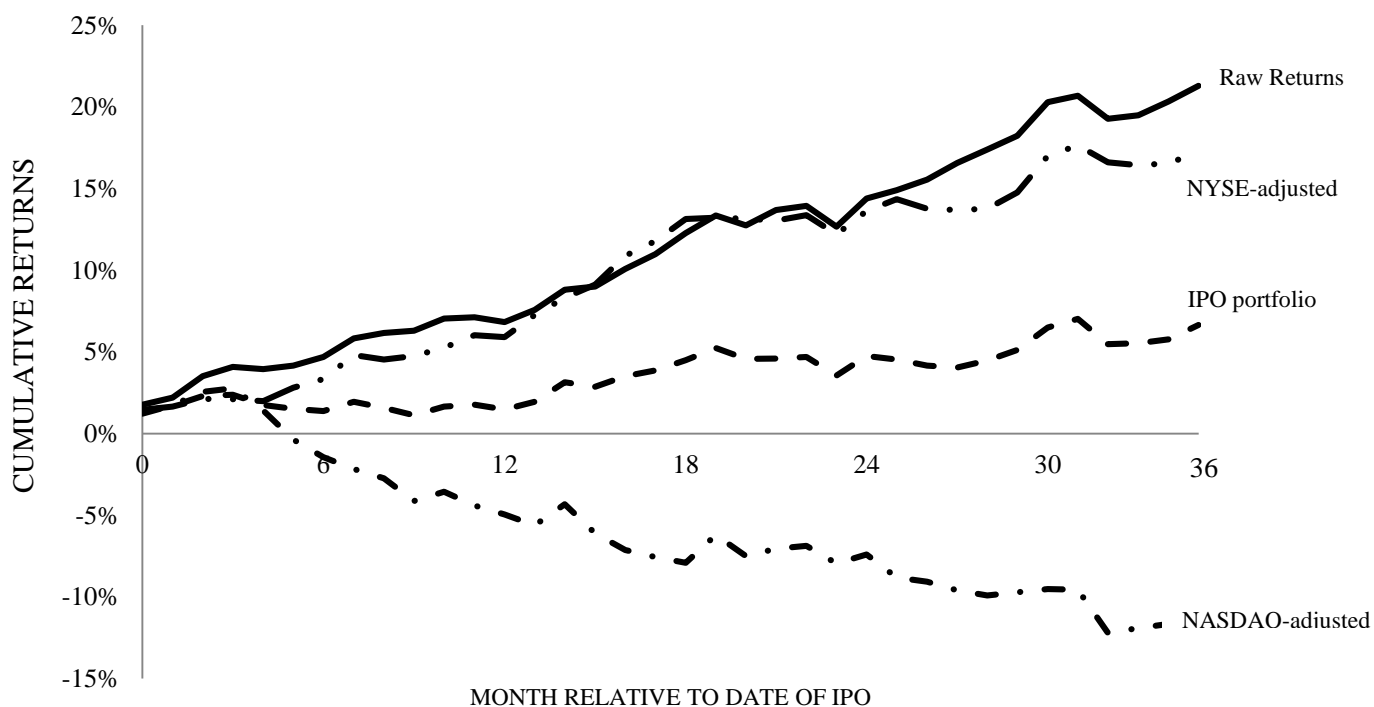
1. IPO-portfolio raw returns
2. NYSE-adjusted returns (Adjusted returns of IPOs traded on the NYSE)

3. All IPOs-adjusted returns (Each stock is adjusted on the market which it is traded on)

4. NASDAQ-adjusted returns (Adjusted-returns of IPOs traded on NASDAQ)

Focusing initially on the raw returns the monthly average raw returns of the whole sample of IPOs vary between -1.42% and 2.06%. The cumulative average raw return of the IPO sample peaks at 21.29% in month 36. This can be possibly attributed to the bull market which started in early spring of 2009 after the financial crisis of 2008 and lasted until the summer of 2015. During this time most stock market indices in the United States performed substantially well. NYSE composite reached 10,800 in June 2015 from just 6,000 in March 2009. During the same period NASDAQ composite reached above 5,100 in the summer of 2015 from 1500 in March 2009. Accordingly S&P500 reached above 2,100 by the summer of 2015 from below 800 in March of 2009.

During this period of March 2009 until late summer of 2012 203 firms from the sample had gone public, a number which represents 48.5% of the total number of IPOs in the sample. and 53.38% of gross proceeds of the sample.

In addition to IPO raw returns figure 1 also includes the cumulative average market-adjusted returns (which are formed by subtracting the market return from each IPO return each month.) for the two indices:

1. NASDAQ composite
2. NYSE composite

These two indices behaved differently after the outburst of the financial crisis of 2007-2008. This crisis threatened the collapse of large financial institutions, which was prevented by the bailout of banks by national governments, but stock markets still dropped worldwide. The crisis played a significant role in the failure of key businesses, declines in consumer wealth estimated in trillions of U.S. dollars and a downturn in economic activity. The bursting of the U.S. housing bubble caused the values of securities tied to U.S. real estate prices to plummet, damaging financial institutions globally. Questions regarding bank solvency, declines in credit availability and damaged investor confidence had an impact on global stock markets, where securities suffered large losses during 2008 and early 2009.

Plotted in figure 2 below is the cumulative return of the two indices. These two indices has been used as benchmarks for the calculation or IPO aftermarket performance during the 132 months that this study expands. We can observe that both indices had a steep drop after the 43th month which is during 2008 resulting in negative returns. The peak of this drop reached a cumulative return of -35.5% for NASDAQ composite and -41.23% for NYSE composite. When the markets turned bull around March 2009 (month 50-51) both indices recorded positive returns which cumulated at 112.57% and 62.34% for NASDAQ Composite and NYSE Composite respectively.

This difference of cumulative returns between these two indices may provide an explanation as to why IPOs traded on NYSE outperformed the index almost by all the measures used for calculating the IPO performance. NYSE composite averaged 1.22% per month during the bull market period while the per-month average return for NASDAQ Composite was 1.82%. This means that NASDAQ composite recorded a 49% higher return per month than NYSE composite from March 2009 to late summer 2015. Generally NYSE Composite substantially underperformed other indices.

Figure 2: Cumulative return of NASDAQ Composite Index and NYSE Composite index from 1/1/2005-1/12/2015
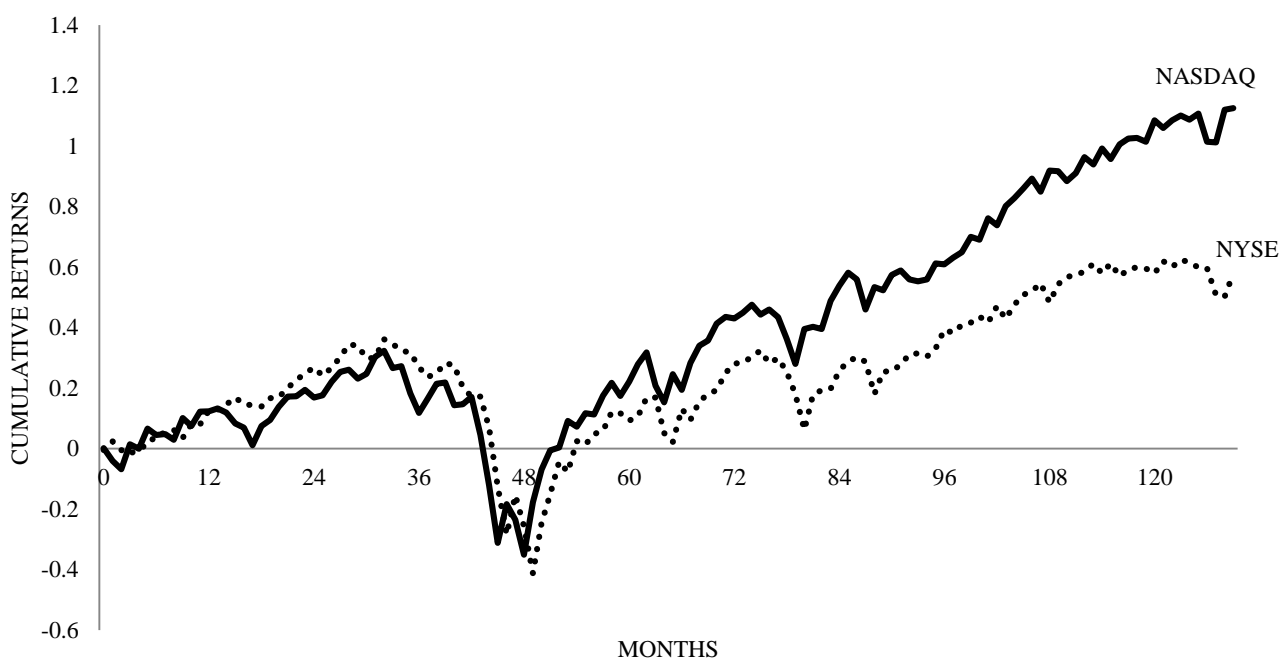
Furthermore given the fact that 60% of the IPOs included in the sample are traded on NYSE, the long-run performance of IPOs is influenced upwards. Combining the information and the findings presented in table 1 and Figure 2 it can be concluded that my findings are partially consistent with the pattern which has been documented in the literature for IPOs of firms going public during times when markets are booming and investors are prepared to pay high market to book prices in order to acquire newly issued stocks. This over optimism is mentioned in the literature as "fads".

It is obvious by looking in figure 2 that as the market gained momentum and cumulative returns started to increase, the number of IPOs also increased. During 2008 issuance was limited to 14 IPOs. However, during the subsequent years the offerings started to increase. There were 30 offerings for 2009, 49 offerings for 2010, 65 and 60 for 2011 and 2012 respectively.

4.3.Regression Results

In the previous sections various cross-sectional and time series patterns have been presented in order to investigate possible reasons for the explanation of the long-run performance of IPOs.

In this section I have run regressions based on the previous patterns in order to identify which of these reasons the long run underperformance can be attributed to.

The regression is based on the ordinary least squares method and the equation is:

$Return_i = b_0 + b_1 IR_i + b_2 Log(1+age_i) + b_3 Log(ISS_i) + b_4 ISP_i + \beta_1 Basic Matetials_{i,t} + \beta_2 Cyclical$
Cons. Goods and Services $+\beta_3 Energy_{i,t} + \beta_5 Financials + \beta_6 Heathlcare + \beta_7 Industials + \beta_8 Technollogy + \beta_9 Telec.Servises + \beta_{10} Utilities + \gamma_1 2006 + \gamma_2 2007 + \gamma_3 2008 + \gamma_4 2009 + \gamma_5 2010 + \gamma_6 2011 + \gamma_7 2012 + e_i$

$Return_i$ is the raw return for each of the years of seasoning measured from the first closing price of the month after the month during which the firm went public. IR_i is the market-adjusted initial return using as market indices the NASDAQ Composite index for the firms traded on NASDAQ and the NYSE Composite for the firms traded on NYSE. $Log(1+age_i)$ is the natural logarithm of the difference between the year of

going public and the year of founding plus one, with firms founded before 1901 assumed to be founded in 1901. Log(ISS_i) is the natural logarithm of the gross proceeds the i_{th} firm raised from its IPO. ISP_i is a 0, 1 dummy variable taking on the value of 1 if the issuing period is characterized by high issuing activity (i.e.: hot market) or the value of 0 if the issuing period is characterized by low issuing activity (i.e.: cold market). The periods from 2005 to 2007 and from 2010 to 2012 are periods characterised as hot market and the periods of 2008-2009 is characterised as cold market period. $Industry_i$ is a dummy variable as well, taking on values of 1 if the firm is included in the specific i_{th} industry or the value of 0 if it is not.

The one-year, two-year, three-year IPO's return was chosen as a proxy for their long-run performance. Thus it was set as a dependent variable in all the regressions performed.

IPO's performance between the offering price and closing price at the end of the first trading day was used as proxy for the degree of overvaluation of the new issue. If the fads hypothesis holds the two parameters must be negatively correlated.

The hot market periods were expressed by the dummy variable with the value of one while the value 0 was designated the cold market period. Negative correlation is expected between the dependent variable and the explanatory variable if the windows of opportunity hypothesis hold.

The two other variables age and issue size in terms of gross proceeds are used as proxies for the ex-ante uncertainty. To the extent that IPO quality is positively correlated with the size of the offering, divergence of opinion will play an important role explaining the long-run performance of both high quality and low quality IPOs. Thus size and age consist the explanatory variables in testing the validity of the uncertainty and divergence of opinion hypothesis.

Furthermore dummy variables are used in order to control for industry effects so as to avoid any influence on the outcome of the study. Fixed effects may impact or bias the outcome variables and thus we need to control for this.

Since the analysis I want to perform is describing a change over time and since the data include a time-invariant identifier (company name) a time-varying outcome

(return) and an indicator for time (period of issuance) a panel regression is most proper regression analysis that has to be used.

The table below presents the results of the regression for the first 12 months of holding the IPOs.

Table 13: Panel regression, 1st year of seasoning, year dummies and industry dummies

| | 1st Year | | | | | | |
	C	INI	ISP	ISS	AGE	R^2	St. Error
Coefficient	1.164	0.0394	0.0746	0.0990	0.0938		
t-Statistic	4.186	0.2141	0.5441	-1.051	1.066	0.34	0.64
p-value		0.8306	0.5868	0.2939	0.2871		

As we can observe for the first year of seasoning, there is no negative correlation between the dependent and the explanatory variables as was expected. Furthermore the proxies responsible for explaining the phenomenon of the long–run underperformance do not pass the threshold of statistical significance. According to the results of the regression none of the possible reasons presented earlier can justify the underperformance documented and measure in this study as well as in earlier studies. Nevertheless, in the research of Buser and Chan (1987) no underperformance is observed. This can be attributed either in the underperformance of the index they used as benchmark or on the fact that their study investigates the performance of IPOs only for two years after the issue rather than the three years of most studies. Since most of the underperformance documented occurs in the third post issue year it is expected that the results will converge to the results of other studies at the second or third year of seasoning.

Table 14: Panel regression 2nd year of seasoning, year dummies and industry dummies

| | 2nd Year | | | | | | |
	C	INI	ISP	ISS	AGE	R^2	St. Error
Coefficient	0.8626	-0.0185	-0.0075	0.15345	-0.0923		
t-Statistic	2.2145	-0.0951	-0.0424	1.103203	-2.3303	0.29	0.81
p-value	0.0276	0.9243	0.9662	0.2709	0.0205		

Table 14 presents the results on the regression for the 2nd year of seasoning. As it can be seen apart from the coefficient of initial return variable, the coefficient of the age

variable has also turned to negative indicating that the uncertainty and divergence of opinion holds.

Miller (1977) argues that a wide divergence of opinion or uncertainty among IPO investors can lead to short-run overvaluation and long-run underperformance. The regression results presented on the table above regressions examine the interaction between two-year buy and hold return of IPOs and of divergence of opinion and uncertainty indicators.

The dependent variable is the two-year buy and hold return. The independent variables are the size of the IPO in terms of gross proceeds and the age of the company measured as the year of its foundation until the year of the firm's IPO.

Consistent with previous studies on IPO long-run performance like the studies of Ritter (1991) and Carter and Singh (1998) is the finding that the age of a firm is a good predictor for the long-run performance of IPOs.

As far as the rest of the proxies are concerned the coefficient of initial returns (INI) and the coefficient of issue period (ISP) are also negative, however, they are not statistically significant. This lack of statistical significance is in contrast with the evidence provided by earlier studies on the long-run performance of IPOs.

Table 15: Panel regression 3rd year of seasoning, year dummies and industry dummies

	3rd Year						
	C	INI	ISP	ISS	AGE	R^2	St. Error
Coefficient	1.3512	-0.1395	-0.2366	0.0435	-0.0559		
t-Statistic	5.0116	-0.7689	-1.3245	0.3316	-0.7398	0.39	0.92
p-value	0.0000	0.4425	0.1864	0.7404	0.4600		

Table 15 presents the results of the regression for the 3rd year of seasoning. Once more we have negative coefficient for initial return denoted as INI was used as a proxy for the degree of overvaluation of the new issues and by which the fads hypothesis have been tested. As it was expected the two parameters are negatively correlated.

The coefficient of the variable ISP which denotes the issue period and was used to test the windows of opportunities hypothesis is negative and in consistence with the

results of earlier studies Negative correlation was expected to be observed between the dependent and the explanatory. However, it is not statistically significant.

The coefficient of the proxy used to test for the uncertainty and divergence of opinion hypothesis-AGE, was also negative and in consistence with other studies and statistically significant at the level of 10%.

5. CONCLUSION

This dissertation was focused on the investigation of the initial public offering puzzle widely documented in the literature- the long run performance of initial public offerings. The results of my study were mixed providing indications of the IPO sample outperforming and underperforming the benchmark set depending on the measure used. More specifically, I used a sample of 419 firms that went public during the period of 2005-2012 and measured their long-run performance for the 1st 2nd and 3rd year of seasoning. The benchmarks used were the index each firm was traded on. The measurement for the long-run performance has been achieved by using the buy-and-hold technique and the measures used were the average market-adjusted return and the median market-adjusted return. Additionally, the long-run performance was calculated by the cumulative benchmark-adjusted return.

Based on the buy and hold technique I have calculated the median market-adjusted return of the portfolio to be -3.18%, with p-value of 0.0393, -9.28% with a p-value of 0.0021 and -14.04% with a p-value of 0.017 for the years one, two and three respectively, a result which indicates that the portfolio consisting of 419 IPOs underperformed the market. When the sample was divided by market the results were mixed. Measuring the long-run performance with the average market-adjusted return the result was an outperformance of the IPOs traded on NYSE which was also statistically significant at the level of 0.1% for years first two years of seasoning and and at the level of 5% for the third year of seasoning. On the other hand the IPOs traded on NASDAQ severely underperformed the index. This underperformance was statistically significant when measured either by the average market adjusted return or the median market adjusted return.

When calculating the long-run performance for the IPO sample using cumulative benchmark adjusted return, the result was an outperformance of 6.65% in month 36. For the NYSE IPOs and on NASDAQ the 36th month ended with a cumulative benchmark adjusted return of 17.24% and -11.08% respectively.

In an attempt to categorize the aftermarket performance of IPOs by period of issuance relative to the financial crisis of 2008 I was able to identify a pattern documented by Loughran and Ritter in their work *New issues puzzle* published in 1995 by the Journal

of Finance according to which firms which decide to go public during periods of high issuing activity tend to perform substantially worse than the stocks of companies which go public during periods of low issuing activity. In consistence with this pattern the 44 firms that went public in the sample I used during the period of 2008-2009 outperformed the market during all years of seasoning by all measures used to account for long-run performance. Both average market-adjusted return and median market-adjusted return indicate the above mentioned outperformance.(Average market-adjusted return: 0.55%, 5.38%, 11.10% for years one, two and three of seasoning respectively. Median market-adjusted returns: 3.11%, 5.31%, 7.94% for years one two and three of seasoning respectively). However these results did not prove to be statistically significant.

In order to identify possible reasons for the underperformance a multivariate analysis was performed. Using proxies suggested in relevant literature (initial return for the identification of fads hypothesis, issue period for the identification of the windows of opportunities hypothesis and the age of the firm and gross proceeds for the validity of uncertainty and divergence of opinion hypothesis)
it was shown that only the age of the firm seriously affected the performance of IPOs in the American market during the period 2005-2012. Most of the results while in consistence with the expected sign, they did not prove to be statistically significant.
The coefficient of the proxy AGE was both negative and statistically significant. This result imply that the uncertainty and divergence of opinion hypothesis provide satisfactory explanation of the long-run performance of the IPOs listed on the NYSE and the NASDAQ

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