ERASMUS UNIVERSITY ROTTERDAM
ERASMUS SCHOOL OF ECONOMICS
MSc Economics & Business
Master Specialisation Financial Economics

Anomalies in the Dutch IPO market

Vasco Hoving

07-09-2009

Author: Vasco Hoving
EUR study number: 288026
Thesis supervisor: S. Gryglewicz
Finish date: 07-09-2009

PREFACE AND ACKNOWLEDGEMENTS

This thesis was written with the intent of gaining more insight on the Dutch IPO market. While the US market has been researched thoroughly, research on other markets has been less intense, and it was my belief there that there are real options of adding value to the body of literature on the Dutch IPO market.

With gratitude, I acknowledge the supervision and assistance I have received from my thesis supervisor, Sebastian Gyrglewicz. Also I would like to thank the Erasmus Datateam. The large part of the research of this thesis has been finding and processing of data, and without the help of the Datateam the research would have been extremely difficult.

ABSTRACT

This thesis investigates anomalies on the Dutch IPO market. Several key findings emerge. First, this paper confirms IPO underpricing on the Dutch IPO market of 18.2% between 1980 and 2002. The volume of IPOs confirms 1997-2000 was a hot issue market, in line with previous research. IPOs are overvalued compared to peers. There is no evidence that indicates IPO overvaluation is a driving factor of underpricing or long-term performance, contrary to evidence from the US market. There was no long-term over- or underperformance of IPOs, in line with the Efficient Market Hypothesis. IPOs from cold issue periods outperformed IPOs from hot issue periods, but this effect is not significant in a regression with control factors. IPO pricing compared to peers did not differ in hot or cold periods, indicating spinning was not a driving factor of underpricing in the dot.com boom period on the Dutch stock exchange. IPOs underwritten by investment banks with a good reputation exhibit lower underpricing, in line with the certification hypothesis.

Keywords: IPOs, Underpricing, Long-term performance, Issue periods, Underwriter reputation

Table of Contents

Chapter 1. Introduction

Over the years the market of Initial Public Offerings, or IPOs, has been subject to careful scrutiny in the academic literature. This particular market exhibits features unlike any other market documented. The premier studies on IPO pricing found IPO first-day returns showed a systematic positive return. In a seminal paper on IPO underpricing, Ibbotson (1975) also showed a high volume of new listings following high IPO underpricing. A number of hot issue periods have been detected on the US stock market, but also on different stock markets all over the globe in which new listings are substantially higher than in other periods that have subsequently been defined as cold issue periods. Long-term underperformance of IPOs, a novelty no longer, was first documented in the literature by Ritter (1991). While in the earlier years it was IPO underpricing that received the bulk of attention now it is also long-term underperformance of IPOs that receives its fair share of research. The Efficient Market Hypothesis postulates the unpredictability of asset returns due to the incorporation of information in prices. The peculiarities mentioned earlier continue to defy the Efficient Market Hypothesis. I aim to expand on the existing literature on these anomalies whilst focusing on the Dutch IPO market.

The research of this thesis builds on findings from a number of studies on the Dutch IPO market, and on a study published by Purnanandan and Swaminathan (2004), which finds IPOs are overvalued compared to peer firms on the US IPO market from 1980 to 1997. In the same study the authors also find that IPOs that are overvalued compared to peer firms exhibit higher underpricing and lower long-term performance. The studies on the Dutch IPO market show IPO underpricing over a number of periods. This thesis starts with an investigation of the existence of IPO underpricing on the Dutch market.

The existence of the long-term underperformance anomaly is also tested on the Dutch stock market using the Capital Asset Pricing Model to assess long-term risk adjusted abnormal returns. Using similar methodology as the study on the US market, I test whether IPOs on the Dutch stock market are overpriced compared to peer firms. Using peer valuation as a proxy for intrinsic IPO value, tests are conducted to assess

whether IPO valuation compared to peer firms drives underpricing and long-term performance. I also test whether underpricing, long-term performance and valuation compared to peer firm of IPOs differs in hot and cold issue markets. A number of studies have investigated the role of underwriters in the IPO process. The certification hypothesis claims prestigious investment banks are able to negotiate superior terms for the issuing firm, which in turn decreases underpricing (Carter and Manaster, 1990). Some studies find evidence in favour of the certification hypothesis while other find evidence of the opposite in a different time period on the US stock market. I investigate the role of underwriters in the new listing process and tests whether IPO valuation compared to peer firms, underpricing and long-term performance of IPOs differs when underwritten by investment banks with a good or bad reputation.

The dataset of this thesis comprises of 70 IPOs from 1990 to 2002 that satisfy the selection criteria. The research of this thesis shows IPO underpricing of 18.2% between 1990 and 2002 on the Dutch stock market, which is similar to other studies on underpricing on the Dutch market (Doeswijk, Hemmes and Venekamp, 2006). The volume of issues indicates the period from 1997 to 2000 as a hot issue markets, in line with previous research on the Dutch IPO market.

Also in line with previous studies on the Dutch IPO market are the results from the long-term performance of IPOs. Using the one-factor model in order to assess long-term risk adjusted abnormal return results in a statistically insignificant mean long-term performance of 1.2% and a statistically insignificant median long-term performance of -1.2%. Other studies on the long-term performance of IPOs on the Dutch IPO market using different long-term performance measurement techniques also show insignificant results (Buijs and Eijgenhuijsen, 1992; Hoeijen and van der Sar , 1999; Doeswijk et al., 2006)

I find the IPOs in the dataset are significantly overvalued compared to peer firms in line with research on the US market. Using a linear regression an insignificant positive relation between IPO overvaluation compared to peer firm and underpricing is found. Contrary to the study by Purnandan and Swaminathan (2004) on the US stock market this thesis does not find evidence of a negative relationship of IPO overvaluation compared to peer firms and long-term performance.

Differentiating the dataset in hot and cold issue periods shows underpricing is significantly higher in hot issue periods and shows long-term performance is significantly higher in cold issue periods. These findings are robust to excluding ICT firms from analysis, which comprised the better part of IPOs during the hot issue period in the dataset and were hurt most during the dot.com crash. A regression controlling for other factors does not however find significant results concluding IPOs from hot issue periods underperformed those from cold issue periods. IPO valuation compared to peer firms does not differ in hot and cold issue periods. This finding appears to contradict the process of spinning during the dot.com boom. Spinning is the deliberate underpricing of underwriters and distribution in favour of loyal clients, which has been named to be one of the explanations of underpricing in the dot.com boom on the US market (Loughran and Ritter, 2004). IPOs in this dataset were priced the same in hot and cold issue periods compared to peer firms, which indicates underwriters did not underprice new issues in this period to reward or enrich loyal clients. Evidence therefore contradicts that the theory of spinning contributed to IPO underpricing on the Dutch stock market in the dot.com boom period.

Research on the role of underwriters in the IPO process is in line with the certification hypothesis (Carter and Manaster, 1990; Carter, Dark and Singh, 1998). Both preliminary and the main statistical tests, a regression controlling for other factors, both indicate this finding. When dividing the dataset in two groups, underwriters with a good and underwriters with a bad reputation, IPOs underwritten by investment banks with a good reputation exhibit statistically significant lower underpricing than IPOs underwritten by an investment bank with a bad reputation. The results show no difference in long-term performance of IPOs underwritten by investment banks with a good or a bad reputation, contrary to the findings of Carter, Dark and Singh (1998), nor in the valuation of IPOs compared to peers. Underwriters with a good and bad reputation seem to price IPOs similarly to peer firms, indicating that underwriters with different reputations appear to use the same valuation methods.

This thesis is structured as follows. Chapter 2 reviews the existing literature on anomalies on the IPO market and on the Dutch IPO market. Chapter 3 presents the

data and methodology used in this thesis. Chapter 4 shows the results from the research and Chapter 5 presents the conclusion.

Chapter 2. Literature review

This chapter systematically discusses the recent and less recent but still important literature on IPO pricing and performance. Section 2.1 presents the literature on IPO underpricing followed by paragraph 2.2 that examines the literature on long-term underperformance of IPOs. Section 3.3 discusses the literature on hot and cold issue periods. Section 3.4 entails previous studies on the Dutch IPO market. These topics are however related and therefore it is vital not to see these topics as separate fields in the discipline of financial studies, but rather as topics that are related and interconnected. The relation between the paragraphs are explained where necessary or there are referrals to the other sections.

2.1 IPO Underpricing

The anomaly of Initial Public Offering Underpricing was first documented in the literature by Stoll and Curley (1970), Logue (1973), Reilly (1973), and Ibbotson (1975). They discovered a systematic positive first day return of companies going public. The IPO underpricing phenomenon occurs all around the globe as is documented in the literature, but the amount of underpricing varies from country to country. Ritter and Welch (2002) found a first day return or IPO underpricing of 18.8% from 1980 to 2001 in the US. Studies in other countries show similar results. In Germany for instance underpricing from 1978 to 1992 was 10,9%, in the UK from 1959 to 1996 underpricing was 15,8% and in Turkey from 1990 to 1995 underpricing was 13,6%. For full coverage of global IPO underpricing I refer to Ritter (1998). Over the course of the years the underpricing anomaly has received more attention. This development can be attributed to the increase of the underpricing anomaly. In the US underpricing increased from 7% from 1980 to 1989 to 15% from 1990 to 1998 before soaring to 65% in 1999 and 2000 (Loughran, Ritter, 2004). The same authors argue the explosion in underpricing can be attributed to the change in composition of the firms going public. However caution is necessary when making a case for causality in

this matter, since there are no conclusive results in the literature showing that "tech" firms are the driver of the increase in underpricing. High underpricing in this period is associated with "tech" firms, as is well documented in the literature, but a missing factor could possibly be the actual driver of the underpricing. Of course there were more ''tech'' firms going public in this period, but the actual source of the underpricing is still somewhat of a mystery even to the most learned of men in the field of finance.

In the years following the discovery of the IPO underpricing anomaly the financial literature has tried to explain the anomaly using a multitude of different theories. In general they are not mutually exclusive and therefore each can contribute to the explanation of underpricing in their own way. The main theories explaining IPO underpricing are building on traditional information asymmetry theories and the allocation of shares theories. The results in the study of Purnanandam and Swaminathan (2004) are not in line with asymmetric information theories and therefore distinguishing between asymmetric and symmetric theories seems a fruitful approach to this thesis. More recent explanations of the underpricing phenomenon attribute underpricing to the allocation of shares. The authors from the previously mentioned study also conclude that their findings indicate the need of better understanding the role of marketing in the pricing of IPOs, which is exactly what these more recent theories are about. The following sub-sections discuss asymmetric information and symmetric information theories followed by the allocation of shares theories.

2.1.1 Asymmetric information theories

The asymmetric information theories focus on the difference in information and the difference in information quality between parties in the IPO process. The parties in the IPO process consist of the issuing firm, investors and the underwriter or underwriters. There are a variety of theories based on information asymmetry.

In the first class of theories that are based on information asymmetry it is assumed the issuing firm is better informed than investors are. This introduces the problem of adverse selection. Because the investors do not know the true quality of the firm, they will bargain a discount or else they will not be interested in the IPO. This discount will discourage quality firms of doing an IPO, causing them to seek capital in cheaper ways such as the debt market instead. The only firms actually willing to go public will be low quality firms in this scenario. This problem may be solved by the signalling hypothesis. Quality firms will signal to the market their quality by offering shares of their firm at a discount. They would supposedly reap the benefits of this strategy in seasoned equity offerings (Welch, 1989), more favourable market responses to dividend announcements (Allen, Faulhauber, 1989) or more positive analyst reports (Chemmanur, 1993). Ritter and Welch (2002) conclude that empirical evidence on these theories is mixed at best. Welch (1989) finds some evidence in line with the signalling hypothesis. It is likely however that any price appreciation of the firm's stock will increase the likelihood of future equity issuances, because external financing by means of seasoned equity offers generate more capital which in turn increases its attractiveness, which is also documented in the literature (Jegadeesh, Weinstein, Welch, 1993).

In the second class of asymmetric information theories investors are assumed to be better informed than the issuing firms. This can be the case when the issuing firm has little or no idea what its actual market value is. Rock (1986) describes a model in which investors fear a winner's curse. When investors have information of different quality the investors with the higher quality of information will withdraw from bids that are overpriced and crowd out investors who have lower quality information in bids that are underpriced. The issuing firm must therefore price the shares at a discount in order to guarantee that the uninformed investors purchase the issue which causes IPO underpricing. Welch (1992) introduces the theory of an informational cascade. It assumes herding behaviour of the investors who will only subscribe to the IPO when other investors are interested. For the IPO to succeed the issuing firm will price the IPO lower to induce the most optimistic investors to subscribe who will be followed by other investors due to the informational cascade. In support with this theory is the finding from Amihud, Hauser and Kirsh (2001) who find IPOs are either under or oversubscribed. Oversubscription could possibly indicate herding behaviour,

because the abundance of investors will induce other investors to invest too which causes oversubscription. Undersubscription could possibly indicate investors do not trust the issue, because there are no other investors willing to participate in the IPO. Both explanations are in line with the informational cascade theory of Welch (1992).

Ritter and Welch (2002) argue that selling IPOs in bundles to investors eliminates the information asymmetry problem, since all investors are offered all IPOs and therefore on average investors will receive both under and overpriced offerings. As the underwriter provides the service for the issuer they will be inclined to use this method which would limit the underpricing. They conclude that the information asymmetry theories are unlikely to explain the high underpricing observed in the nineties.

2.1.2 Symmetric information theories

Symmetric information theories constitute theories which do not rely on the difference in information and information quality between the individual parties in the IPO process. There are a number of these theories, albeit less prominent than the information asymmetry theories.

One of these theories is the legal liability theory. According to this theory issuing firms underprice because they aim to limit their legal liability. In the event an IPO fails, which is a decline in firm value shortly after the IPO, issuers may be liable for the losses taken by investors. This theory was first introduced by Tinic (1988) and Hughes and Thakor (1992). Even though legal liability may provide incentives to avoid overpricing and thus possibly could contribute to underpricing, this theory is very unlikely. A prominent lawsuit in the Netherlands was the case against Nina Brink after the IPO of World Online, a firm also in the dataset of this thesis, in which the investors lost in the end. Keloharju (1993) investigates firms in countries with different litigative practises and finds underpricing is similar. Legal liability therefore is unlikely to contribute to underpricing.

2.1.2 Allocation of shares theories

Recent literature on IPO underpricing focuses on the allocation of shares in IPOs. There are a number of theories on the allocation of shares in the IPO process. Many of these theories are related to the more traditional information-asymmetry theories on underpricing. First there is the discrimination of share allocation to induce information relevation. Note that information revelation implies information asymmetry This theory describes the bookbuilding process which allows underwriters to obtain valuable information from investors who in turn reward investors with an allocation of underpriced shares (Benveniste, Sphindt, 1989; Benveniste, Wilhelm, 1990). This bookbuilding process consists of a roadshow in which underwriters promote the IPO. Similar to the asymmetry theories the issuer or underwriter will not be fully aware of the market demand for the IPO and the informed investors, who are often institutional investors, will reveal information in return for underpricing and beneficial share allocation. There is empirical evidence backing the information revelation theory. The findings of Hanley (1993) show that underwriters do not fully adjust their pricing upward when demand is strong. When they do revise their pricing upward underpricing tends to be strong. Also Cornelli and Goldreich (2002) research orders placed by institutional investors and find that underwriters, after completing their roadshow in which they engage in a dialogue with investors, set offer prices that are more in line with the bid prices of these investors than the price that would be derived from the demand for the IPO.

Secondly there are theories on the discrimination of share allocation in IPOs due to agency problems between underwriters and issuers (Loughran, Ritter, 2002). The divergence of interests of the underwriter and the issuer may lead to an agency problem. Underwriters have incentives to maximize their fees and issuers have an incentive to negotiate a high offer price. Underwriters may underprice shares and allocate them to preferred clients, a practise called ‘’spinning’’ (Ritter, Welch, 2002). This practise is seen as a reward for being loyal to the underwriter, which in effect is

preferential treatment of clients which negatively affects the revenues of the IPO for the issuer.

The prospect theory argues that IPO offer prices are only partially adjusted when the market rallies which subsequently increases underpricing. In line with this theory Lowry and Schwert (2002) find an autocorrelation for both the number of IPOs issued and the level of underpricing of IPOs. This study therefore also finds conclusive evidence in favour of ‘’hot’’ and ‘’cold’’ issue periods, the topic of discussion in section 3 of this chapter.

Beatty and Ritter (1986) were one of the first authors to test the influence of underwriter or investment banker reputation and underpricing. They proposed that ex ante uncertainty of the offering, which is the uncertainty of success of the IPO, contributes to underpricing because investors will demand a higher discount premium. Investment banks with a good reputation, a reputation that is earned through time by underwriting successful IPOs, will be able to bargain a smaller discount premium which would ultimately lead to less underpricing of the stock offering. This is known in the literature as the certification hypothesis. Carter and Manaster (1990) builds on the article by Beatty and Ritter and proposes firms signal their quality by selecting prestigious investment banks to underwrite their IPO. Prestigious underwriters protect their reputation by only underwriting issues from high quality firms. Carter, Dark and Singh (1998) find that IPOs from underwriters with a good reputation exhibit lower underpricing than underwriters a bad reputation in the 1980s. Beatty and Welch (1996) and Cooney et al. (2001) find evidence in their research where this is reversed in the early 1990s.

Michaely and Womack (1999) find positive analyst coverage on the IPO firm from the investment bank involved in the underwriting process of the IPO after the period in which they are legally prohibited of releasing analyst coverage following the IPO, even though these IPOs underperform afterwards. Rajan and Servaes (1997) document overly optimistic analyst coverage of investments banks that did not underwrite the IPO.

All these theories which have been named in this section on the allocation of shares have in common that excess demand is created by the underwriter of the IPO which results into underpricing.

The aim of this section is to give oversight on the different theories which attempt to explain the IPO underpricing anomaly. Evidence is mixed however and conclusive empirical results to explain this phenomenon still elude authors. This is why the study by Purnanandam and Swaminathan (2004) offers a fruitful avenue for new research. They find empirical evidence underpricing is caused by overoptimistic analyst reports and overoptimistic investors in general, more in line with the theories above such as Michaely and Womack (1999) and Rajan and Servaes (1997). All in all the only definite conclusion from this section should be that nothing can actually be concluded and that the jury is still out on this matter.

2.2 Long-term underperformance

It follows from the efficient market hypothesis that when IPOs are publicly traded their stock price performance should not be predictable. Once they are listed on a stock exchange their stock price should behave in the same manner as other firms should, which means they are priced efficiently and therefore their long-term performance should not be predictable because all available information is priced in the firm's stock. There are studies however that contradict the efficient market hypothesis when it comes to IPOs. First documented in the literature by Ritter (1991), the result show that issuing firms from 1975 to 1984 substantially underperformed a sample of matching firms from the closing price on the first day of public trading to their three year anniversaries. The author concludes the results are consistent with an IPO market in which investors are overoptimistic about the firm's future performance. Loughran 1993 find results which show lower returns on NASDAQ firms compared to NYSE firms are primarily a manifestation of the poor performance of IPOs. Of the 6% per year performance differential between NYSE and NASDAQ firms, nearly 4% of this differential is caused by the poor performance of IPOs on a six year period from 1973 to 1988. More evidence in favour of the long-term underperformance theory of IPOs can be found in the study by Loughran and Ritter 1995. While holding

both the size and the book-to-market ratios constant and controlling for betas in the benchmark firms, the Fama and French three factors, IPO firms underperformed their benchmarks. The authors do concede it is possible there is some other unidentified risk factor affecting the low returns of IPOs.

The results of the studies cited above seem solid and robust. Nevertheless it was Benjamin Disraeli who said: ‘’There are three kinds of lies: there’s lies, damn lies and statistics.’’ In the years following these before mentioned studies there has been debate in the literature on the correct measurement technique of long-term performance of stocks. For an in depth analysis of the measurement techniques of long-term performance I refer to the next chapter which discusses the methodology that is subject of debate on this issue. Schultz (2003) show that IPOs cluster at market peaks, making IPOs susceptible to long-term underperformance in an efficient market. Brav, Geczy and Gompers (2000) find no evidence of long-term underperformance of IPOs when using the three-factor model and argue the long-run underperformance is a size and a value effect and not an IPO underperformance anomaly. Loughran and Ritter (1998) find long-term IPO underperformance controlling for the size and value factor in ‘’hot issue markets’’, but find no long-term underperformance in “cold issue markets.’’ Even though the authors use a single-factor model they do control for the Fama and French (1993) factors. Nevertheless Lyon, Barber and Tsai (1999) do find three biases in the long-term performance measurement of stocks. As the debate in the literature on long-term underperformance of IPOs is still ongoing, no final conclusions can be drawn from the above mentioned studies. Carter, Dark and Singh (1998) conclude long-term performance of IPOs from an underwriter with a good reputation outperform IPOs from an underwriter with a bad reputation. The study by Purnanandam and Swaminathan (2004) also provides some interesting points with respect to the long-term underperformance of IPOs. The authors emphasize long-term performance results should be interpreted with caution, but do control for many of the measurement biases and conduct their study using various techniques and find significant long-term underperformance of IPOs that are overvalued compared to their peers. This previously mentioned study provides interesting points with respect to the long-term underperformance findings and offers new opportunities for future research.

2.3 Hot and cold issue periods

In a seminal paper Ibbotson and Jaffe (1975) describe the IPO market as a cyclical one in which volume and underpricing follows a cyclical pattern. Although widely acknowledged in the financial industry beforehand, this paper was the first ever to discuss the topic in the literature. The study focuses on the prediction of "hot issue markets" which are typically described as periods in which IPO volume and underpricing is high. Many other authors have tried to explain "hot" and "cold" issue markets. Ritter documents 3 or 4 periods between 1960 to 1982 in which monthly average IPO underpricing has been extremely high for prolonged periods. Each of these periods were followed by a large increase in volume of IPOs. The author also shows the hot issue market is for the largest part limited to the natural resources industry. Lowry and Schwert (2002) determine a number of periods from 1960 to 2001 in which a period of high underpricing is followed by a large volume of IPOs. The authors find a significant positive relation between high first-day returns or IPO underpricing and IPO volume. Their results also show serial correlation in initial returns is largely driven by changes in the types of firms going public and by information that becomes public during the registration period of the IPO but is only partially incorporated in the offer price. Lowry (2003) finds evidence in line with results in which investor sentiment and companies' demand for capital seem to explain IPO volume. Still not much is known why IPO volume fluctuates so much as it does. It is another unexplainable phenomenon of the IPO market, which is related to IPO underpricing and therefore studying these periods separately may yield interesting results.

2.4 Previous studies on the Dutch IPO market

The majority of companies that went public until the mid 1990s on the Dutch stock exchange did so through the method "offer for sale at a fixed price", in which both the

price and shares offered in the IPO are fixed. After this period the bookbuilding method gained popularity and is now the dominant pricing mechanism of IPOs in Europe (Schuster, 2003; Ritter, 2003). The bookbuilding method was discussed in sub-section 2.1.2.

A multitude of papers have found evidence in support of the presence of the underpricing anomaly on the Dutch IPO market. In a dataset comprising of 53 firms Eijgenhuijsen (1989) finds 7,9% underpricing of new equity issues on the Amsterdam stock exchange. Van der Hoeijen and van der Sar (1999) find 7,8% IPO underpricing in their dataset of 81 IPOs in the period from 1980 to 1996.

The first paper that studies the long-term performance of IPOs on the Dutch IPO market was by Buijs and Eijgenhuijsen (1992). They found an insignificant negative long-term performance of IPOs after 1 month and after 12 months and no underperformance after 24 months. Another study on the long-term underperformance of IPOs was the study by van Hoeijen and van der Sar (1999) which found an insignificant outpeformance of 17,1% after 3 years and an insignificant underperformance of 17,9% after 5 years. All these outcomes are insignificant and therefore not very useful in our understanding of the long-term performance of IPOs. If anything, these studies favour the efficient market hypothesis which would predict long-term out or under performance is unpredictable. Roosenboom et al. (2003) find that long-term underperformance is more negative for IPO firms when accruals in reported earnings are greater. This is a logical finding since IPOs that make the issuing firm look better probably aren't as confident as the market is on the future performance of the issuing firm.

Studies on the Dutch IPO market classify different periods as hot and cold issue markets, which could pose a problem for research on the Dutch IPO market. Buijs and Eijgenhuijsen (1992) classify 1985 and 1986 as hot issue markets just like the other studies, but Huygen and Tourani (1993) propose 1989 has some characteristics of a hot issue market too, with above average initial returns. I concur with Huygen and Tourani (1993), since a spike in the number of IPOs in 1989 is observeable, which is widely associated in the literature with a hot issue market. Therefore 1989 will be difficult to label either a hot issue period or anything else for that matter. Van der

Goot also classifies the first half of 1987 as a hot issue market. I also believe this period can be classified a hot issue market, since there is a large volume of IPOs in 1987. The literature describes hot issue periods are often preceded by market rallies or booms. Vice versa can be said for stock market crashes. It is therefore likely the stock market crash of 1987 put an end to the hot issue period of the first half of 1987.

Doeswijk, Hemmes and Venekamp (2006) focus on initial underpricing and long-term underperformance on the Dutch IPO market from 1977 to 2001. They use sector-specific benchmarks close to the IPO itself. They find an average underpricing of 17,6%. These results are more or less in line with studies on the US IPO market on which Ibbotson et al. (1994/2001) find IPO underpricing of 18,6%. Doeswijk et al. (2006) find IPOs underperformed in the first three years following the IPO by 10% but the results are statistically insignificant. Their results show two hot issue periods, more or less in line with previous research. They do question the hot issue market of 1986 and 1987 since underpricing is not that much higher compared to cold issue periods before and after this period. The long-term underperformance results from the same study show no long-term underperformance from IPOs in 1986 and 1987 and long-term underperformance with IPOs from the hot issue period of 1997 to mid 2000.

The research I conduct differs from the studies mentioned above in a variety of ways. I correct first-day IPO returns for market returns and performs statistical tests, among which a regression, to examine the affect of several factors on underpricing from 1990 to 2002. In this thesis the long-term performance of IPOs is measured in a completely different way. I use the Capital Asset Pricing Model to measure long-term risk-adjusted abnormal returns. Using time-series regressions the beta and Jensen's alpha are estimated to assess the long-term performance of IPOs over a 5 year time period. Afterwards a number of factors will be used to test their explanatory power on long-term risk-adjusted abnormal returns in a cross-sectional regression in order to get insight in the drivers of long-term IPO performance. I also conduct statistical tests by grouping the dataset in IPOs with a "good" and "bad" reputation and in IPOs in "hot" and "cold" issue periods. Using parametric and nonparametric tests any differences in the group in underpricing, IPO pricing compared to peers and long-term performance will be tested and a dummy variable is added to the regression to test its affect.

Chapter 3. Data and methodology

This chapter contains a description of the data and methodology. The next section contains an analysis of the data. The second section explains the methodology on IPO valuation based on peer multiples, long-term underperformance, hot and cold issue periods and underwriter reputation in that order.

3.1 Data

This section discusses techniques and databases that were used to collect the data together with the results from these searches. In Purnanandam and Swaminathan (2004) sample selection IPO firms have to satisfy certain criteria. For inclusion in the dataset, IPOs need to satisfy similar but different criteria:

1. The IPO should issue ordinary common shares.
2. Information has to be available on sales and earnings for the fiscal year prior to the firm's IPO.
3. The IPO firm should be a non-financial firm.

The IPO should issue ordinary common shares since it is the aim to test actual IPO performance. Seasoned equity offerings (SEOs), new listings and other special filings are not listings I aim to investigate. Double listings are included. Double listings are listings in which a firm goes public simultaneously at two stock exchanges. Examples of double listings in the dataset used are Gucci and Baan.

Financial firms are commonly excluded from analysis in similar studies, because of the different characteristics of these firms. I therefore adopt this common criterion from these similar studies which is also used in the study by Purnanandam and Swaminathan (2004). Financial firms include among others REITS (Real estate investment trusts), banks, insurance companies, investment trusts and mutual funds.

Information on sales, EBITDA and earnings prior to the fiscal year going public are used to compute the IPO multiples in order to analyse whether IPOs are over or underpriced compared to peer multiples. In the dataset, which is added in the appendix, some firms do not have information on prior fiscal year EBITDA. There are also IPO firms that have negative prior fiscal year EBITDA in the dataset. EBITDA should be positive in the fiscal year prior to going public, because negative multiples will lead to useless results in IPO peer group valuations. The EBITDA multiples for both the firms that do not have prior fiscal year EBITDA and those that have negative prior fiscal year EBITDA are therefore excluded from analysis. When Earnings are negative the P/E multiple will be excluded in the same way. Therefore the procedure to exclude the negative or missing multiples but not to exclude these firms are adopted.

The study by Purnanandam and Swaminathan (2004) excludes IPO firms that do not have information on prior fiscal year EBITDA and IPO firms that have negative prior fiscal year EBITDA, in contrast to this study which merely excludes the multiples. In order to enlarge the number of IPO firms in the dataset, these firms have been included in the analysis. The EBITDA-multiple, or subsequently the P/E multiple if earnings are negative are excluded but the remaining multiples, which are the Sales-multiple and the P/E or EBITDA multiple are included to compute the overall PV-ratio. Another reason for including these firms in the dataset is the fact that excluding these firms from the dataset can lead to biased results. Excluding negative prior fiscal year EBITDA IPOs leads to a systematic exclusion of a certain part of the population of IPOs on a given stock exchange. Tech and biotech firms for instance are more likely to have negative EBITDA than other types of firms. The results from research excluding these IPOs may not be representative of the whole population of IPOs.

Thomson One Banker was used in order to find 179 firms that started trading on the AEX stock exchange in the period between 1980 and 2003. By comparison, the study Doeswijk, Hemmes and Venekamp (2006) found 183 companies that started trading on the AEX stock exchange in the period 1977-2001.

For inclusion in the dataset listings have to meet the criteria mentioned above. Purnanandam and Swaminathan (2004) describe the difficult process of finding the prior to IPO year fiscal information. During the search for the same data similar problems were encountered with this study. After excluding listings that do not meet these criteria, further analysis of the remaining IPO firms show IPOs before 1990 do not have prior to going public fiscal year information on sales, EBITDA and earnings. The dataset therefore limits itself to the time period of 1990 to 2003. The prior to IPO fiscal year information is gathered from both Thomson One Banker and CompustatGlobal. Comparing data from the two different databases resulted in more reliable and robust data. The issue dates and the issue prices were gathered from a variety of sources, since no single source proved to be sufficient to find all the data needed. CompustatGlobal and Thomson One Banker were used to find issue dates and issue prices. Missing issue dates and issue prices were found using Thomson Research. With this database the prospectuses of the IPOs were found which include information on issue price, issue date and underwriters which were the lead managers of the IPO. The Erasmus Universiteit Rotterdam however does not have a subscription for prospectuses and therefore the database did not have all the prospectuses which are needed. In order to find the remaining data such as offer prices, issue dates and underwriter information, the newspaper archive of LexisNexis Academic was used to find news articles on the IPOs. These articles contain reliable and useful information. LexisNexis Academic was also used to check whether the information by Thomson One Banker and CompustatGlobal was correct.

The IPOs SIC codes were retrieved using Compustat Global, Thomson One Banker and the prospectuses. Using these different databases resulted in more robust and reliable SIC codes of the individual IPOs. First day closing prices were gathered from Thomson Financial Datastream.

The market value of the IPO at the offer is calculated by:

$$MV_i = S_i \times OP_i$$

Where,

MVi = Market value IPO at the offer of IPO firm i
Si = Number of common shares offered by IPO firm i
OPi = Offer price of IPO firm i

Thomson One Banker was used to check the market value of the IPO at the offer by retrieving the market value at the day prior to going public. This information was not always available. Therefore this thesis uses the market value after the first day of trading, which is more readily available, and subtracts the change in market value which is reflected in the underpricing of the firm's stock.

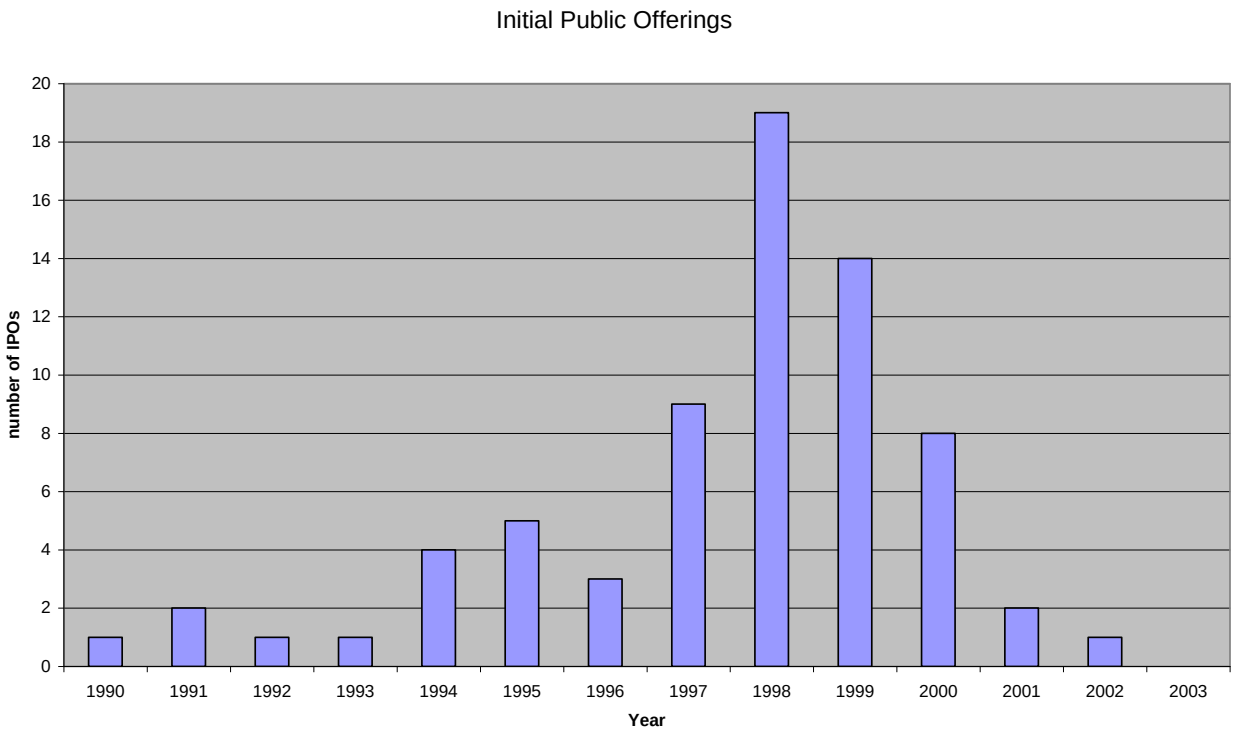
$$MV_i = \frac{MV_{i,t+1}}{1+UP}$$

Where,

MVi,t+1 = the market value of the IPO after the first day of trading

Long-term performance of IPOs was measured for 5 years and thus the dataset of IPOs spans from 1990 to 2003. After filtering the dataset comprises 70 IPOs in the period between 1990 and 2003. In their study Doeswijk (2005) find a similar amount of IPOs in this time period taking the IPOs in consideration that were excluded from the dataset due to the more stringent selection criteria used in this thesis. Figure 1 shows the number of IPOs in the time period used in this thesis.

Figure 1. IPOs by year. Source Thomson One Banker/Thomson Datastream



The figure shows a peak in IPOs in the period from 1997 to 2000 and a substantial lower amount of IPOs in the period from 1990 to 1996 and 2001 to 2003. The results are in line with previous studies on the Dutch IPO market. Figure 2 shows the average amount of underpricing in each year of the time period.

Figure 2. Underpricing.

Source: Thomson One Banker, Thomson Datastream

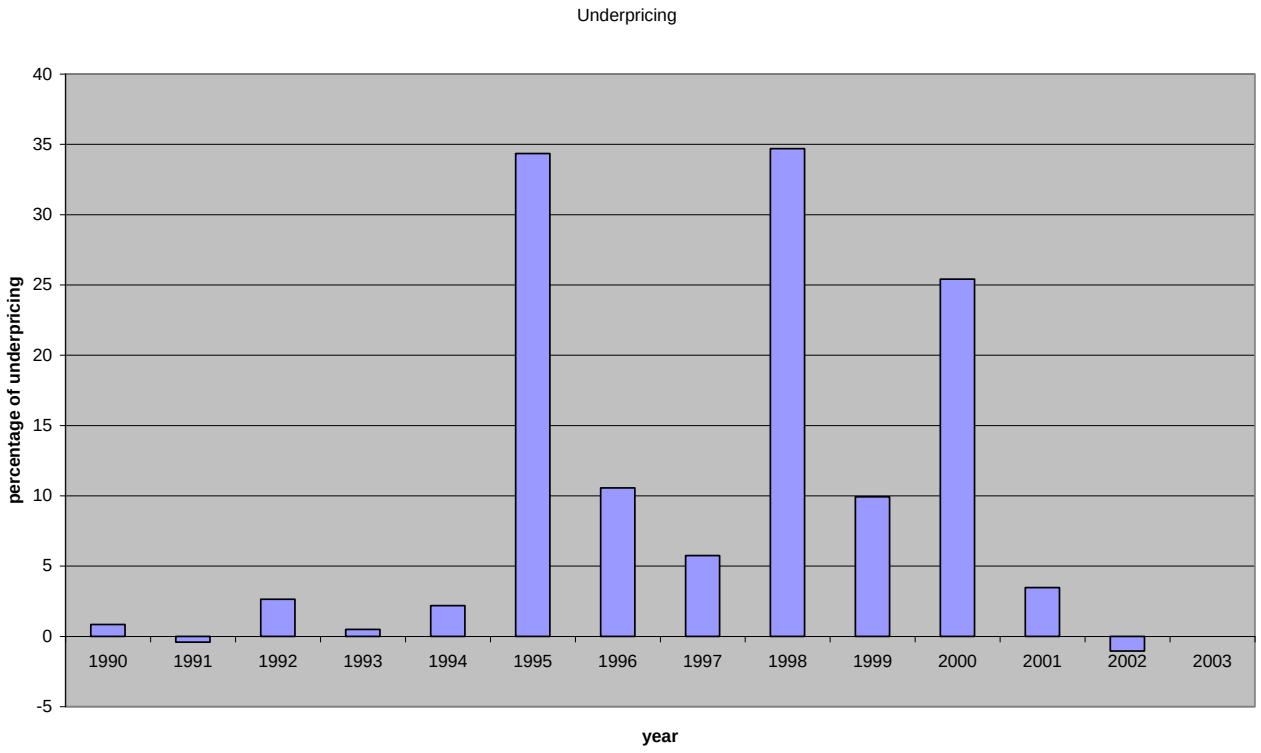


Figure 2 shows underpricing is limited in the time period from 1990 to 1994 and 2001 to 2003. From 1995 to 2000 there are three years with heavy underpricing and three years with high but not as spectacular underpricing. The large amount of underpricing in 1995 and 1996 may have triggered the large amount of IPOs from 1997 to 2000. Previous studies show evidence in line with high underpricing triggering a large amount of new issues in the past**.**

Over the whole time period average underpricing is 18,2%. By comparison Doeswijk et al (2006) found an average initial return of 17,6% on the Dutch market between 1977 and 2001. The results therefore appear to be similar. Figure x shows IPO underpricing adjusted for market returns, the outcome of which is similar to the first-day return of the IPO dataset. The proxy for the market return are the daily returns on the AEX stock exchange. I use these results to conduct statistical tests on the sources of underpricing.

Figure 3 presents value weighted market-adjusted first-day returns of the IPOs, which do not differ substantially from the first-day returns shown earlier in figure 2.

Value weighted market adjusted first-day returns are computed in the following way:

$$ER_{i,t} = R_{i,t} - R_{m,t}$$

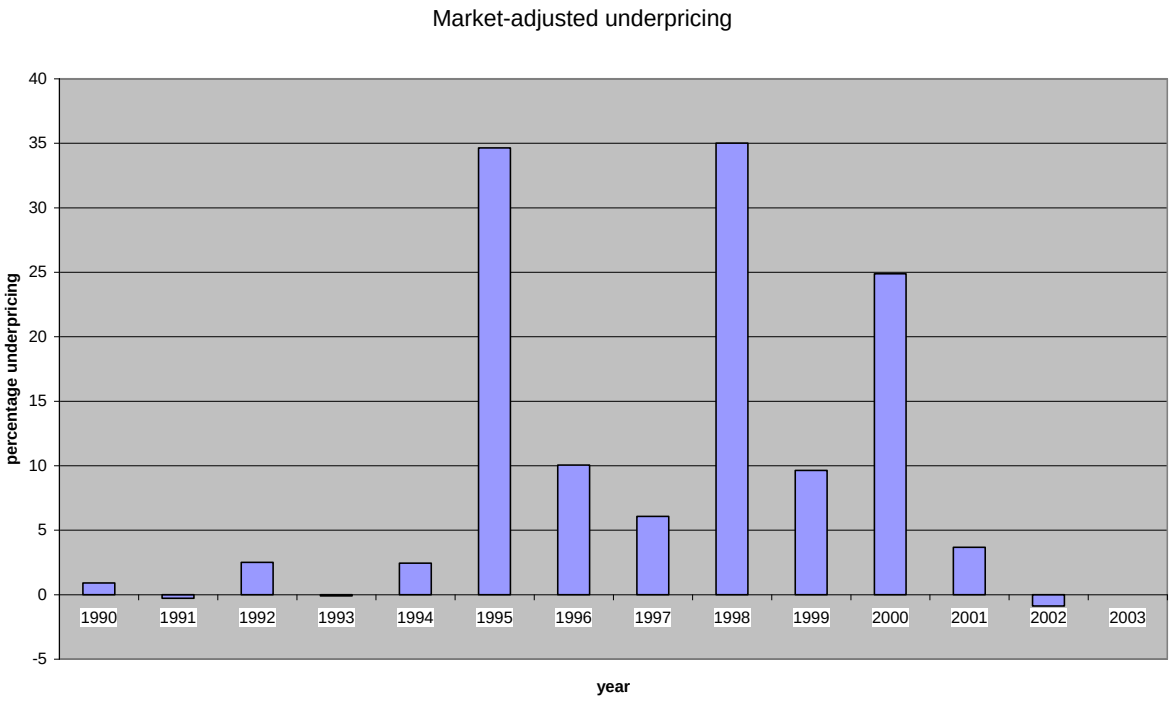
Where,

ERi,t = Excess return over the market index of IPO firm i at time t
Ri,t = Return firm i on time t
Rm,t = market return, the total return on the AEX stock exchange is used, at time t

For the remainder of this thesis value weighted market adjusted first day returns are used in the statistical tests and analyses that follow.

Figure 3. Market adjusted IPO underpricing

Source: Thomson One Banker, Thomson Datastream Financial.



The IPO peer group fiscal information which comprises sales, EBITDA and earnings was gathered using Thomson One Banker. Their SIC codes were found with Compustat Global and Thomson One Banker. The peer group market value I retrieve from Datastream. The market value of the peer group is defined by Datastream as common shares listed times share price, the same methodology is used in order to compute IPO firm market value. In order to find IPO peer firms all firms that traded on the AEX Stock exchange between 1990 and 2003 were found. This resulted in 239 firms being traded on the stock exchange in that time period. The EBITDA, Sales, and EBITDA were also retrieved on a yearly basis.

In order to measure long-term performance stock market information was gathered using Thomson Financial Datastream. The data used in the times series are monthly total returns which are corrected for stock-splits and dividends.

3.2 Methodology

This section explains the methodology used in conducting the research. I will first discuss IPO valuation and the multiples used. The next section discusses the difference in opinion of highly respected authors in the literature on the measurement techniques of long-term stock performance and the measurement techniques that were used. The last section explains where investment bank reputation and hot and cold issue periods fit in and how they will be used in the research.

3.2.1 IPO valuation using multiples

I conduct IPO valuation based on multiples largely in the same manner as is done by Purnanandam and Swaminathan (2004). For each IPO firm the price-to-value (P/V) ratio is computed. P resembles the IPO firm's multiple and V the peer group multiple. For both the IPO firms and the peer group firms I compute the price-earnings ratio multiple, Sales multiple and the EBITDA. When earnings or EBITDA data is missing or EBITDA and earnings are negative, the multiples are excluded from analysis. The market value from the peer group is the market value the day prior to going public of the IPO firm. The market value of the IPO firm is the market value which section 3.1 defines.

P(earnings) = Market value IPO firm / IPO firm earnings prior to going public
P(sales) = Market value IPO firm / IPO firm sales prior to going public
P(EBITDA) = Market value IPO firm / IPO firm EBITDA prior to going public

V(earnings) = Market value peer group / Peer group earnings prior to IPO year
V(sales) = Market value peer group / Peer group sales prior to IPO year
V(EBITDA) = Market value peer group / Peer group EBITDA prior to IPO year

The price-to-value ratio:

P(earnings)	/	V(earnings)
P(sales)	/	V(sales)
P(EBITDA)	/	V(EBITDA)

These ratios determine whether IPOs are either under or overvalued compared to their peer group sample. The overall PV-ratio is defined as:

$$OPV_i = \frac{\sum PV_i}{N}$$

Where,

OPVi	=	overall PV-ratio for firm i
PVi	=	the individual ratios that are computed for firm i
N	=	the number of PV-ratios that are computed for firm i

For the remainder of this study the overall PV-ratio is referred to as the PV-ratio. When an individual PV-ratio is not included for analysis, because for instance prior to going public fiscal year EBITDA is missing, the earnings and sales PV-ratio constitute the overall PV-ratio. (the numerator will entail the sum of PV(sales) and PV(earnings) and N will be two)

Peer group firms or IPO matching firms need to satisfy the criteria section 3.1 mentions. IPO matching firms need to satisfy similar criteria for the sample of peer group in the study by Purnanandam and Swaminathan (2004). Their study also enjoys the benefit of being conducted using US stock exchanges, which are to put it mildly, a lot larger than the stock exchange in The Netherlands. Their peer group sample firms did not go public 3 years prior to the IPO. They did this in order to measure the pricing difference of IPOs and firms that have already traded on the stock exchange for some time. In order to test the pricing difference of IPO firms and comparable firms this peer group selection criterion is adopted. Matching firms are selected on basis of their industry, size and profitability in the previously mentioned study.

Matching firms are selected on industry sector because firms in the same industry share similar operatings risks, profitability and growth. Sales are used as a proxy for size. IPOs and peer group firms should be matched on size, because economies of scale may distort their comparability when size differs. EBITDA is a proxy for operating profits. EBITDA is more accurate than earnings, which is affected by non-operating items. Selecting on these three criteria should result in comparable firms, as is documented in the literature by Bhojraj and Lee (2002). They also group their peer group firms in 48 industries in the same manner as was done by Fama and French (1997).

The peer group selection criteria that are used differ from the Purnanandam and Swaminathan (2004) study for the reason stated earlier above, being the fact that the AEX stock exchanges has a limited amount of firms. The peer group selection criteria limit itself to industry, reflected in SIC-codes, and size, measured by sales. The first two numbers of SIC-codes signify a certain industry. Peer groups are selected using these first two SIC code numbers[1]. From this peer group I select a firm which has sales closest to the IPO firm sales, which is the IPO peer firm. Differentiating industry in the 48 industries named by Fama and French (1997) results in too few firms with sales in the vicinity of the IPO firm and in many cases in no peer firm at all. Therefore I focus on selecting peer firm by similar size and industry of the peer firm, but in a less stringent fashion. Kim and Ritter (1999) also argue for controlling for differences in growth prospects, but controlling for growth is beyond this thesis, because data on growth prospects at the IPO year is unavailable. Using the data available the multiples of the peer firms are computed which are used to calculate the P/V ratio.

In order to test the explanatory power of various factors on underpricing, including IPO valuation compared to peer firms, I perform a linear regression. The variables in the regression are the same as in the study by Purnanandan and Swaminathan (2004). This study excludes the growth variable due to a lack of data on the Dutch market. The regression used in this study is as follows:

[1] The study by Purnanandan and Swaminathan conducts robustness checks in which they also use the first two digits of the SIC-code as an industry classification method and find there results are similar to their findings.

$$UP_i = \alpha + \beta PV_i + \chi Accruals_i + \delta Sales_i + \varepsilon BM_i + \phi EBITDA_i + u_i$$

Where,

UPi	= value weighted market adjusted underpricing of individual firm
PVi	= natural log of PV-ratio of individual firm
Accrualsi	= Accruals to total assets of individual firm
Salesi	= natural log of Sales of individual firm
BMi	= natural log of Book-to-Market ratio of individual firm
EBITDAi	= EBITDA margin, EBITDA divided by sales of individual firm
Ui	= Residual

The accrual variable is computed using two methods. Due to a lack of data neither method results in accruals of all firms in the dataset. In the first method Thomson One Banker is used to retrieve cash flow from operations and income before extraordinary items from the cash flow statement. Accruals in this case are calculated by subtracting cash flow from operations from income before extraordinary items. In the second method Compustat Global was used in order to retrieve current assets, cash, current liabilities, debt included in current liabilities, income tax payable and depreciation and amortization from the balance sheet statement prior to and after going public. Using this method the accruals are attained by subtracting the change in cash, current liabilities, depreciation and amortization from the sum of the change in current assets, debt included in current liabilities and income tax payable. Afterwards accruals are scaled by the average of total assets at the start and end of the year of going public. These methods results in finding the accrual ratio for 52 IPO firms, which leaves 18 IPO firms with missing data on the accrual variable.

The Sales variable is the natural log of the IPO firm's sales prior to going public. The Book-to-Market value is derived by multiplying the number of common shares outstanding by the book value per common share and dividing the total by the market value of the IPO after the first day of trading. The EBITDA margin is EBITDA of the IPO firm prior to going public divided by sales prior to going public.

3.2.2 Long-term underperformance

As mentioned in the section on the literature of long-run underperformance of IPOs, the long-run measurement techniques of IPO stock returns are a subject of debate in the literature. The most obvious technique of assessing long-run stock performance is the CAR, or cumulative abnormal return in which abnormal returns are summed up on a monthly basis in order to gain the ultimate long-run performance. This technique however is not favoured by authors for measuring long-run stock performance. There are several popular methods to measure the long-term stock performance of IPOs, of which there is debate which is appropriate.

The first is the BHAR. This method measures the long-run stock performance using a buy and hold abnormal return technique. In the literature a number of biases that can occur using this method are named (Barber and Lyon, 1997; Lyon, Barber and Tsai, 1999). The first is the new listings bias. This bias arises because in event studies sampled firms generally have long post-event history of returns, while firms that constitute the reference portfolio typically include new firms that begin trading subsequent to the event month. The second is the rebalancing bias which occurs because the compound returns of the reference portfolio are typically calculated assuming periodic rebalancing, while the return of sample firms are compounded without rebalancing. The last bias is the skewness bias, which arises because long-run abnormal returns are positively skewed. Lyon, Barber and Tsai (1999) recommend using this technique and carefully constructing a reference portfolio with a mean return of zero. They also recommend using a bootstrapped skewness adjusted t-statistic to measure the power of the results.

The second measuring technique is the calendar time returns methodology contrary to event-time returns. Schultz (2003) shows in a simulation based on the time period form 1973 to 1997 that in an efficient market, in which expected abnormal returns are zero, IPO long-term performance is significantly negative. The solution he provides is to average the average return by calendar, instead of event-time returns in which all event returns are averaged. The clustering of IPOs near market highs is therefore controlled for.

There is also a debate in the literature on whether regressions should be run in a univariate framework or a multivariate framework in order to test long-term stock performance. Loughran and Ritter (2000) argue long-term performance measured with the Fama and French (1992) three factor model does not accurately test market efficiency. Other authors favour multivariate models (Brav et al, 2000). There is also a difference of opinion on the power of the different methodologies in measuring long-term performance. It would appear the best way, if there is any, to test long-term performance of stocks is to use multiple measuring techniques. Purnanandam and Swaminathan (2004) use different techniques. They estimate a cross-sectional regression test to formally examine the relationship between the P/V ratio and long-run risk-adjusted returns. They also do portfolio tests using calendar-time regressions based on the single-factor model and Fama and French (1993) three-factor models. They also provide results based on the BHAR approach. Testing long-run performance using all these techniques is however beyond the scope of this thesis and therefore the methodology on long-run stock performance is limited to a number of techniques. In order to test long-run IPO stock performance the 3 factor is used to calculate the risk-adjusted abnormal returns of the individual IPOs.

Finding the three factors is very difficult however on the Dutch stock market and therefore this thesis uses the one-factor model. Even though the one-factor or market model may seem less sophisticated, it is argued by authors in the literature that this model is the only correct model to measure long-term stock performance. Loughran and Ritter (2000) prefer the one-factor capital asset pricing model over the 3-factor model for measuring long-term stock performance. They argue normative models (CAPM) test market efficiency whereas positive models (Fama&French 3-factor model) merely test whether patterns that exist are being captured by other patterns. The patterns Loughran and Ritter refer to are the Size and Value ratios that have no real theoretical basis as of yet and therefore they question whether market efficiency can actually be tested using this model.

The time-series regression that computes the risk-adjusted abnormal returns of individual IPOs is as follows:

$$R_i - rf = \alpha + \beta(Rm - Rf) + u_i$$

where,

R = monthly total return of the IPO adjusted for splits and dividends
rf = Dutch equivalent of the 1-month T-bill rate
α = risk-adjusted abnormal return of IPO
β = Beta of the individual stock
Rm = monthly return of market index
u = Residual

The monthly risk-free rate is derived from the monthly redemption yield of ten year Dutch Government bonds. The market index is the AEX stock exchange, where the monthly total returns are used, which are adjusted for stock splits and dividends

R – rf can be defined as the monthly excess returns of the IPO over the risk-free rate. R m – R ft can be defined as the monthly excess return of the market index over the risk-free rate. The study of Purnanandan and Swaminathan finds long-term underperformance after the 6 month lock-up period expires. Long-term performance is therefore tested over a 5-year period as is done in the former study and excludes the first 6 months for analysis, resulting in a testing period of 54 months.

After obtaining the long-term risk-adjusted abnormal returns of the individual IPOs the outcomes are used in a cross-section regression to formally test the effect of the P/V ratio on long-run IPO performance. The cross-sectional regression tests that I use to explain the relationship between the P/V ratio and the long-run risk-adjusted abnormal returns does not include growth forecasts due to lack of data. The cross-sectional regression test is as follows:

$$R_i = \alpha + \beta PV_i + \chi BM_i + \delta Accruals_i + \varepsilon Sales_i + \phi EBITDA_i + u_i$$

where,

Ri	= the long-run risk-adjusted abnormal return of firm i
a	= intercept
PVi	= the natural log of the PV-ratio
BMi	= the natural log of the Book to Market ratio
Accruals	= Accrued income and expenses
Sales	= the natural log of Sales
EBITDA	= The EBITDA margin or EBITDA divided by Sales
ut	= residual

I exclude growth forecasts for the same reason stated earlier, which is the lack of data. Chapter 4 presents the results.

3.2.3 Hot and Cold issue periods

Doeswijk et al. (2006) differentiate their dataset comprising of IPOs into periods labelled hot and cold issue periods. There is some debate in the Dutch IPO literature on whether certain periods in the 1980s where hot or cold periods. For a detailed discussion on this I refer to the literature review section 2.4. The data I use for the research in this thesis is from the beginning of this century and the 1990s and therefore does not have the issue of classifying IPOs into hot or cold issue periods in the 1980s. As was done in the study by Doeswijk et al. (2006) the period from 1997 to mid 2000 are labelled a hot issue period. The remainder of the time period from 1990 to 1996 and from 2000 to 2003 are labelled cold issue periods.

In order to test differences in outcomes between the two periods non-parametric tests will be used. The main statistical test is however a regression with a dummy variable which will be added in the linear regression of subsection 3.2.1 which will take a value of 1 for a hot issue period and a value of 0 for a cold issue period. Because EBITDA and Accruals are not available for all IPOs these variables are excluded. Given these changes the regression will be:

$$UP_i = \alpha + \beta PV_i + \delta Sales_i + \varepsilon BM_i + HCdummy + u_i$$

These are the same variables from subsection 3.2.1 plus the dummy variable for "hot" and "cold" periods.

3.2.4 IPO underwriter reputation

Similar to the hot and cold issue periods the dataset will also differentiate between IPOs underwritten by investment banks with a good and a bad reputation. Previous research in the IPO market and underwriter reputation has resulted into mixed results over different time periods. For a detailed discussion on the literature in this matter I refer to the literature review section. The dataset of IPOs will be differentiated into two groups. Good and bad underwriter or investment bank reputation. The results between the IPOs with underwriters with a good and bad reputation are analysed and are statistically tested for any differences. The dataset differentiates investment bank or underwriter reputation on the market share of the underwriter and on the tombstone ads. The tombstone ads are the ads in papers such as The Wall Street Journal which announces equity and debt underwritings and the underwriters that are lead and co-managers. Sometimes other terms such as global manager are used. This information can also be found in the prospectuses of the IPOs. The only study conducted on the Dutch market on underwriter reputation also qualifies on the basis of market share (Frederikslust, van der Geest, 2001) and find ABN-Amro has the biggest market share. ABN-Amro also has the biggest market share in the dataset of this study and is therefore assigned to the group with a "good reputation" along with global investment banks such as Goldman Sachs, JP Morgan and Morgan Stanley. The remainder of underwriters are labelled to have a "bad reputation.''

In order to test the affect of underwriter reputation statistically I use a non-parametric and a parametric test. The main statistical test to test long-term performance the regression from subsection 3.2.3 with a dummy variable for underwriter reputation. This results in the following regression:

$$UP_i = \alpha + \beta PV_i + \delta Sales_i + \varepsilon BM_i + HCdummy + Udummy + u_i$$

The variables are the same as in the regression in subsection 3.2.1 and 3.2.3 plus a dummy variable for underwriter reputation.

4. Results

This chapter presents the results from this thesis' research. The next section will present the outcomes from the IPO valuations based on peer multiples and the relationship between IPO valuation and underpricing. Section 4.2 will show the results from the IPO long-term risk adjusted abnormal returns of the IPOs and the cross-section regression on long-term IPO returns. Section 4.3 entails the outcomes from differentiating the dataset in hot and cold issue periods. Section 4.4 presents the outcomes from the research on underwriter reputation.

4.1 IPO valuation based on multiples and underpricing

This section shows the results from IPO valuation based on Sales, EBITDA and P/E multiples. First, the comparison between IPO firm market value at the offer and the proxy for its intrinsic or fair value at the offer based on the different multiples. Second, a test which assesses the relationship between underpicing and under or overvaluation of IPO firm market value compared to the proxy for fair or intrinsic firm value.

4.1.1 IPO valuation

One peer firm for each IPO firm is selected based on industry and sales. There are discrepancies between the IPO firm sales and the peer firm sales. This thesis aims to limit these discrepancies to get a best fit as possible. In only 5 firms the best fit IPO

peer firm has been a firm with a SIC-code in which the second number of the SIC code differed between the peer and IPO firm. Table 1 gives an overview of the number of IPOs each year, the Median PV-ratio and the average PV-ratio each year. The median has been included because the median is less affected by outliers than the mean is. The PV-ratio is an average between the three PV-ratios. When either EBITDA or earnings were not available these multiples were excluded from the analyses and the weights assigned to the average PV-ratio between the multiples were adjusted accordingly.

Table 1. Overview P/V-ratio.

Year	IPOs	Median PV-ratio	Average PV-ratio
1990	1	0.86	0.86
1991	2	0.77	0.77
1992	1	2.43	2.43
1993	1	0.85	0.85
1994	4	1.10	1.26
1995	5	11.60	12.97
1996	3	1.06	6.01
1997	9	1.41	9.33
1998	19	1.70	1.90
1999	14	4.01	4.83
2000	8	6.41	9.22
2001	2	2.24	2.24
2002	1	1.79	1.79

This table presents the number of IPOs, their median and mean PV-ratio for each year from the time period. Subsection 3.2.1 shows how the PV-ratio is derived from the individidual PV-ratios. A value higher than one indicates the higher IPO valuation compared to peer firm based on all multiples that were available for the individual firms.

The findings of the PV-ratio indicate a substantial higher number of PV-ratios higher than one, or in other words, a PV-ratio which indicates higher IPO firm valuation compared to the IPO peer firm assigned. When using peer firm valuation as a proxy for intrinsic value, one could conclude IPO firms in the dataset are overvalued. In three years (1990, 1991 and 1993) IPO firm were undervalued compared to IPO peer firms. These years only constitute 4 IPO firms out of a total of 70 IPO firms from the entire dataset. All the other years exhibit a PV-ratio, both in the median and mean PV-

ratio higher than one, which indicates overvaluation of the IPO firm compared to the designated IPO peer firm. Table 2 shows the individual PV-ratios' mean and median.

Table 2. Overview different PV-ratios.

	PV Sales	PV EBITDA	PV Earnings	PV Ratio
Mean	4.85	5.48	2.57	5.16
Median	1.91	1.47	1.27	1.79

Table 2 shows the mean and median individual PV-ratios based on Sales, EBITDA and earnings. A number higher than 1 shows IPO firms are valued higher than peer firms at the offer. Subsection 3.2.1 explains how the individual PV-ratios are computed.

Unsurprisingly these outcomes indicate in both the mean and median PV-ratios, in all different kinds of PV-ratios, a number higher than one. These findings also indicate IPO firm overvaluation compared to peer firms based on multiples, or in other words IPO firm overvaluation compared to a proxy for intrinsic or fair IPO firm value. In the study by Purnanandam and Swaminathan (2004) the sample median for the PV with sales, EBITDA and earnings were 1,54 for the PV(sales), 1,49 with the PV(EBITDA) and 1,54 with the PV(Earnings). When comparing them with the outcomes of this study, the PV(EBITDA) seems to resemble most whereas the PV-ratio for sales and earnings seem to deviate more.

There are various possible explanations for the discrepancy in results between this study and the study on the US market on IPO valuation based on peer multiples. The study by Purnanandam and Swaminathan researched over 2000 IPO compared to a meagre 70 IPO firms in this thesis. The large difference between the amount of firms being researched could contribute to the difference in both studies. It is also possible that these differences can be explained due to differences in firms being traded on US Stock market and firms being traded on the AEX Stock exchange, it is however important to note that firms trading on the Dutch Stock exchange have significant exposure to the US market. Indeed even some IPOs in this dataset were dual-listings, IPOs that were simultaneously released on the Dutch and US stock market. It is also important to note that the study mentioned earlier did not include firms with a negative prior to IPO fiscal year EBITDA, whereas these firms are included on the

basis of creating a larger dataset and avoiding a bias in the dataset which could stem from excluding firms that had prior to IPO fiscal year negative EBITDA (tech and biotech firms could possibly fit this profile). Lastly the difference from the results of both studies could be caused by the selection criteria of the IPO peer firms. The criteria were more stringent in the study by Purnanandam and Swaminathan than the criteria in this thesis. For details about the difference in peer firm selection criteria I refer to sub-section 3.2.1.

The overvaluation of IPO firms compared to peer firms does not however account to anything academically if not tested statistically. In order to test whether the median or mean of the IPO firm PV-ratios differs significantly from 1, which can be seen as the break-even point of the IPO firms between either being valued equally to peer firms or being overvalued compared to peer firms, it is important to assess the distribution of the PV-ratios. Figure 3 shows the distribution of the PV-ratios and the graph which shows the outcomes which constitute the normal or Gaussian distribution.

Figure 3. Q-Q plot.

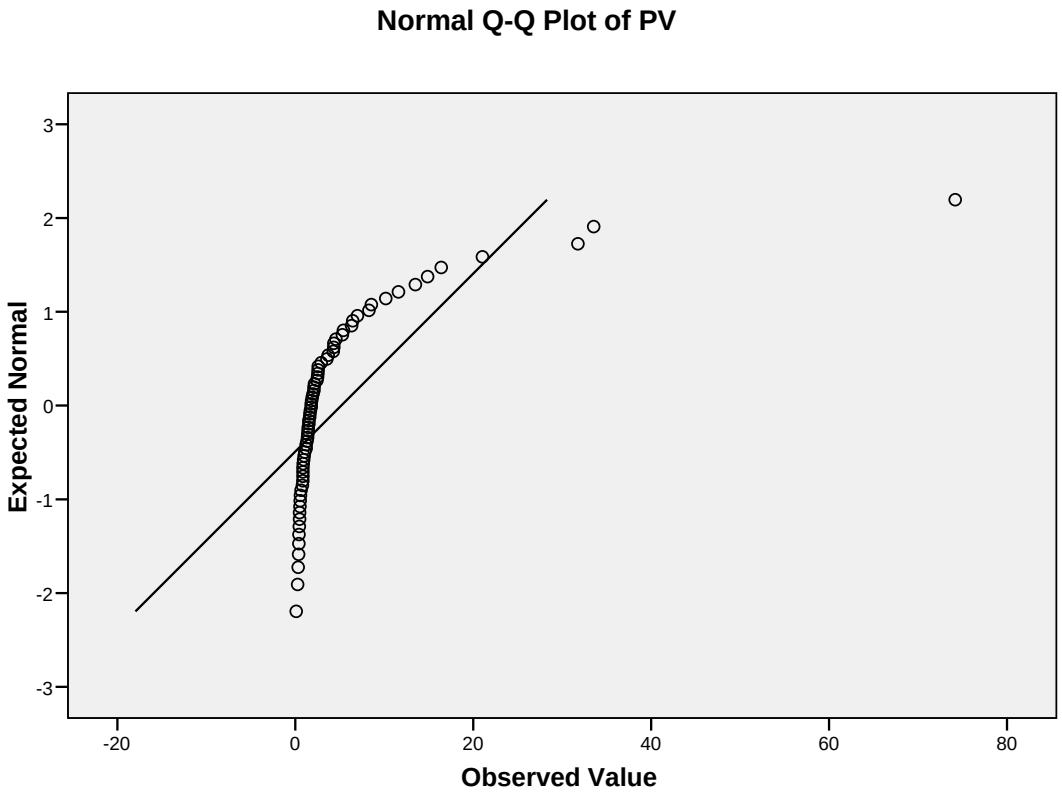


Figure 3 shows a normal q-q plot of the PV-ratio, or the overall PV-ratio which is composed using the individual PV-ratios. The line depicts the outcomes which are expected if the PV-ratios are normally distributed and the dots reflect the PV-ratios. The figure clearly shows a non-normal distribution.

Figure 3 shows it is inappropriate to use statistical tests reliant on the normal distribution to test whether IPO firms are statistically overvalued. Instead of a test reliant on the normal distribution a non-parametric test should be used. The study by Purnanandam and Swaminathan also use a non-parametric test in order to test the significance of the deviation from 1 of the individual PV-ratios, presumably for the same reasons, although they do not specify the reason why. One of the tests that could be used to test whether the mean differs significantly from one is the Wilcoxon signed-rank test. It is possible to test whether a mean of a single population deviates significantly from some test value using a single population Wilcoxon signed-rank test. SPSS 15.1 however does not have a function to perform this test and therefore the paired-observation two sample Wilcoxon test is adapted in this study in order to test whether the mean of the PV-ratio differs significantly from 1. In order to test

whether the PV-ratio differs significantly a fictional variable is created in the form of 1 for every observation being tested, which refers to the test value of 1. Adjusting the Wilcoxon signed rank test in this manner results in a single sample Wilcoxon signed rank test (Aczel, fifth edition, page 686). The results from this test of the PV-ratio are presented in table 3.

Table 3. Wilcoxon- and sign test.

	Wilcoxon p-value	**Sign-test p-value**	**N**
PV Sales	0.000	0.006	70
PV EBITDA	0.001	0.156	60
PV Earnings	0.001	0.003	60
PV Ratio	0.000	0.001	70

Table 3 shows the outcomes from the Wilcoxon test and the sign test which tests whether the PV-ratios differ significantly from 1. H0: Mean = 1 and H1: Mean > 1. N is the number of PV-ratios tested. The PV EBITDA and PV Earnings only have a value of 60 for N due to missing or negative values of the IPO firm EBITDA and Earnings.

Tables 3 shows a p-value of 0,000 which indicates a rejection of the null-hypothesis. The null-hypothesis implies equality in IPO and IPO peer firm pricing (mean is equal to one). The mean therefore differs significantly from 1. The Wilcoxon test used in the Purnanandam and Swaminathan study results in similar p-values.

There is a caveat however to using the Wilcoxon-test. One of the assumptions of the Wilcoxon-test is the assumption of a symmetric distribution of the PV-ratios (Aczel, fifth edition, page 683). Figure 4 shows a distribution of the PV-ratios.

Figure 4. PV-ratio distribution

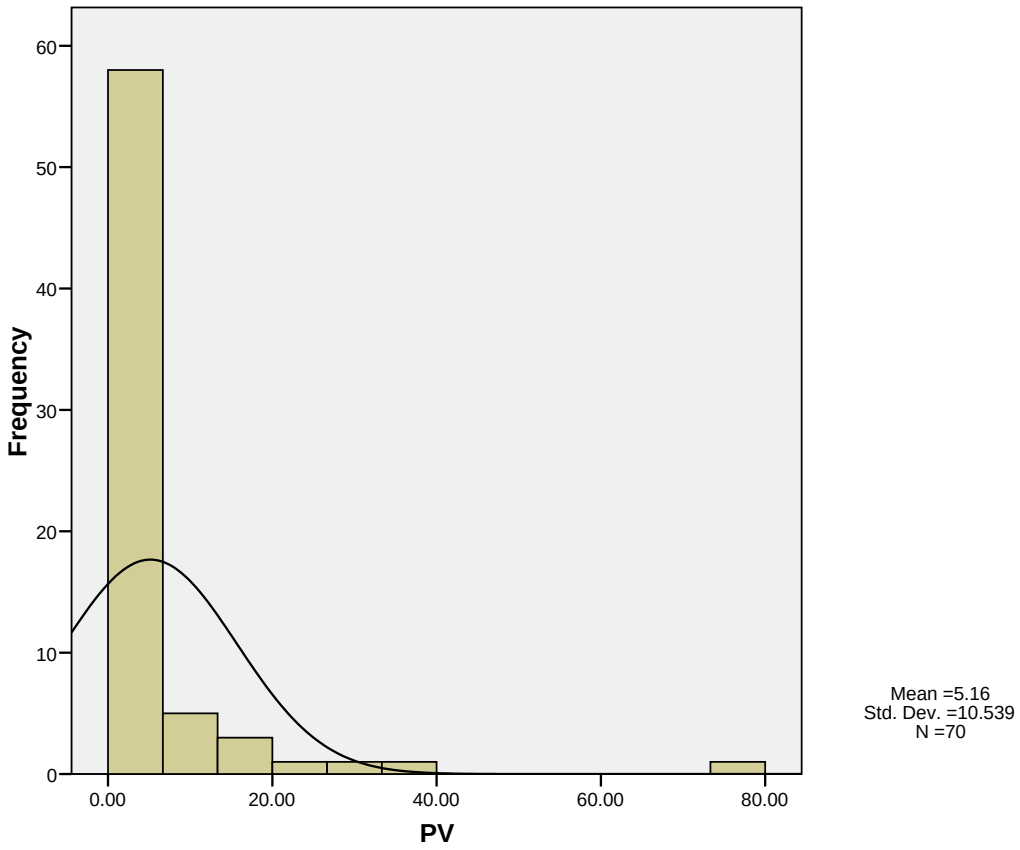


Figure 4 shows the distribution of the PV-ratio, or the overall PV-ratio which is composed using the individual PV-ratios. The line depicts the outcomes which are expected if the PV-ratios are normally distributed. The outcomes clearly show the distribution of the PV-ratios is not symmetric at all, which is assumed when using the Wilcoxon test.

The figure shows a distribution of PV-ratios that is not nearly the equivalent to a symmetric distribution, or a normal distribution as shown in the graph in the histogram. The authors do mention the positive skewness of the distribution of the PV-ratios found in their study, which is also visible in figure 4. The dataset therefore does not satisfy the assumption of being symmetrical which may diminish the appropriateness of using the Wilcoxon test. In the study by Purnanandam and Swaminathan there is no mention of this predicament. The only solution would be to use the sign-test which does not require a symmetric distribution. The results from the sign-test are also shown in table 3 and are largely in line with the findings from the Wilcoxon test. The sign test does not take into account the magnitude of deviations in calculating whether the PV-ratio differs significantly from one and is therefore a

crude measure[2]. Only the PV(EBITDA) ratio is not significantly deviant from 1 using the sign-test.

The above mentioned analyses indicate a significant IPO firm overvaluation compared to peer firm based on multiples, albeit with statistical tests that may not captivate the full complexity of the dataset. When using peer firm valuation as a proxy for IPO firm valuation, the results are therefore in line with IPO firms having been overvaluated in the period from 1990 to 2002 on the AEX stock exchange, except for in the years 1990, 1991 and 1993. Using the peer firms as a proxy for fair or intrinsic value we could therefore conclude IPO overvaluation at the offer compared to fair or intrinsic value in the overwhelming majority of IPOs in this thesis.

There are a multitude of possible explanations for this outcome, which is in line with the research conducted by Purnanandam and Swaminathan. The first explanation entails the possibility of the incomparability of the IPO firm and the IPO peer firm. It is conceivable that IPO peer firm is not comparable to the IPO firm, even though they have been selected on the basis of industry and size. The study by Purnanandam and Swaminathan however also selects its peer firms on the basis of profitability, and find similar outcomes. There are other reasons why a higher market value of IPOs compared to peer firms may be justified. One of these entails growth expectations; it is likely IPO firms, with the new influx of cash, are able to do investments to increase size and profitability of the firm. In this line of reasoning it is also likely IPO firms, seeking a new influx of cash, are firms that are predominantly firms with higher growth expectations and firms that are in solid shape, else they would not go public[3]. Leverage affects the firm tax shield and therefore differences in leverage may also distort these outcomes. A systemic difference in leverage between peer firms and IPOs could possible influence the PV-ratio outcomes.

[2] The Sign-test only examines whether the values exceed the test-value, which is 1 in this test. The Sign-test does not take into account the magnitude of the deviation and therefore lacks power and sophistication to be used as a serious non-parametric test, but in the case of this thesis it is useful as a control measure

[3] The study by Purnanandan and Swaminathan do control for growth prospects, but only using analyst forecasts that are made public 3 months after the IPO, which makes it less effective.

Table 4 shows the Spearman correlation between the individual PV-ratios. Multiples should be correlated in order to be useful methods of firm valuation. Higher valuation based on earnings or EBITDA should be associated with higher valuation based on Sales.

Table 4. Nonparametric correlations with Spearman-test.

		PV Sales	PV EBITDA	PV Earnings
PV Sales	Correlation Coefficient	1.000	0.807	0.585
	p-value		0.000	0.000
PV EBITDA	Correlation Coefficient	0.807	1.000	0.772
	p-value	0.000		0.000
PV Earnings	Correlation Coefficient	0.585	0.772	1.000
	p-value	0.000	0.000	

Table 4 shows the correlation between the individual PV-ratios using the nonparametric Spear-test for correlations. The results show a significant correlation between the individual ratios. The Sales and EBITDA ratios have the highest correlation followed by the Earnings and EBITDA ratios.

The outcomes from this figure show high and significant correlation between the different PV-ratios which indicates that valuation of the IPO firms based on peer firm multiples leads to similar outcomes, which in turn increases the reliability of the results.

4.1.2. IPO valuation compared to peer firms and underpricing

This section shows the results from the analysis of the relationship between the PV-ratio and underpricing. Figure 6 shows a scatter plot of the PV-ratio and underpricing.

Figure 6. Scatter plot underpricing and PV-ratio

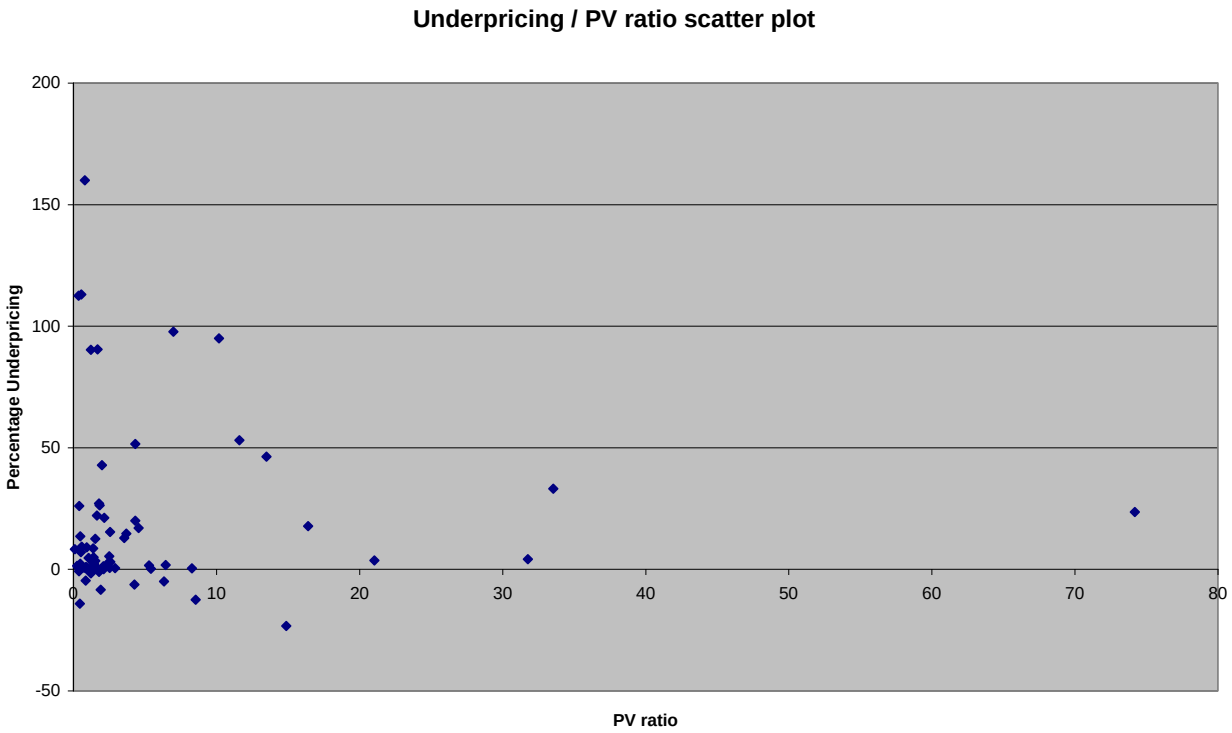


Figure 6 shows a scatter plot of market adjusted underpricing and the PV-ratio. The y-axis shows underpricing and the x-axis the PV-ratio.

The results from the scatter plot do not seem to indicate a good fit for a linear relationship between underpricing and the PV-ratio. In order to test the relationship between the two variables statistically a linear-regression model is used.

The results from the linear regression between underpricing and the PV-ratio are in table 5.

Table 5. Linear-regression of underpricing and PV-ratio

Dependent variable = UP		
Independent variable	**Coefficient**	**p-value**
PV	1.222	0.729
Accruals	-3.709	0.437
Sales	-3.634	0.470
BM	-3.091	0.437
EBITDA	9.165	0.219

Adj R-squared	**Durbin-Watson**	**N**
0.081	2.271	48

Table 5 shows the outcomes from the linear regression. Dependent variable is market adjusted underpricing. The number of firms included in analysis is only 48, because the EBITDA and Accrual variable are not available for all IPO firms. The intercept from the regression is 22.044 and has a p-value of 0.177. Subsection 3.2.1 shows the formula used in this regression and an explanation of the variables and how they are constructed.

The outcomes show an insignificant positive relationship between the PV-ratio and underpricing. The result is insignificant on a 5% and a 10% level. The study by Purnanandam and Swaminathan showed a significantly positive relationship between the PV-ratio and underpricing. Although the sign is the same in this analysis, these findings are insignificant and therefore no conclusions can therefore be drawn from these outcomes.

4.1.3 Robustness checks

This sub-section shows the outcomes from the previous two subsections, but with adjustments to perform robustness checks. The PV-ratio is computed by assigning a peer firm to each IPO firm which has the best fit. This subsection filters peer firms that have a bad fit and excludes PV-ratios from IPOs that are not based on all three individual PV-ratios. After the selection process 57 firms are left. With these adjustments, IPOs are still overvalued compared to peer firms. The mean PV-ratio is 3.0 and the median PV-ratio 1.52. Both the median and the mean PV-ratio are slightly smaller, indicating filtering the dataset results in less overvalued IPO firms compared to peer firms. After a linear regression using the filtered dataset on market adjusted underpricing with the log of the PV-ratio, the log of sales and the log of the Book-to-Market ratio as independent variables results are similar to the previous subsection.

The sales and book-to-market value variable are both negative, the PV-ratio positive and all are statistically insignificant.

4.2.1 Long-term underperformance

I measure individual long-term stock performance using the market or one-factor model in the manner subsection 3.2.2 describes. Not all the IPOs in the dataset traded for 5 years. Some went out of business and others were acquired by other firms. Table 6 shows the long-term risk-adjusted abnormal return of the whole dataset comprising of 69 firms, some of which traded less than 5 years on the Amsterdam stock exchange, and the long-term risk-adjusted return of IPOs that trade at least 5 years on the Stock Exchange. The dataset is limited to 69 firms instead of 70, because Datastream proved to be unable to find the stock performance of one particular firm.[4]

Table 6. Overview long-term risk adjusted return

Abnormal risk adjusted return all IPOs	**Monthly**	**Per annum**
mean	-0.4	-4.9
median	-0.3	-3.4
	N	**p-value**
Wilcoxon-test	69	0.231
One-sample t-test	69	0.160
5-year abnormal risk adjusted return	**Monthly**	**Per annum**
mean	0.101	1.2
median	-0.092	-1.2
	N	**p-value**
Wilcoxon-test	49	0.786
One-sample t-test	49	0.836

Table 6 shows the long-term risk adjusted return in percentage of all firms and of all firms that traded for 5 years on the Dutch Stock exchange. The average testing period of long-term performance of the whole dataset of 69 firms was 47 months. Of the whole dataset only 49 firms traded for 5 years on the stock exchange. The Wilcoxon and one-sample t-test, one nonparametric and one parametric test, show none of the outcomes deviate significantly from 0, and therefore none of the outcomes are statistically different from 0.

[4] This firm is DPA Flex Group. The identifier was available, but Thomson Financial Datastream could not find the total return.

The results show mixed and insignificant results of long-term IPO performance, and are therefore in line with the Efficient Market Hypothesis which postulates unpredictability of stock performance. These results are contrary to some studies conducted on the US market but in line with most of the findings on the Dutch market. Hoeijen and van der Sar (1999) find insignificant underperformance of 17.9% after 5 years. The results of this study show positive mean risk adjusted abnormal return over 5 years when excluding the first 6 months and negative median risk adjusted abnormal return over the same period. Table 6 also shows these results are statistically insignificant

The next step is to test the explanatory power of the PV-ratio on long-term risk adjusted abnormal returns. Figure 7 shows a scatter plot of the PV-ratios of the IPOs and long-term risk adjusted abnormal returns from these IPOs. The figure does not appear to show a linear relation between the two variables, neither negative nor positive.

Figure 7. Scatter plot PV-ratio and long-term risk adjusted abnormal returns.

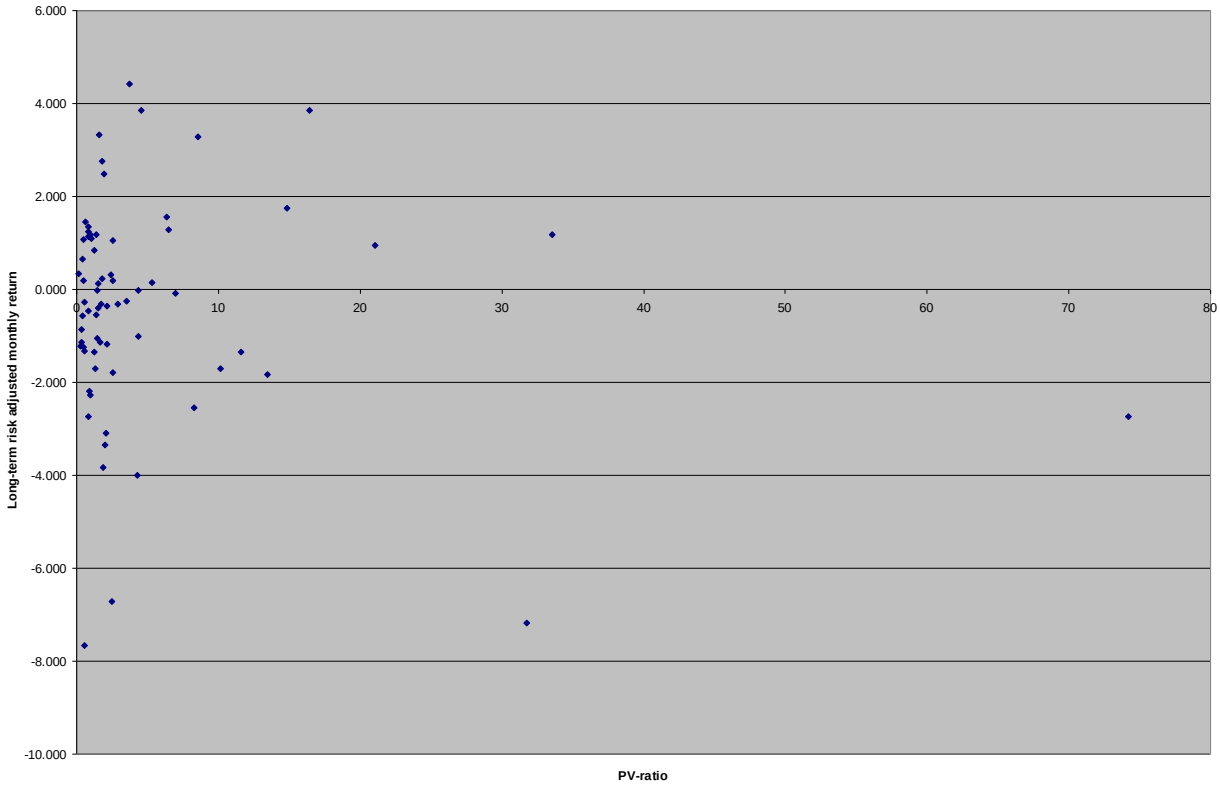


Table 7 shows the outcomes of the cross-sectional regression on the explanatory power of the PV-ratio along with the other factors subsection 3.2.2 formulates on long-term risk adjusted returns. The results show no relationship between the PV-ratio and long-term IPO performance on a 5% and a 10% significance level. These results are also in line with the Efficient Market Hypothesis, since these findings indicate long-term IPO performance cannot be explained by IPO valuation compared to peers. These results are contrary to the study Purnanandan and Swaminathan which signify IPO firm overvaluation compared to peer firm drives IPO firm long-term underperformance.

Table 7. Cross-sectional regression on long-term risk-adjusted returns of years.

	Dependent variable = R	
Independent variable	**Coefficient**	**p-value**
PV	0.100	0.638
Accruals	0.171	0.623
Sales	0.405	0.029
BM	-0.605	0.090
EBITDA	-1.966	0.019

Adj R-squared	**Durbin-Watson**	**N**
0.128	2.636	34

Table 7 shows the cross-sectional regression with long-term IPO performance measured for 54 months after the initial 6 months of trading as the dependent variable a number of explanatory variables. Number of firms being tested is only 34 since the firms that did not trade for 5 years on the stock exchange were excluded along with firms that had missing EBITDA or Accruals.

4.2.2 Robustness checks

This subsection performs the same filtering process as subsection 4.1.3 and repeats the regression from table 5, but excludes the accrual and EBITDA variable to increase the sample size. The results from this alternate regression are largely the same as the results in table 5. There is a insignificant positive relation between the PV-ratio and long-term performance.

4.3 Hot and cold issue periods

The aim of this subsection is to analyse whether findings differ in "hot" and "cold" issue periods. Section 3.2 labels periods "hot" and "cold" issue periods and remarks the different level in underpricing in these periods. Table 8 shows median and mean market-adjusted underpricing in "hot" and "cold" issue periods. The table shows a significant difference in underpricing in "hot" and "cold" periods. The difference between underpricing in the periods is statistically significant. These statistical tests however do not control for other factors, as is in the previous subsections.

Table 8. Hot and cold issue periods

	Underpricing	Long-term performance	Long-term performance without ICT	PV-ratio
Median cold period	2.0	3.8	7.2	1.85
Mean cold period	6.1	6.5	8.0	5.39
Median hot period	7.9	-3.4	-2.6	1.74
Mean hot period	24.5	-2.7	-1.1	5.04
One sample t-test	0.002	0.007		
Wilcoxon test	0.036	0.003		

Table 8 shows median and mean market adjusted underpricing in hot and cold issue periods and the statistical signifcance of the deviation. The results show higher underpricing in hot periods than in cold periods, which is statistically significant. The tests used are a parametric one sample t-test and a nonparametric t-test, both yielding the same outcome. The table shows median and mean long-term IPO performance for a period of 54 months after the first 6 months of trading in hot and cold issue perods. The difference between the means is statistically significant in both statistical tests. The amount of IPOs in hot issue markets numbers 28 and 21 in cold issue markets. The table shows the outcomes of long-term performance over 54 months of IPOs in hot and cold issue periods excluding firms that are ICT firms. The table also shows median and mean PV-ratios in hot and cold issue periods.

Table 8 presents long-term risk-adjusted IPO returns in "hot" and "cold" periods. The table shows IPO long-term performance is worse in hot issue periods compared to cold issue periods. This difference is statistically significant. The finding is very interesting, and indicates long-term performance of IPOs is better in "cold" issue periods.

A possible explanation for this may be that issuing firms use a window of opportunity to go public during hot issue periods, because they are of low quality and would not be able to go public during a cold issue period. Another explanation for this may that ICT firms mostly went public during the hot issue period of the dot.com boom. When the dot.com crash happened the ICT firms were among the firm worst hit which may result in lower long-term performance compared to the market index which is composed of a large variety of firms which may have been less affected by the dot.com crash. These outcomes do not control for other factors however and are therefore less useful than the regressions in the previous subsections. Table 8 shows mean long-term performance over "hot" and "cold" issue periods excluding ICT firms.

Table 8 clearly shows the difference in long-term return is not driven by ICT firms, since excluding these firms for analysis results in similar findings. The only explanation remaining is that low quality issuing firms use a window of opportunity to go public in "hot" issue periods or that low quality firms fail to go public during "cold" issue periods due to increased investor scrutiny. These results are in line with previous research on IPOs backed by venture capitalists (Lerner, 1994).

Table 8 shows the PV-ratio in "hot" and "cold" periods. The table shows IPO valuation compared to peer firms does not differ in "hot" or "cold" issue periods. The results "spinning" which is a technique rumored to have been used in dot.com boom period by underwriters on the US market. Loughran and Ritter (2004) argue spinning contributed to the increased underpricing on the US market. In the spinning theory an underwriter deliberately underprices its IPO and allocates the shares to its loyal customers in order to maintain their loyalty (Ritter, Welch, 2002). This table shows valuation of IPOs does not differ in hot or cold periods, and therefore these findings seem to indicate underpricing is not caused by deliberate underpricing of the IPO at the offer, since IPOs are valued similarly to peer firms in cold issue periods, which did not exhibit high underpricing. Spinning therefore could not have contributed to IPO underpricing on the Dutch market.

Table 9 presents the results from the regression on underpricing and long-term performance, which differs from the regression of subsection 4.2 by excluding the accrual and EBITDAmargin variable but adds a dummy for hot and cold periods. The accrual and EBITDAmargin variables are excluded in order to enlarge the data sample and the power of the regression. These regressions are the main statistical tests and are more reliable than the previous ones in this subsection, since these tests control for other factors.[5] The hot and cold dummy does not result in statistically significant results on a 5% or a 10% level, although the sign is in line with the findings from tables 7 and 8. When controlling for other factors the "hot" and "cold" issue period dummy variable is insignificant with the regression on long-term risk adjusted abnormal return and underpricing.

Table 9. Hot and Cold issue period regressions.

	Dependent variable =	**UP**
Independent variable	**Coefficient**	**p-value**
PV	2.645	0.484
Sales	-4.622	0.037
BM	-4.014	0.301
HCdummy	11.320	0.239
Adj R-squared	**Durbin-Watson**	**N**
0.143	1.62	70
	Dependent variable =	**R**
Independent variable	**Coefficient**	**p-value**
PV	0.166	0.431
Sales	0.225	0.107
BM	-0.284	0.363
HCdummy	-0.655	0.282
Adj R-squared	**Durbin-Watson**	**N**
0.033	2.297	49

The table shows the outcomes from the regressions on market adjusted underpricing and long-term risk adjusted abnormal return of IPOs. The factors are the same as the ones from the previous regressions. The outcomes of the hot and cold issue periods are both insignificant.

[5] The regression from table 12 does not control for accruals or EBITDAmargin, in order to enlarge the sample. Adding the control factors did not affect the results the significance or signs of the coefficients.

4.4 Underwriter reputation

This section analyses the findings from IPOs that were underwritten by investment banks with a "good" and "bad" reputation in a similar manner as was done in the previous section where the findings are analysed and differentiated in different issue periods. Table 10 presents the results of market-adjusted underpricing of IPOs underwritten by investment banks with either a "good" or "bad" reputation.

Table 10. Underwriter reputation

	Good reputation	**Bad reputation**
Mean underpricing	8.4	32.6
Median underpricing	3.3	9.8
Wilcoxon test	0.000	
One-sample t-test	0.000	
Mean PV-ratio	4.32	4.83
Median PV-ratio	2.15	1.67
Mean abnormal return	-0.62	-0.40
Median abnormal return	-0.36	-0.09

The table shows mean and median market adjusted underpricing of IPOs underwritten by lead managers with a "good" and "bad" reputation. The Wilcoxon and one-sample t-test both show a significant deviation between the underpricing of the two groups. The Table also shows the long-term performance and IPO to peer valuation in the form of the PV-ratio of IPOs underwritten by lead managers with a "good" and "bad" reputation. The table shows there is near to no difference between the two groups in both long-term performance and valuation compared to peers. IPOs that did not trade for 5 years on the Stock exchange were excluded from analysis.

The table shows significant higher underpricing by underwriters with a "bad" reputation compared to underwriters with a "good" reputation. This finding is in line with the certification hypothesis and studies on underwriter reputation by Dark and Singh (1998) who also find investment banks with a good reputation underwrite IPOs which exhibit less underpricing than investment banks with a bad reputation. These results are contrary however to the studies by Beatty and Welch (1996) and Cooney et al. (2001) where the effect is reversed. The only study on the Dutch market on underwriter reputation is a working paper, Frederikslust and van der Geest (2001), which also finds evidence in favour of the certification hypothesis. These are however results that do not control for other factors like the regressions from the previous subsections.

Table 10 also shows the outcomes from the PV-ratio and long-term return of IPOs underwritten by investment banks with either a "good" or "bad" reputation. The table does not entail any results which would indicate a difference in PV-ratio and long-term risk-adjusted abnormal returns between IPOs underwritten by investment banks with a "good" and "bad" reputation. Contrary to the findings from Carter, Dark and Singh (1998) who find lead managers with a "good" reputation underwrite IPOs which have higher long-term performance than IPOs underwritten by lead managers with a "bad" reputation. IPO pricing compared to peers does not therefore seem affected by the reputation of the underwriter. Prestigious and less prestigious underwriters seem to price IPOs similarly compared to peer firms, an explanation for this might be that underwriters use similar methods of valuation or because all underwriters base their IPO valuation, at least in part, on peer firms.

Table 11 shows the regression on underpricing from the previous subsection, but with an added dummy for underwriter reputation. The accrual and EBITDAmargin control variables are excluded to enlarge the datasample and to increase the power of the regression[6]. This regression provides a more robust test for underwriter reputation as it controls for other variables and should therefore be seen as the main test on underwriter reputation. The outcomes are in line with previous findings from this subsection, but only the dummy variable for underwriter reputation on underpricing is significant at a 10% level. Given a small dataset a significance level of 10% may be appropriate. Controlling for other factors thus results in findings in line with the certification hypothesis.

[6] Adding the accrual and EBITDAmargin variables did not affect the sign or the signifcance of the outcomes.

Table 11. Underwriter reputation regression.

Dependent variable = UP		
Independent variable	**Coefficient**	**p-value**
PV	5.94	0.195
Sales	-3.05	0.256
BM	-2.16	0.621
Udummy	-19.68	0.060
HCdummy	11.99	0.254

Adj R-squared	**Durbin-Watson**	**N**
0.174	1.836	58

Dependent variable = R		
Independent variable	**Coefficient**	**p-value**
PV	0.129	0.613
Sales	0.181	0.322
BM	-0.506	0.202
Udummy	-0.393	0.547
HCdummy	-0.991	0.176

Adj R-squared	**Durbin-Watson**	**N**
-0.022	2.097	41

Table 14 shows the outcome of the regression on market adjusted underpricing and long-term risk adjusted abnormal returns using the formula from subsection 3.2.4. The results from both the underwriter and hot and cold dummy have the sign which is to be expected, but the outcomes are statistically insignificant.

5. Conclusion

The results show underpricing in line with previous studies on the Dutch IPO market. The results on the volume of IPOs over the years indicate a hot issue period from 1997 to 2000, also in line with previous research on the Dutch stock market. Adjusting first-day return for market returns does not significantly affect the outcomes.

The IPOs in this study are significantly overvalued compared to peer firms selected on industry and size, these outcomes are robust to changes that exclude IPO firms that have less multiples available. It is possible overvaluation of IPO firms is driven by growth prospects. It is reasonable to believe IPO firms receive funds from their new listing which they use for investments, which would subsequently positively influence growth and would therefore justify a higher market value for the IPO firm compared to the peer firm. It is also reasonable to believe IPO firms often go public in order to get funds for investments, which subsequently indicates IPO firms tend to be firms with higher growth expectations than IPO peer firms.

There is an insignificant positive relationship between the PV-ratio and market adjusted underpricing. Overvalued compared to peer IPO firms therefore tend to have higher first-day returns, but the effect is insignificant. Had it been significant, it would be contrary to asymmetric information theories on underpricing, which would postulate higher underpricing by IPO firms that are undervalued. The results from the by a study on the US market do find a positive significant relationship between the PV-ratio and underpricing.

The results of the long-term risk adjusted abnormal returns of the IPOs using the one-factor model indicate no long-term underperformance of IPOs, in line with previous research on the Dutch stock market. Contrary to findings on the US stock market by another study, IPO overvaluation compared to peer firm does not seem have to a negative relationship with long-term IPO performance.

Underpricing is significantly higher in hot issue periods than in cold issue periods. Long-term performance of IPOs in cold issue periods is higher than in hot issue periods, which is also statistically significant. The dot.com hot issue period saw a lot of ICT firms going public and the dot.com crash hurt many of these firms, but these firms did not seem to drive long-term underperformance during the hot issue period. This result was robust to excluding IPO firms from analysis. A plausible explanation would be that low quality firms used the hot issue period as a "window of opportunity" to go public or that low quality firms find it difficult to go public in cold issue periods. IPO pricing compared to peer firms did not differ in hot and cold issue periods. Spinning has been named in the literature to have contributed to underpricing the the dot.com boom period on the US market. Spinning is the deliberate underpricing of IPOs by underwriters to reward loyal clients. If spinning contributed to underpricing on the Dutch stock market during the dot.com boom period, IPO pricing compared to peer firm would be lower in this period when assuming peer firm valuation to be a proxy for IPO intrinsic value. The findings of this thesis are therefore contrary to the theory of spinning having contributed to underpricing in the dot.com boom period on the Dutch stock exchange.

Results on the role of underwriters in the IPO process are in line with the certification hypothesis. IPOs underwritten by lead managers with a good reputation demonstrate lower underpricing than IPOs underwritten by lead managers with a bad reputation. IPO pricing compared to peer firms is more or less the same between underwriters with a good and bad reputation, possibly indicating investment banks price IPOs using similar valuation techniques. Long-term performance did not differ between IPO underwritten by investment banks with a bad and a good reputation, contrary to earlier findings on the US stock market.

The only major caveat of this thesis is the market that is researched. The Dutch market proved to be small indeed compared to the US, especially because a larger time period was impossible due to a lack of data. Both the size of the market and the data available severely limit the research possibilities. Should this research be conducted on a larger market, findings will probably be more clarifying.

In short, the results of this thesis confirm the existence of the IPO underpricing anomaly on the dutch Stock market between 1990 and 2002. The results also show underpricing has been significantly higher in hot issue periods. The results are not in line with the IPO underperformance anomaly. The results however do indicate long-term performance was significantly worse for IPOs from hot issue periods compared to IPO from cold issue periods, indicating low quality IPO firms used “a window of opportunity” to go public in this period. IPO firms are overvalued compared to peer firms at the offer, but overvaluation does not seem to drive underpricing or long-term performance. The results are in line with the certification hypothesis, which claims IPOs with investment banks with a good reputation have lower underpricing. The results refute the process of spinning being the cause of underpricing in the dot.com boom period on the Dutch stock exchange.

References

Aczel, Amir D., Complete Business Statistics, fifth edition

Allen, Franklin, and Gerald R. Faulhaber, 1989, Signaling by underpricing in the IPO market, *Journal of Financial Economics*, 23, 303–324.

Amihud, Yakov, Shmuel Hauser, and Amir Kirsh, 2001, Allocations, adverse selection and cascades in IPOs: Evidence from Israel, Working paper, New York University.

Beatty, Randolph P., and Jay R. Ritter, 1986, Investment banking, reputation, and the underpricing of initial public offerings, *Journal of Financial Economics*, 15, 213–232.

Benveniste, Lawrence M., and Paul A. Spindt, 1989, How investment bankers determine the offer price and allocation of new issues, *Journal of Financial Economics*, 24, 343–362.

Benveniste, Lawrence M., and William J. Wilhelm, 1990, A comparative analysis of IPO proceeds under alternative regulatory environments, *Journal of Financial Economics*, 28, 173–208.

BOEK IPOS in Amsterdam: An Analysis of Unseasoned Issues of Common Stock in The Netherlands, 1982-1991, A Buijs, HG Eijgenhuijsen - 1993 - Nijenrode University Press

Brav, A., Geczy, C., Gompers, Paul A., 2000, Is the abnormal return following equity issuances anomalous?, *Journal of Financial Economics*, 56, 209-249

Buijs, A. and H.G Eijgenhuijsen (1992), 'IPOs in Amsterdam: An Analysis of Unseasoned Issues of Common Stock in the Netherlands 1982–1991,' Faculty Research Paper Series No. 2, Nijenrode University.

Carter, Richard B., and Steven Manaster, 1990, Initial public offerings and underwriter reputation, *Journal of Finance*, 45, 1045–1067.

Carter, Richard B., Frederick H. Dark, and Ajai K. Singh, 1998, Underwriter reputation, initial returns, and the long-run performance of IPO stocks, *Journal of Finance*, 53, 285–311.

Chemmanur, Thomas J., 1993, The pricing of initial public offers: A dynamic model with information production, *Journal of Finance*, 48, 285–304.

Cooney, John W., Ajai K. Singh, Richard B. Carter, and Frederick H. Dark, 2001, IPO initial returns and underwriter reputation: Has the inverse relationship f lipped in the 1900s? Working paper, University of Kentucky, Case Western Reserve University, and Iowa State University.

Cornelli, Francesca, and David Goldreich, 2002, Bookbuilding: How informative is the order book? Working paper, London Business School.

Doeswijk, Hemmes, Venekamp (2006), ‘’25 years of dutch IPOs’’, *De Economist*, Springer

Eijgenhuijsen, H. (1989), ‘Aandelenintroducties op de Amsterdamse Effectenbeurs en het Verschijnsel ‘Underpricing’ (IPOs at the Amsterdam Stock Exchange and Underpricing), *Maandblad voor Accountancy & Bedrijfseconomie*, 63, pp. 119–127.

Fredrikslust and van der Geest, 2001, working paper

Hanley, Kathleen Weiss, 1993, The underpricing of initial public offerings and the partial adjustment phenomenon, *Journal of Financial Economics*, 34, 231–250.

Hoeijen, van H.J. and N.L. Van der Sar (1999), ‘De Performance van Aandelenintroducties op de Amsterdamse Effectenbeurs’ (The Performance of IPOs at the Amsterdam Stock Exchange), *Maandblad voor Accountancy & Bedrijfseconomie,* 73, pp. 120–132.

Hughes, Patricia J., and Anjan V. Thakor, 1992, Litigation risk, intermediation, and the underpricing of initial public offerings, *Review of Financial Studies* 5, 709–742.

Huygen, T.G. and A. Tourani (1993), 'Beursintroducties op de Nederlandse Aandelenmarkt' (IPOs in the Dutch Stock Market), *Economisch Statistische Berichten* (ESB), 78, pp. 428–431.

Ibbotson, Roger G., Jaffe, Jeffrey F, 1975, 'Hot issue markets', *The Journal of Finance*, Vol. 30, No. 4

Ibbotson, R.G., J. Sindelar and J. Ritter (1994, updated in 2001), 'The Market's Problem with the Pricing of Initial Public Offerings,' *Journal of Applied Corporate Finance*, 7, pp. 66–74.

Ibbotson, R.G., J. Sindelar and J. Ritter (1994, updated in 2001), 'The Market's Problem with the Pricing of Initial Public Offerings,' *Journal of Applied Corporate Finance*, 7, pp. 66–74.:

Ibbotson, Roger G., 1975, Price performance of common stock new issues, *Journal of Financial Economics*, 2, 235–272.

Jegadeesh, Narasimhan, Mark Weinstein, and Ivo Welch, 1993, An empirical investigation of IPO returns and subsequent equity offerings, *Journal of Financial Economics*, 34, 153–175.

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

Lerner, Joshua, 1994, Venture capitalists and the decision to go public, *Journal of Financial Economics*, 35, 293-316

Lintner, J, 1965, The valuation of risk assets and the selection of risky investments in stock portfolios and capital budgets, *Review of Economics and Statistitcs*, vol. 47, no. 1

Logue, Dennis E., 1973, On the pricing of unseasoned equity issues: 1965–1969, *Journal of Financial and Quantitative Analysis*, 8, 91–103.

Loughran, T., Ritter, J.R., 1995, 'The new issues puzzle', *Journal of Finance*, Vol. L, no. 1

Loughran, Tim, 1993, NYSE vs. NASDAQ returns: Market microstructure or the poor performance of Initial Public Offerings?, *Journal of Financial Economics*, 33, 241-260.

Loughran, Tim, and Jay R. Ritter, 2002, Why don't issuers get upset about leaving money on the table in IPOs?, *Review of Financial Studies*, 15, 413–443.

Loughran, T. and J. Ritter. 2004. Why has IPO underpricing changed over time? *Financial Management* 33: 5–37.

Lowry, M. (2003), 'Why Does IPO Volume Fluctuate so Much?', *Journal of Financial Economics*, 67, pp. 3–40.

Lowry, Michelle, and G. William Schwert, 2002, IPO market cycles: Bubbles or sequential learning?, *Journal of Finance*, 57, 1171–1200.

Lyon, JD., Barber, BM., Tsai, CL., 1999, Improved methods for tests of long-run abnormal stock returns, *Journal of Finance*, Vol. 54, no.1

Michaely, Roni, and Kent L. Womack, 1999, Conflict of interest and the credibility of underwriter analyst recommendations, *Review of Financial Studies*, 12, 653–686.

Rajan, Raghuram, and Henri Servaes, 1997, Analyst following of initial public offerings, *Journal of Finance*, 52, 507–529.

Reilly, Frank K., 1973, Further evidence on short-run results for new issues investors, *Journal of Financial and Quantitative Analysis*, 8, 83–90.

Ritter, JR., Welch, I., 2002, A review of IPO activity, Pricing, and allocations, *The Journal of Finance*, vol. 57, no. 4

Ritter, Jay R., 1991, The long-run performance of initial public offerings, *Journal of Finance*, 46, 3-27.

Ritter, Jay R., 1998, Initial public offerings, Contemporary Finance Digest 2, 5–30.
Rock, Kevin, 1986, Why new issues are underpriced, *Journal of Financial Economics* , 15, 187–212.

Roosenboom, P., van der Goot, T. and Mertens, G., 'Earnings management and IPOs evidence from the Netherlands', *International Journal of Accounting*, forthcoming, 2003.

Schultz, P., 2003, Pseudo market timing and the long run underperformance of IPOs, *The Journal of Finance*, vol.58, no. 2, 483-517

Schuster, J. A., 'IPOs: insights from seven European countries', Working Paper (London School of Economics, 2003).

Sharpe, WF., 1964, 'A theory on market equilibrium under conditions of risk', *Journal of Finance*, vol.19, no. 3

Stoll, Hans R., and Anthony J. Curley, 1970, Small business and the new issues market for equities, *Journal of Financial and Quantitative Analysis*, 5, 309–322.

Tinic, Seha M., 1988, Anatomy of initial public offerings of common stock, *Journal of Finance*, 43, 789–822.

Welch, Ivo, 1989, Seasoned offerings, imitation costs, and the underpricing of initial public offerings, *Journal of Finance*, 44, 421–450.

Welch, Ivo, 1992, Sequential sales, learning, and cascades, *Journal of Finance*, 47, 695–732

Sources and databases

Compustat Global
Lexis Nexis Academic
Thomson Datastream Financial
Thomson One Banker
Thomson Research

Appendix

A. Overview IPO firms, issue dates and market adjusted underpricing

Issue date in month/day/year and underpricing in percentages, adjusted for value weighted market returns.

Firm	Issue Date	Market Adjusted Underpricing
Accell Group NV	10/1/1999	1.616
AFC Ajax NV	6/5/1998	22.109
AINO NV	6/6/2000	4.692
Airspray International	5/20/1998	96.306

ASM Lithography Holding NV	3/15/1995	33.171
Astra Informatica Groep NV	8/26/1998	3.047
Avalix	2/9/1998	2.589
AXA STENMAN INDUSTRIES NV	3/19/1998	3.818
Axxicon Group NV	6/9/1995	45.685
Baan Company NV	5/19/1995	54.028
Ballast Nedam NV	5/16/1994	2.721
BE Semiconductor Industries NV	4/12/1995	16.978
Benckiser NV	11/24/1997	4.380
Beter Bed Holding NV	11/29/1996	8.190
Blue Fox Enterprises NV	5/21/1999	12.096
Brunel International NV	6/19/1997	8.146
CARDIO CONTROL N.V.	6/26/1998	89.689
Computer Software Solutions	4/25/1997	24.886
Copaco NV	12/2/1998	7.734
Crucell NV	10/27/2000	-14.766
Ctac NM NV	11/3/1998	90.126
DETRON GROUP N.V.	2/26/1999	5.033
Devote NV	2/26/1999	8.271
DOCdata NV	30-4-1997	0.594
DPA Flex Group NV	3/29/1999	-2.496
Draka Holding NV	10/29/1991	-1.734
Endemol Entertainment BV	10/31/1996	17.720
Euronext NV	7/5/2001	-8.157
EVC International NV	11/18/1994	1.780
Exact Holding NV	6/3/1999	-1.143
Fugro NV	3/31/1992	2.499
Gucci Group NV	10/23/1995	23.357
Heijmans NV	9/16/1993	-0.090
HELVOET HOLDING NV	5/2/1990	1.171
HITT NV	4/6/1998	28.271
Holland Chemical International	10/30/1997	3.267
ICT Automatisering NV	6/25/1997	3.723
InnoConcepts NV	4/23/1998	44.027
IsoTis NV	10/5/2000	-12.929
Jetix Europe NV	11/18/1999	-0.308
Koninklijke KPN NV	6/13/1994	2.140
Koninklijke Vopak NV	11/4/1999	2.635
KPNQwest	11/9/1999	51.584
KSI INTERNATIONAL N.V.	12/3/1998	110.586
LANDIS GROUP NV	4/23/1998	113.769
McGregor Fashion Group NV	4/29/1999	2.127
Nedgraphics Holding BV	3/4/1998	12.109
NEW SKIES SATELLITES NV	10/4/2000	-6.125
Nutreco Holding NV	2/6/1997	11.426
Nyloplast NV	11/4/1997	-3.142
PinkRoccade NV	7/7/1999	0.567
PRIORITY TELECOM N.V.	9/27/2001	15.481
Punch Graphix NV	7/1/1997	1.366
Qurius NV	11/27/1998	8.158
Randstad Holding NV	5/28/1990	0.896
Seagull Holding NV	2/2/1999	16.004
SMIT TRANSFORMATOREN NV	10/14/1994	3.126
SNT Group NV	3/2/2000	94.408

TAS Groep NV	8/27/1998	4.404
Tele2 Netherlands Holding	23-7-1999	20.548
TIE Holding NV	3/2/2000	159.344
TNT NV	6/29/1998	-0.104
Trader Classified Media	3/31/2000	-23.067
UCC Holding NV	9/5/1998	1.333
Unit 4 Holding	2/26/1998	25.589
United Pan-Europe Comm NV	2/11/1999	24.945
UNIVAR N.V.	7/1/2002	-0.886
Van Leer Packaging Worldwide	2/5/1996	4.226
VODAFONE LIBERTEL NV	6/15/1999	-4.965
World Online BV	3/16/2000	-2.541

B. Overview PV-ratio and long-term risk adjusted abnormal return

Long-term risk-adjusted abnormal returns are in percentages and on a monthly basis. Outcomes also include long-term performance of IPOs that did not trade for 5 years. The PV-ratio is composed by the individual PV-ratios.

Firm	Long-term risk adjusted abnormal return	PV-ratio
Accell Group NV	1.176	0.994
AFC Ajax NV	-1.322	0.550
AINO NV	0.189	0.451
Airspray International	0.145	5.288
ASM Lithography Holding NV	3.861	4.561
Astra Informatica Groep NV	-1.248	0.476
Avalix	-2.738	0.860
AXA STENMAN INDUSTRIES NV	0.226	1.788
Axxicon Group NV	-1.136	1.650
Baan Company NV	-1.831	13.491
Ballast Nedam NV	-1.216	0.258
BE Semiconductor Industries NV	-1.343	11.598
Benckiser NV	-0.019	1.456
Beter Bed Holding NV	-0.281	0.578
Blue Fox Enterprises NV	-0.025	4.331
Brunel International NV	-1.783	2.538
CARDIO CONTROL N.V.	-0.092	6.984
Computer Software Solutions	-0.539	1.407
Copaco NV	-1.186	2.148
Crucell NV	3.283	8.551
Ctac NM NV	-3.351	1.990
DETRON GROUP N.V.	3.321	1.618
Devote NV	1.559	6.327
DOCdata NV	-2.264	0.937
DPA Flex Group NV		5.412
Draka Holding NV	0.845	1.217
Endemol Entertainment BV	3.853	16.403

Euronext NV	2.485	1.904
EVC International NV	-2.184	0.888
Exact Holding NV	0.116	1.526
Fugro NV	0.315	2.429
Gucci Group NV	1.184	33.547
Heijmans NV	1.343	0.850
HELVOET HOLDING NV	-1.137	0.321
HITT NV	-0.244	3.549
Holland Chemical International	1.079	0.482
ICT Automatisering NV	1.460	0.652
InnoConcepts NV	-0.316	1.696
IsoTis NV	-4.008	4.267
Jetix Europe NV	1.277	6.454
Koninklijke KPN NV	0.183	2.580
Koninklijke Vopak NV	0.654	0.395
KPNQwest	-6.707	2.505
KSI INTERNATIONAL N.V.	-3.831	1.837
LANDIS GROUP NV	-7.664	0.520
McGregor Fashion Group NV	1.172	1.379
Nedgraphics Holding BV	-3.092	2.092
NEW SKIES SATELLITES NV	-0.326	2.914
Nutreco Holding NV	1.248	0.860
Nyloplast NV	-1.056	1.436
PinkRoccade NV	-0.570	0.410
PRIORITY TELECOM N.V.	1.049	2.566
Punch Graphix NV	-2.741	74.188
Qurius NV	-0.403	1.529
Randstad Holding NV	1.139	0.863
Seagull Holding NV	4.419	3.698
SMIT TRANSFORMATOREN NV	-1.714	1.320
SNT Group NV	-0.472	0.800
TAS Groep NV	-1.338	1.222
Tele2 Netherlands Holding	-1.002	4.321
TIE Holding NV	-1.704	10.170
TNT NV	-0.362	2.107
Trader Classified Media	1.756	14.873
UCC Holding NV	-0.858	0.370
Unit 4 Holding	0.337	0.105
United Pan-Europe Comm NV	-2.551	8.282
UNIVAR N.V.	2.752	1.789
Van Leer Packaging Worldwide	1.102	1.059
VODAFONE LIBERTEL NV	0.937	21.030
World Online BV	-7.181	31.770