Initial Public Offerings and Online IPO Auctions —— Significant Advantages in Pricing?

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Glossary

Best Efforts	In a best efforts commitment the underwriting syndicate agrees to do its best in selling the issuing company's shares. However the underwriter does not carry the risk of purchasing the shares if they are unable to sell them as in a firm commitment.
Discriminatory Price Auction	In a discriminatory auction winning bidders pay their bid prices.
Due Diligence	Due diligence implies investigating and disclosing any information that is relevant to investors and providing an audit of accounting numbers by a certified public accounting firm. If material information is not disclosed and the security performs poorly, the underwriter can be sued by investors.
Firm Commitment	In a firm commitment the underwriting syndicate agrees to purchase all of the shares from the issuing company for the issue price.
Flipping	Buying IPO stocks and than selling them on the first day of trade in order to potentially lock in fast profits.
Lock up period	The period of time when company insiders primarily management and Venture Capital investors are not allowed to sell their shares. Usually this period is 90 days, but often it is extended to 180 days by mutual agreement.
"Money Left on the Table"	Pop (see "pop") multiplied by the number of shares sold, which is also the money in the pockets of the investors and not the issuing company's accounts.
NASD	National Association of Securities Dealers.
Offering Price	The price at which the IPO stock is initially traded at.
Over Allotment	Selling more securities than are available in an IPO. Under this provision the underwriter will buy the shares back at a later date.
Prospectus	(In IPOs) The final and approved registration statement including the price at which the security issue is offered.
Price Discovery	Price discovery is the general process used in determining spot prices. These prices are dependent upon market conditions affecting supply and demand. For example, if the demand for a particular commodity is higher than its supply, the price will typically increase (and vice versa).
"Pop"	The difference between the offering price and first day closing price of an IPO.
"Quiet period"	The quiet period begins from initial filing of the preliminary prospectus to 25 days after IPO. The company is not allowed to provide any other information to the public that is not in the prospectus.
Tech Stocks	Internet Stocks, Computer software and hardware, communications equipment, electronics, navigation equipment, measuring and controlling devices, medical instruments, telephone equipment, and communications services, however excluding biotechnology.
Uniform Price Auction	In a uniform price auction all winning bidders pay the same price, typically the highest price at which demand equals or exceeds supply.
Winner's Curse	A problem faced by uninformed bidders. For example, in an initial public offering uninformed participants are likely to receive larger allotments of issues, which informed participants know to be overpriced.

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1 Introduction

An initial public offering (IPO) is a securities offering, in which an enterprise sells its stock publicly for the first time without having a prior price history. There are many ways in which an enterprise can conduct its IPO. The three most common avenues utilized are, the U.S. style "book building", IPO auctions[1], and fixed price offerings. The means chosen for going public are determined by the given country's legislation and common practices. In certain instances, the issuer may have an option of going public by relying on any one of these three above-mentioned options. Globally, the most common avenue chosen for an IPO is the U.S. style "book building" mechanism (Ljungqvist et al. 2000, 1). In current times, with the advent of Internet technology, new underwriting mechanisms have been developed to allow for innovative ways of pricing IPOs and allocating shares. Using Internet technology to conduct an IPO is also often referred to as an online IPO auction.

This research intends to analyze the potential effects new technology has on the IPO mechanism, based on the notions as outlined by Wilhelm (1999):

> *Wilhelm (1999) discusses that, while traditional investment banking was based on relationships with a small number of large investors, internet technology could potentially allow one to sell unseasoned shares to a large number of relatively small investors, with no or little relationship with the investment bank. An interesting avenue of further research could be to investigate the consequences of this evolution for the optimal pricing and allocation of IPOs. In particular, it would be interesting to analyze price discovery, information elicitation, and strategic issues in the context of internet-based sales to a large diffused investor base*. (Biasis 2002, 29)

The key area of research relating to IPOs has been the attempt to measure the efficiency of different mechanisms for pricing and allocating IPO shares. This study questions whether Internet technologies and uniform price auctions have improved the IPO mechanism in the U.S. from the point of view of the issuing company. Since an Open IPO is the only online uniform price auction mechanism that has been used over the past years, this thesis will compare NASDAQ listed book built IPOs and Open IPOs[2].

[1] There are a few different types of auctions: for example uniform price auctions, discriminatory price auctions, and fixed price auctions.
[2] All Open IPOs have been listed on the NASDAQ to date.

The opinions of researchers in the field regarding the pros and cons of these different methods are largely divided. It is argued that the relationships between the investment banker and potential investors make book building more efficient than other mechanisms. Benveniste and Wilhelm (1997) illustrate that the book building method makes better use of information on market demand conditions, in addition to leveraging the investment banks' long standing relationships with potential investors which benefit the issuing firm. Meanwhile, others have demonstrated that there are drawbacks to the book building mechanism. For example Ausubel and Cramton (1997) argue that underpricing, at least in the U.S. IPOs, has been much higher than required. Moreover, they believe that book building is a poorly performing mechanism for the selling of new issues. The current compensation or spread to underwriters for a book built IPO in the U.S. is around 7% of the value of the issue, whereas the price of an online IPO auction is around 4% (Chen, Ritter 2000, 1106). The spread for Google's IPO was 2,8% of the total value of the issue (Google, 2004, 1).[3] Many investors believe that the traditional book building process is very costly and inefficient, in addition to placing the final investors and the issuer at a disadvantage. (Valensise 2003)

Following the collapse of the tech-bubble 2000, there has been controversy regarding the traditional book building process. Questions have been raised in terms of how IPO stocks are marketed, priced and distributed. The most visible result of this controversy has been a $1,4 billion settlement[4] (Shell 2003) between several leading investment banks and the Securities and Exchange Commission (SEC). The settlement included measures to separate equity research analysts from firms' investment banking operations. Also during the past year (2005), new guidelines and rules have been introduced regarding IPOs. (SEC[1], International Financial Law Review)

Before the advent and widespread use of information technology, the IPO mechanism was largely conducted manually. This entailed that all communication was either conducted over the telephone or through letters. In this setting, gathering and distributing information was a slow and expensive task. As noted by Wilhelm (1999) the investment industry's core technology was "*the banker's network of personal*

3 It must be noted that Google's issue was much larger ($2 billion) than an average offering.
4 The banks involved in this settlement were (settlements paid in USD millions) Citigroup ($400), Credit Suisse FB ($200), Merrill Lynch ($200), Goldman Sachs ($110), UBS ($80), Lehman Bros. ($80), Morgan Stanley ($80), Bear Stearns ($80), J.P. Morgan ($80), Piper Jaffray ($32.5).

relationships". The *bankers network* allowed a more streamlined approach to information sharing and gathering. The "relationship technology" enabled banks to function more efficiently by enabling them to distribute larger and larger blocks of securities in co-operation with other banks and corporations. The need for these "relationship technologies" could be displaced at least to some extent with the advent of Internet technology. Internet technologies have substantially decreased the price of information sharing and communication. In addition, there are indications that the issuing company pays lower commissions for going public through the online IPO auction, as compared to the traditional book building auction (Wilhelm 1999, 6).

1.1 Purpose and Contribution

As outlined above, the aim of this study is to examine whether there are advantages to utilizing online IPO auctions in comparison to traditional book building methods.

Due to recent improvements in Internet technology and different types of misconduct on the part of underwriting investment banks, a strong belief has surfaced regarding advantages to utilizing new types of IPO mechanisms, such as online IPO auctions. The most prominent online underwriter is *W.R. Hambrecht+CO* which conducts online IPOs over their Open IPO mechanism.

The notion of improvements to the IPO mechanism is both broad and complex. There are many different variables that can be measured that could be defined as improvements to the IPO mechanism. In this research however, improvements to the IPO process will be analyzed from the viewpoint of the issuing enterprise. As such this thesis defines improvements in the IPO process in terms of an overall decrease in the cost of going public. For the issuer, the cost of going public is comprised of two parts (1) the spread that is paid to the underwriting syndicate, and (2) the first day returns that are observed on the secondary market. (Ritter1998, 2)

The null hypothesis for this thesis is that the Internet technologies and Open IPO mechanism have no effects on the improvements in price discovery and/or spreads of equity issues.

1.2 Limitations

Naturally, there are some limitations to the current research. The main limitation to this research is the lack of a large data test pool. This is due to the fact that online IPO auctions are a new phenomenon and have not been utilized to a great extent. Furthermore, many of the Open IPOs to date were conducted during the IT bubble from 1999 to the end of 2000 (Kaneko and Pettway 2003, 449). During the tech bubble the market saw extraordinary first day returns matched with high volatility (Loughran 2002, 428). The combination of a small data sample and unstable markets when most online IPO auctions were conducted will have some effect on the results of this research.

1.3 Structure of the Study

This study is structured around seven chapters. Chapters 1, 2, 3, 4 reflect upon key definitions, provide pertinent background information, and introduce main concepts as well as the theoretical framework. Chapters 5, 6, 7 focus specifically on the data set, analysis, and discussion of the central findings. Thus, notions underlying IPO theory are examined in the first four chapters.

The following chapter details the concepts related to initial public offerings, including the IPO mechanism, price discovery, as well as a discussion on the various costs related to going public. Chapter three subsequently delves into theories of IPO performance, whereas chapter four examines previous studies that have been conducted on the topic at hand. Chapter five presents the quantitative data of this study. This chapter also analyzes the descriptive statistics of the data. Chapter six presents the method of analysis and empirical results. The method of analysis that will be applied in this study is linear regression. Finally, chapter seven presents the findings of the research and concludes the study.

2 Initial Public Offerings

In order to establish a common base of reference between the reader and the author, the following sections present central concepts to this study, along with the context in which they are embedded. This chapter encompasses a brief and by no means exhaustive discussion on initial public offerings and related mechanisms. For the purposes of this study, I am relying on the definitions presented in the section below. Next IPO mechanisms are explained, followed by a discussion on the pricing of IPOs and on the allocation of IPO shares.

2.1 The IPO Mechanism

As noted in Chapter 1, there are three main mechanisms that companies use for going public, the U.S. style "book building" method, auctions, and fixed price offerings. This study compares two of these, the book building process and uniform price auctions (Open IPO) in terms of whether Internet technologies have improved the IPO mechanism in the U.S from the viewpoint of the issuing company.

Since the focus of this thesis is on online IPO auction, a few issues regarding Internet technologies should be covered. It must be noted, that the utilization of the Internet technology, as in e-commerce, will not change any of the fundamental processes related to the IPO mechanism. The three ways of going public mentioned above are also used in so called Internet IPOs. For example Wit Capital has used the Internet to complement book building style IPOs by allowing small investors to participate in IPOs. Alternatively, W.R Hambrecht + Co. uses a uniform price auction to price and allocate IPO shares in their Open IPO service (W. R. Hambrecht +CO[1]). That said, the Internet simply alters the economics of information gathering and distribution in the IPO mechanism. This might potentially change the economics of the IPO process, enabling new ways of marketing, pricing and allocating shares. (Wilhelm 1999, 6)

This section explains the general process of going public. The process of going public is governed mainly by tradition and common practice. The law requires some of the processes that are related to IPOs, whereas the rest of the processes are well-understood,

albeit informal, rules. In short, regulations require the issuing company to provide full and complete disclosure of information, which might be relevant to prospective investors. This research nonetheless, is limited to considering the differences between the book building method and the online nondiscriminatory IPO auctions (Open IPOs). Fixed price offerings are beyond the scope of the research (for information on fixed price offerings see Keloharju 1993, Benveniste and Busaba, 1997).

As there is no universally accepted process for the U.S. style book building process, I will provide a standard definition of this process in Section 2.1.1. The interpretation for the U.S. style book building process that I am relying on is drawn from a number of sources namely Chen et al. (2000), Laughran (2002), Sherman (2000), Wilhelm (1999) and SEC (2004), in addition to a number of online sources.

In section 2.2, the online IPO auction process is explained in detail. This section is limited to the process of online uniform price IPO auctions, which is used by W.R. Hambrecht + Co's Open IPO. The interpretation for the online uniform price auction process that I am relying on, in this study, is drawn from a number of sources namely Biasis (2000), Google (2004), Kandel (1999), Li Calzi (2005), Pettway (1996) and Wilhelm (1999). The process explained in this study is also partly the same process that was used for the Google IPO[5] in 2004. Other types of IPO auctions are price discriminatory auctions, which are used in Japan (Kaneko and Pettway 2003) and uniform price market clearing auctions that are used in Israel (Kandel 1999).

2.1.1 The Book building Process

This section explains a standard book building process. Variations to this process may occur, as they are not generic. This section serves as a tool for familiarization with the IPO process.

The IPO process begins with a company's intent to go public. Usually, the issuer sets the process in motion by hiring a lead underwriter, that is, an investment bank. In addition to

5 It should be noted that Google was originally intending to go public solely using a Internet auction. However, as the management at Google found it difficult to raise the amount of capital they required through such a medium, they were forced to turn to the investment banks. *"They tried to teach Wall Street how to do business, and that's not a place I would want to be,"* said David Menlow, President of IPO Financial Network, a Millburn, N.J., research firm. *"Wall Street is Wall Street. This is the way things get done. It's our rules and our ball."* (Shabelman 2004)

an underwriter the company also hires a law firm to prepare the necessary filings, an auditor to assure that the company's books conform to accounting standards, and also in many cases, a public relations company is hired to help the company, which attain the desired level of publicity. (Fraud Bureau)

The due diligence aspect is conducted in cooperation between the law firm and auditing company (Grinblatt and Titman 2002, 9). The lead underwriter, together with management begin the selling of the deal, at which time, the preliminary prospectus and registration statements are handed to the SEC. This statement includes a preliminary offer price range. The SEC and National Association of Securities Dealers (NASD) review the preliminary prospectus for accuracy and may require amendments to be made to the prospectus, granted the occurrence of misstatements or incomplete information. (See Ritter and Welch 2002, Fraud Bureau)

At the same time, the lead underwriter assembles a syndicate of other underwriters. Usually, an IPO is too large for one investment bank to manage alone. There are two reasons for this, firstly the syndicate decreases the lead underwriter's risk, and secondly, the syndicate helps distribute the shares to a larger investor base. Each of the banks in the syndicate receives a certain allocation of shares that they can sell. The syndicate will either make a firm commitment to the issuing company to buy the shares, or make a "best effort" commitment in which the syndicate will not be liable for the unsold portion. (Chen, Ritter 2000, 1120-1124)

In order to gain an understanding of the current demand for the issuing stock, the underwriter collects conditional offers from clients to chart the type of demand curve available for the deal, also referred to as price discovery. At this stage the prospective buyers are not required to commit to any deals, as trading is prohibited until the preliminary prospectus has been cleared registration by the SEC. At the time when the underwriter sets the price, the objective is to balance the company's desire to price the stock so as to raise as much capital as possible, with the investor's interest to gain financial reward for taking on the risk of investing in a company without any trading history. (Sherman 2000, 702)

Simultaneously the management of the company and the underwriter syndicate embark on a road show, where they present the company to potential investors. The management team's ability to convince potential investors is paramount to the success of the IPO in light of the issuing enterprise. (Share Builder)

At the end of the road show, the issuing company has hopefully developed an adequate understanding of the demand for its shares. The issuer then begins drafting the final prospectus. To do this, the company decides on the offer price and whether or not to use the over allotment option (Section 2.4.1, p. 20). Once this has been done, the final prospectus is provided to all potential investors. The prospectus includes the actual issue price per share and the amount of shares to be issued. Two days after final prospectus has been provided to the investors, the IPO is declared effective. Usually this is done after the market closes, in order for trading on the IPO to be able to begin the next day (Sherman 2000, 702). At this stage the syndicate transfers the proceeds from the IPO, with their commission subtracted, to the issuing company's bank account. (Share Builder)

The IPO is finally declared effective seven days after the offering. On rare occasions, an IPO can be cancelled even after stock starts trading. (Share Builder)

2.1.2 The Online IPO Auction Process

There are many different ways in which an online IPO auction can be conducted. Since this thesis is limited to considering the uniform price auction of Open IPOs and how they are conducted over the Internet, other methods are not explained. A model of the online uniform price auction was also used for the Google IPO in 2004. The process explained below is drawn in part from Google (2004) and includes several points that may have been specific to that particular offering. Therefore, it must be noted, that where the U.S. "book building" IPOs have a very well established common process, the processes for online auctions are not established. (Biasis 2002, 29,Wilhelm 1999, 3)

The initial stages of the online IPO auction are very much the same as those of a book building style auction. The issuing enterprise hires an underwriter, a law firm, and an auditor who each play a role in the drafting of the initial prospectus. The IPO team

performs the same type of due diligence as in the book building procedure. After the initial due diligence work has been concluded, the preliminary prospectus is filed. In the Open IPO mechanism there is only one underwriter, whereas in other online IPOs the lead underwriter builds an "e-syndicate" of underwriters. (Wilhelm 1999, 6)

When the preliminary prospectus has been submitted to the SEC and NASD, the IPO team can begin the road show. Unlike in the traditional book building IPOs, the investor base is very diverse, and therefore, reaching all of the potential investors is a more arduous task. To accommodate this dilemma, the SEC has instituted a change to the regulations, allowing companies to hold online road shows since 1997. (Lazarus 1997)

The actual auction process works in five basic steps: qualification, bidding, auction closing, pricing and allocation. During the qualification stage, a preliminary prospectus is provided to the public for review according to regulations. All interested investors who are qualified[6] must obtain a bidder ID through their underwriter or investment bank. With the bidder IDs investors can make bids through the specified underwriters for the offering. In Google's case, there were many different underwriters (Google 2004). (Wilhelm 1999)

Bidding begins on the day that is specified on the preliminary prospectus. To bid, investors state the dollar amount per share they are willing to pay, in addition to the amount of shares they are bidding for. Commonly, the bid can be above or below the price range that is stated in the preliminary prospectus. Bidders are moreover allowed to submit more than one bid. The majority of bids will be made online, however for most underwriters, bids can also be submitted by phone and facsimile. Therefore, as previously discussed, the Internet is a less costly medium for conducting the auction and does not alter the fundamental bidding process. Bidders are allowed to withdraw their bids at any time before the closing of the auction. (Google 2004)

Different rules exist pertaining to how the final price is set. As of yet, in the U.S., there are no exact guidelines outlining the manner in which the final offering price should be set. In Google's case, Google held the right to make multiple revisions to the offering

[6] Currently in the United States, one must be a U.S. citizen to qualify for placing a bid (Google 2004).

price of the stock, as well as the right to determine the final total amount issued shares. (Google 2004)

The auction itself does not directly dictate the price of the offer. Instead, the offers function similarly to the conditional offers that are collected in the book building process. The issuing enterprise and the underwriters build the demand curve based on the bids. Unlike in the book building process, the bidders are required to buy the shares that they have bid for at the set price. (Google 2004)

Before the closing of the bidding for the stock, the SEC must declare the registration statement of the given stock effective. In Google's case the closing of the stock did not have a specified time. The only time criteria stated for the closing of bidding was the requirement that the SEC confirms the effectiveness of the offering, after which Google held the right to close the bidding at any time it chose[7]. Once the closing has been confirmed, underwriters will provide an electronic notice to bidders, after which bids can no longer be withdrawn. (Google 2004)

The pricing process varies between companies. In a standard online IPO auction, the company that is issuing the IPO along with its underwriters set the price according to their discretion. The company may decide to sell the shares at the highest price or it may wish to sell the shares at a discount. In Google's case, the company had more room to maneuver, as they were allowed to control the price and the amount of shares that they were willing to sell in the offering. The final price is announced in the final prospectus that is distributed to investors. In most online auction IPOs this has been conducted through electronic means. (Google 2004)

2.2 Price Discovery of IPOs

Price discovery is defined as the method of determining the price for a specific commodity or security through basic supply and demand factors related to the market (Investopedia). In IPOs, price discovery is related to the pricing of an issue, however it

[7] Google specified that the auction could be closed within two hours, following the notice of effectiveness was provided from the SEC.

is only the process for finding the spot price. Since there is no price history for IPOs, the market price must be assessed by other means than observing price quotes.

In both the book building and Open IPO methods price discovery is conducted in different ways. This is an important point, as issue pricing is a key process which has a significant effect on the success or performance of the IPO. The success of the pricing can be measured from the first-day-returns. (Kaneko and Pettway 2003, 441)

The goal of the price discovery is to set the price of the offering at the true market price, nonetheless in such a manner that the value of the issuing enterprise is maximized. Furthermore, the goal of the underwriter is to price the issue in a manner that rewards the initial investors for assuming the risk of investing in previously un-traded security, lacking a track record. Simultaneously, there is the desire to compensate the investors for their role played in the information production of the book building mechanism. (Cornelli 2001, 2337-2338, Sherman 2000, 698)

2.2.1 Price Discovery in "Book building"

As stated in the introductory section of this thesis, the traditional way of gaining an understanding of the market demand for an IPO is by soliciting indications of interest from a few institutional investors. These indications of interest encompass the amount of stock that a given investor would like to buy and the dollar amount that they are willing to pay for the stock. By gathering this information the underwriter is able to form an understanding of the demand at different prices for the issue, which is also the so-called demand curve. As stated previously, the issue price is not set by any explicit rule, but is rather based on the underwriter's interpretation of the investor population's indications of interest. In general, the price is set in a manner whereby demand exceeds supply. (Cornelli 2001, 2337-2338)

Much of the literature implies that the book building pricing of a stock allows the investment bank to collect information, and hence price the issue better than with any other mechanism for going public (Spatt and Srivastava 1991), interestingly this is contradicted by other researchers such as Kaneko and Pettway (2003).

2.2.2 Price Discovery in Open IPOs

The price discovery of the online uniform price auctions follows the same process as that of the book building method. However, in these cases, the demand curve has been constructed from bids of the whole potential investor population, instead of from a few institutional preferred customers of investment banks. Usually, during the auction, the pricing and allocation rules are stated in the prospectus (Corelli 2001, 2338). However, as noted previously, Google held the right to change the offer price at their discretion as well as the amount of shares issued. (Google 2004)

The Open IPO process is moreover often referred to as a Dutch auction, in reference to a variation of a uniform price auction that is also known as a "dirty Dutch" auction[8]. (Sherman 2005, 5)

2.3 Allocation

The allocation of IPO shares is becoming a more active area of research. Ritter and Welch (2002) predict research into the allocation IPO shares to be the most promising area of research in the field in the near future. The allocation of book building priced shares has begun to draw more academic attention, because of the increased public attention focused on the perceived unfairness of how shares are allocated, given the large amounts of money left on the table.

The allocation of the issued shares is conducted in two different ways. In the book building method the underwriter has full discretion over whom the issued shares will be allocated to, whereas in the online IPO auctions, the shares are allocate based on the bids that are at or above the "clearing price".[9]

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[8] *Uniform price auctions, often mistakenly called Dutch or Vickrey auctions, are multi-unit sealed bid auctions in which all winning bidders pay the same price, usually the market-clearing price (the highest price that allows all shares to be sold). More specifically, we will focus on X+1st price auctions, where the company is auctioning off X shares and the price is based on the X + 1st highest bid. In practice, for IPO auctions with thousands of bidders for millions of shares, it is extraordinarily rare for the X-highest bid to be different from the X+1-highest bid. A better measure is the rationing rate at the market-clearing price, since issuers often give full allocations to bidders above the offering price and pro-rate bids at the clearing price.*

This is further complicated by the fact that many countries have used "dirty" IPO auctions, where they "leave something on the table" by pricing below market-clearing. With 'dirty Dutch' auctions, all orders at or above the chosen offering price typically get pro-rated. The US is the only country that we know of in which the issuer is allowed to keep the actual market-clearing price secret, so that investors have no way of knowing whether an offering was dirty. Many countries have also used discriminatory (a.k.a. pay what you bid) IPO auctions. (Sherman, 2005, 5)

[9] The "clearing price" is the price at which the issue will be made at. Thus all bids that have a price over the "clearing price" will receive an allocation of shares.

IPOs in general are priced in a way that there is oversubscription for the issue, meaning that there is more demand than supply at the given price. In the book building process the underwriter has total control over whom the shares are issued to, whereas in the online auction model, a pro rata allocation[10] is used. (W. R. Hambrecht +CO[3] 2005)

2.3.1 IPO Allocation Trends

A growing amount of research studies the allocation of IPO shares. Historically the effect of underwriter discretion in terms of allocation in book building IPOs has been a popular point of research. In this thesis below, research results relating to such IPO share allocation are presented.

The key area of research relating to IPOs has been the attempt to measure the efficiency of different mechanisms for pricing and allocating IPO shares. Benveniste and Spindt (1998) argue that by not explicitly publishing the allocation rule, the investment bank can reward regular customers who act as a form of insurance against badly received IPOs. Moreover, Cornelli at al. (2001) found that investment banks tend to reward shares to bidders in line with information they reveal through their bids. Furthermore, they found that bidders who revised their bids over time as new information became available, received more favorable treatment. Their research also indicated that investment banks prefer the allocation of shares in larger blocks, rather than smaller ones, allocated to pension funds and insurance companies. As such, these types of allocations tend to favor large investors who have long standing relationships with the investment company, in addition to vast amounts of assets.

Wilhelm (1999) found that the banking industry has succeeded in its efficiency because of its relationship-based technology. This relationship has in part required that the underwriter has had discretion over whom IPO shares are allocated to. However with the utilization of information technology, the relationship-based technology is made redundant at least to some degree. With the use of Internet technologies, it is as cost effective to chart the demand curve of the entire investment population, rather than

10 Pro Rata allocation means that a given investor will receive the amount of shares that he has bid for in proportion to the amount that are issued. For example, if there are 100 shares being issued and there are qualified bids for 120 shares then each investor will get (100/120=0,8333) 83% of the shares that they bid for according to a rounding rule, which in the OpenIPO is to the closest full hundred shares. (W. R. Hambrecht +CO[3] 2005)

uncovering the demand of only a handful of institutional investors. Internet technologies have reduced the traditional need for free allocation of IPO stocks to "reward" information sharing (Sherman 2000, 710).

2.3.2 The Hot IPO Market and IPO Stock Allocation

Following the rapid decline of the value of technology stocks in 2001, there has been debate regarding the underwriter's free discretion of IPO share allocation, both in the media and by academics in the field. The key reason for this has been the enormous amount of money left on the table during the IT bubble. During the hot market of the technology bubble, underwriters used under-priced share allocation to enrich buy-side clients in return for quid pro quos, whereby underwriters curried favor with potential clients, ultimately even influencing politicians. (SEC[1], Ritter and Welch 2002, 1810)

Loughran and Ritter (2002) found that when the underwriters are given discretion over share allocation, the underwriters do not automatically use their discretion in the best interest of the issuing firm. Therefore, it can be inferred that the underwriter acts in view of other interests, including their own.

2.4 The Cost of Going Public

In the introductory chapter it was pointed out that Internet technology has the overall potential to decrease the costs related to IPOs.

There are two direct costs for the issuing firm derived from going public. The first is the gross spread, which is usually a percentage of the value of the ex ante issue. The second includes the costs of complying with the SEC and NASD regulations, embodied in increased accounting and auditing costs. The Sarbanese-Oxley Act of 2002 has imposed additional requirements and costs onto the issuing firms for compliance with tightened accounting and auditing regulations (Liljeblom 2005).

There is a general understanding that the spreads of IPOs are higher than they would be in a price competitive "commodities" market. That said, there are three different factors that indicate the average spread to be artificially elevated in the United States. As an

outset, American spreads are much higher than anywhere else in the world. Secondly, if the spreads were determined primarily by costs, since the spread is the same for a $20 million IPO and an $80 million IPO. The third reason is that investment bankers themselves openly admit to the costs being too high "The fact is that we would be cutting our own throats to compete on price".[11]

2.4.1 Book building IPO Spreads

The spread of a book building IPO is usually negotiated before during or before the handing in of the preliminary prospectus. Therefore, at the time of agreement, the issuer is unaware of the issue price or whether the over allotment option[12] will be used. As a result, competition on the basis of valuation is not present.

In Table 1 below, 3203 equity IPOs are presented that had proceeds of more than $20 million[13]. One can observe that the average spread is 7 percent in nearly all of the periods. This is especially true for the 1990s, as can be seen in panel C from the time period 1988-94 and 1995-98. Also, IPOs with proceeds of $80 million or more have lower than 7 percent spreads on an average.

There is mounting evidence that U.S. IPO spreads are not at a competitive level. This would indicate that underwriters do not compete with price, but instead compete with other attributes such as bundling services.[14] Other evidence indicating U.S. spreads to be too high are comparative underwriter spreads paid in other countries. As an example, the spreads in the United Kingdom for companies that have proceeds between $20 and $80 million are around 3 to 4 percent on an average (Chen and Ritter 2000, 1112-1113). Whereas in Japan similar IPOs have spreads of around 4 to 5 percent on an average as noted by Kaneko and Pettway (2003).

One theory that has attempted to explain higher spreads in the U.S. has been the higher likelihood of lawsuits in the country. Nevertheless, the record indicates that investment

[11] This is a comment from an anonymous Head of Underwriting for an investment bank in Roger Lowenstein's April 10, 1997 Wall Street Column.
[12] The over allotment option is an option for the investment bank to sell more securities than are available in the IPO. Usually there is a 15% over allotment option for the underwriter.
[13] It should be noted that U.S. buyers of IPOs pay no brokerage commission.
[14] Bundled services can include the underwriting of the IPO, analyst coverage over time, and supportive share purchases by the underwriter to maintain a desired share price.

banks have been very successful in winning court cases brought against them (Beatty and Welch 1996).

2.4.2 Explanations Underlying Spread Tendencies

A company going public usually holds a “beauty contest” to find an optimal underwriter based on a certain set of attributes. The key attributes that issuing companies evaluate are underwriter prestige and analyst reputation.

Analyst coverage is especially important in keeping the stock liquid, in addition analyst recommendations (“buy” and “strong buy”) influence investor opinions which in turn affect market price and liquidity (Dunbar 2000, 11). Krigman, Shaw, and Womack (2001) report evidence that analyst coverage is the most important attribute when considering an underwriter. It has also been noted that analyst coverage serves as a large barrier to entry for potential underwriters. Without a known analyst on an underwriting team, issuers may and often do become skeptical in terms of the potential to provide analyst coverage in the after market, as well as in terms of providing adequate analyst coverage for the prospectus.

Underwriter prestige, as noted in previous sections, is also an important attribute when deciding on an underwriter. The IPO market characteristics support higher pricing of more prestigious underwriters. Similar to the consulting and legal services industry, a higher price signals higher “quality” of service. In practice however, this does not always hold true, if for instance Goldman Sachs would decide to cut their spreads, it is difficult to imagine that issuers would begin to consider Goldman Sachs a low-quality underwriter. As noted by Chen and Ritter (2000) the most probable reason high IPO spreads is implicit collusion of price setting by underwriters.

Table 1. Number of IPOs by calendar year, proceeds, and gross spreads 1985 – 1998 (Source, Chen and Ritter 2000, 1109)

Number of IPOs by Calendar Year, Proceeds, and Gross Spread, 1985–1998

The sample consists of 3,203 firm commitment initial public offerings (IPOs) with domestic gross proceeds of at least $20 million before the exercise of the overallotment option. Securities Data Co. is the source of the data. Closed-end funds, REITs, ADRs, and unit offerings are excluded. The amount of proceeds is expressed in terms of dollars of 1997 purchasing power, using the U.S. GDP price deflator. There are three categories of gross spreads expressed as a percentage of proceeds: below seven percent, seven percent, and above seven percent.

	Panel A: $20–79.99 million proceeds				Panel B: ≥$80 million proceeds				Panel C: All IPOs			
	Gross Spread				Gross Spread				Gross Spread			
Year	Below 7%	7%	Above 7%	All	Below 7%	7%	Above 7%	All	Below 7%	7%	Above 7%	All
1985	38	18	22	78	16	1	3	20	54 (55%)	19 (19%)	25 (26%)	98
1986	92	38	51	181	42	8	8	58	134 (56%)	46 (19%)	59 (25%)	239
1987	51	49	39	139	29	4	3	36	80 (46%)	53 (30%)	42 (24%)	175
1988	16	22	10	48	13	3	0	16	29 (45%)	25 (39%)	10 (16%)	64
1989	13	32	8	53	13	2	0	15	26 (38%)	34 (50%)	8 (12%)	68
1990	13	37	14	64	12	0	0	12	25 (33%)	37 (49%)	14 (18%)	76
1991	26	109	27	162	46	2	0	48	72 (34%)	111 (53%)	27 (13%)	210
1992	25	155	18	198	62	4	1	67	87 (33%)	159 (60%)	19 (7%)	265
1993	26	223	18	267	68	10	0	78	94 (27%)	233 (68%)	18 (5%)	345
1994	18	153	16	187	35	5	0	40	53 (23%)	158 (70%)	16 (7%)	227
1995	14	248	12	274	53	12	0	65	67 (20%)	260 (77%)	12 (3%)	339
1996	21	348	14	383	74	26	2	102	95 (20%)	374 (77%)	16 (3%)	485
1997	15	256	16	287	59	30	1	90	74 (20%)	286 (76%)	17 (4%)	377
1998	6	158	3	167	45	23	0	68	51 (22%)	181 (77%)	3 (1%)	235
1985–87	181	105	112	398	87	13	14	114	268 (52%)	118 (23%)	126 (25%)	512
	(46%)	(26%)	(28%)	(100%)	(76%)	(12%)	(12%)	(100%)				
1988–94	137	731	111	979	249	26	1	276	386 (31%)	757 (60%)	112 (9%)	1,255
	(14%)	(75%)	(11%)	(100%)	(90%)	(10%)	(0%)	(100%)				
1995–98	56	1,010	45	1,111	231	91	3	325	287 (20%)	1,101 (77%)	48 (3%)	1,436
	(5%)	(91%)	(4%)	(100%)	(71%)	(28%)	(1%)	(100%)				

2.4.3 Indirect Revenue

Sources of indirect additional revenue, in addition to the agreed spread, are the use of the 15 percent over allotment option (see section 2.4.1). As described above, in the book building mechanism, underwriters have nearly full discretion in terms of to whom they will allocate the IPO shares. Consequently in a situation where there is a $40 million offer, the first-day-return is 15 percent, meaning the underwriter can hand-over $6 million in profits to preferred customers, that potentially will "repay" these profits (SEC[1]). A considerable source of additional revenue is market making after the issue has been completed. Market making is moreover larger in larger issues, but as depicted in Table 1 below it has no effect on the spreads.

2.4.4 IPO Cost Conclusions

Book built IPO spreads are higher than competitive "commodities" based markets would require. This can be observed as the equal spread in $20 million offerings as compared to $80 million offerings that have the same gross spread. This would imply that there are no economies of scale in the IPO industry. According to Chen and Ritter (2000) this is however not the case. A key reason for why spreads were found to be weak determinants in choosing an underwriter, is that the most important factors influencing underwriter selection are underwriter prestige and analyst coverage. (Chen and Ritter 2000, 1116-1119)

It should be assumed however that some issuers prefer to pay high fees in return for a "high" level of service, whereas other issuers would prefer to pay lower fees and assume a "lower" level of service. On the contrary, as depicted in table 1 above, the lack of spread dispersion suggests that the issuer does not have a choice in the matter.

In their concluding remarks Chen and Ritter (2000, 1130) note that a new source of competition could arise from the new underwriters, who utilize internet technologies, such as California-based W.R. Hambrecht + Co.

3 Theories of IPO Performance

This chapter outlines the theoretical framework underpinning this study. Generally, theory serves as the conceptual architecture, sharpening the context of the study while situating the topic within a broader theoretical discussion. However, it bears mentioning that no one framework is able to capture all of the complexity related to IPO performance.

In general, there are two key factors used for measuring the performance of IPOs on the secondary market. The first is the analysis of the first day returns, and the second is the analysis of the post IPO price performance over a longer period after the issue. Most commonly a 36 month time period is used. (Ritter and Welch 2002, 1818-1820)

3.1 Theories for Underpricing

Underpricing is a very relevant to this study since it is a key measure of success in terms of the pricing of an issue. The first day price gain was also used as a tool in research conducted by Kaneko and Pettway (2003) in comparing book building IPO mechanism and IPO auction mechanism in Japan. Moreover, it is important to note that the terms underpricing, initial return, and first-day-returns are used interchangeably through out this thesis.

It can be acknowledged from Table 2 below with a sample size of 6249 IPOs over the years 1981 through 2001, that there is an average first day return of 18,8 percent whereas the average daily market return in only 0,05 percent. Table 1 also illustrates that underpricing has been steadily increasing over the past two decades. Around 79 percent of all IPOs are underpriced. Underpricing on an average is present in all IPOs around the world, which includes all IPO mechanisms and legislation. (Ritter and Welch 2002, 1802-1803)

Extensive literature has proven IPO auctions to be underpriced less than any other form of going public. The question, which thus bears asking, is why companies increasingly tend to rely on the book building method. (Ritter and Welch 2002, 1810)

Table 2. Number of IPOs, First-day Returns, Gross Proceeds, Amount of Money Left on the Table, and Long-run Performance, Year 1980 to 2001. (Ritter and Welch 2002, 1797)

The equally weighted (EW) average first-day return is measured from the offer price to the first CRSP-listed closing price. Gross proceeds is the amount raised from investors in millions (2001 purchasing power using the CPI, global offering amount, excluding overallotment options). Money left on the table (millions of dollars, 2001 purchasing power) is calculated as the number of shares issued times the change from the offer price to the first-day closing price. EW average three-year buy-and-hold percentage returns (capital gains plus dividends) are calculated from the first closing market price to the earlier of the three-year anniversary price, the delisting price, or September 30, 2001. Buy-and-hold returns for initial public offerings (IPOs) occurring after September 30, 2000 are not calculated. Market-adjusted returns are calculated as the buy-and-hold return on an IPO minus the compounded daily return on the CRSP value-weighted index of AMEX, Nasdaq, and NYSE firms. Style-adjusted buy-and-hold returns are calculated as the difference between the return on an IPO and a style-matched firm. For each IPO, a non-IPO matching firm that has been CRSP listed for at least five years with the closest market capitalization and book-to-market ratio as the IPO is used. If this is delisted prior to the IPO return's ending date, or if it conducts a follow-on stock offering, a replacement matching firm is spliced in on a point-forward basis. IPOs with an offer price below $5.00 per share, unit offers, REITs, closed-end funds, banks and S&Ls, ADRs, and IPOs not listed on CRSP within six months of issuing have been excluded. Data is from Thomson Financial Securities Data, with supplements from Dealogic and other sources, and corrections by the authors.

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

3.2 Explanations for Underpricing

An abundance of literature attempts to explain the consistent phenomenon of underpricing. This section will endeavor to explain a sample of related theories on the matter.

At the outset it is necessary to acknowledge that basic market misevaluation or asset pricing risk fundamentals are unable to explain the 18% first day returns depicted in Table 1. In addition should a diversified IPO investor require compensation for bearing systematic or liquidity risk, then should not investors that purchase the IPO stocks on the second day require this same compensation? Therefore, findings which will be discussed in greater detail in subsequent sections seem to indicate that the solution to the underpricing puzzle must lie in the issue price, in which the underwriter supplements the normal rules of supply and demand.

3.2.1 Signaling

Signaling is a theory that attempts to explain the consistent underpricing of IPOs. The principle is that the issuing company signals the investor population that their company is a good investment by means of an underpriced issue. This creates higher first day returns, and hence potentially functions as a favorable signal. The proposed reasons underlying companies' willingness to forgo investment during the IPO include the potential gains that they hope to reap in a higher priced follow on sale of shares, better analyst coverage, and the hope for more favorable market responses to dividend payments. (Welch 1989)

Existing evidence nonetheless contradicts the signaling theory. For example, it has been found that the amount of underpricing has no relation to the probability of a company doing a follow on offering or that more dividends would be paid. (Michaely and Shaw 1994) Also, it remains unclear why such signals would be a more efficient signs to investors than for instance advertising.

3.2.2 Trade-off Theories

In the book building process, investors know that by bidding the highest dollar value that they are willing to pay for the issue, the issue price will consequentially rise. As investors are aware of this they are not willing to truthfully bid at the highest price. Trade-off theories explain this scenario as a reason for underpricing. According to such logic, the underwriter allows for a certain amount of underpricing in order to compensate the investors' information provision to the underwriters. (Benveniste and Spindt 1989)

That said, there are nonetheless other theories that illustrate the marginal value of a single investor's information provision, as an investment banker may canvas hundreds of intentional bids. As such, compensation theory is limited to explaining, at the most, only a few percent of consistent underpricing. (Ritter and Welch 2002, 1805)

Meanwhile, Habib and Ljungvist (2001) document that underpricing can serve as a substitute for marketing expenditures, where an extra dollar left on the table, proportionately reduces other marketing costs.

3.2.3 Winner's Curse and Adverse Selection

Winner's curse or adverse selection stems from traditional auctions, where the winning bidder was aware of having bid more for an item than anybody else. As a result, the winner knows that he has paid more than the market price for the item, and is therefore overpaying. The winner's curse metaphor carries over to IPOs in a similar manner. Uninformed investors that receive their whole allocation of shares because informed investors chose not to invest in the offering, are also subject to Winner's Curse, in that they are aware that they paid more than the market price for the issue. Because of Winner's Curse, investors that are conscious of the existence of known-unknowns avoid investing in IPOs. (Grinblatt and Titman 2002, 85-86)

To counter investors' fears of Winner's Curse, Rock (1986) suggests that underwriters could attract more uninformed investors to the offering by underpricing any given issue. Rock's assumptions have been supported by Betty and Ritter's (1996) study which illustrates that more risky IPOs must on an average be underpriced more than less risky

IPOs. Keloharju (1993) corroborated these findings in his research of Finnish IPOs.[15] In his study, Keloharju demonstrated that buyers receive more shares from an overpriced IPO, and fewer shares from an underpriced IPO. Because investors receive more of the overpriced issue then the underpriced issue, they do not make positive returns on IPO investments.

In conclusion, it can be inferred that uninformed investors who are wary of high risk IPOs are compensated for their lack of knowledge by bringing down the initial offering price. On the secondary market this can be seen as underpricing in the first day of trading, since the offer price was below market price.

3.2.4 Underpricing During the Internet Bubble

In as much as the theories above may explain some of the underpricing present, they however cannot synthesize the underpricing which occurred during the technology bubble, during which the average initial day return was 65 percent (Table 2 above).

One line of reasoning for the higher underpricing during the technology bubble, is that underwriters could not justify a higher offer price on tech stocks, because of legal concerns, when the companies were already highly overvalued.

This explanation starkly contradicts actual investment bank behavior during the Internet bubble period. At the time, investment banks encouraged overvaluation by issuing "buy" recommendations even though the market price of some stocks was over twice that of the issue price.[16] During the period between 1996 and 2000, 87 percent of investment bank recommendations at the end of the so-called quiet period were either "buy" or "strong buy". (Bradley, Jordan and Ritter 2003, 1)

Boehmer and Fisher (2001) found that higher underpricing induces a higher amount of trading in the aftermarket. Thus, the underwriter gains additional revenue from the trading of the IPO shares since they are usually the main market makers. This is also

[15] In Finland, a fixed-price method is used to distribute and allocate shares, and the degree for rationing is public information. (Grinblatt and Titman 2002, 86)

[16] *Credit Suisse First Boston (CSFB) took Corvis public on July 28, 2000, at an offer price of $36,00. At the closing price of $84,719 on the fist day of trading, the first day return was 135 percent. When the quiet period ended…the five comanaging underwriters all put out "buy" recommendations, and CSFB initiated coverage with a "strong buy" recommendation, even though the price had increased to $90. At $90 per share, Corvis had a market capitalization of $30 billion, despite never having had any revenue.* (Ritter and Welch 2002, 1808)

supported by Ellis et al. (2000) who reasoned that market making could be worth 2 percent of the total value of the IPO issue to the lead underwriter three months following the issue.

3.3 Valuing IPOs

Consistent underpricing raises the issue of valuation i.e., whether the issuer side or the investor side prices the offering according to the expected net present value of the offering.

Since the issuing company in an IPO has no prior trading history, it also lacks a valued market price, which could be used as the issue price. Therefore, the most common way to value an issuing company is by surveying its financial information and comparing it to similar already traded companies. As noted, the results of this type of evaluation are heavily affected by a company's prior financial performance and accounting information.

In reality, this method of valuing companies is not very effective, since most companies that are going public do so in order to gain resources to grow, while in transition into the next stage in its life cycle. Taking this into account the value of the issuing company is in its growth potential, and not in its historical performance. Reliance on such comparative company analysis in the pricing of IPOs has also been proven to have a very weak ability to explain IPO pricing, even in cases when earnings forecasts have been included in the analysis. (Ritter and Moonchul 1999, 417)

Other research has also shown that IPOs are priced around 50 percent higher than comparable companies that are already traded. In addition, it has been documented that there is a positive relationship between the amount an IPO issue is priced over the average price of similar traded companies and long-run underperformance. (Ritter and Welch 2002, 1816)

Based on the findings above, there seems to be no directly indicative nor conclusive results that would suggest that the valuation process has any effect on underpricing or on the success of the an IPO.

3.4 Post-IPO Performance

Two leading theories aim to explain post-IPO performance. The first, proposed by Miller (1977) states that only the most optimistic investors invest in an IPO. As a result, the price is set according to the most optimistic investor's expectations. Then, over time, as the opinions regarding the value of the IPO stock decreases, the value of the stock is lowered to the point of the average perceived value of the investing population, thus causing post-IPO underperformance.

The other, more recent leading theory is by Schultz (2003), who argues that more IPOs will follow successfully completed IPOs. As a result, the last large group of IPOs following a hot market under perform. These findings are also supported by Ritter (1991, 3) who noted that, "*investors are periodically overoptimistic about the earnings potential of young growth companies, and firms take advantage of these "windows of opportunity.*"

It must be noted that almost all of the tech stocks that had high first-day-returns during the1999-2000 period have fallen in value.

4 Previous Research

This section describes five key studies that have researched different forms of going public. This chapter also provides a brief account of a study which analyzed spreads, in addition to outlining a study which analyzed the impact of Internet technology on investment banking.

4.1 Kenji and Smith (2004)

Kenji and Smith (2004) study the benefits and drawbacks of auctions versus book building as a method of IPO issuance in Japan. Their reason for choosing Japan as a test environment was due to the fact that book building has been a legal way of going public in Japan since 1997. Previously, auctioning was the only way that a company could go public in Japan. In their research, Kenji and Smith use the total issue cost as a percentage of the value of the issue to measure the benefits and drawbacks of the different methods of going public.

The data that is used in this paper is a sample of 484 IPOs by companies that are listed on the JASDAQ or JASDAQ-OTC markets during a five-year period from 1995 to 1999. This included 321 auction IPOs and 163 book built IPOs. However, due to varying market conditions during the years spanning from 1995 to 1999, the research has been divided into two different sections. The first uses all the data from the whole sample period, whereas the second section uses data only from the years 1996 through 1998, when the market was characterized by very stable market conditions. This provides a fairly similar setting for both auctions (January 1996 - September 1997) and book built (October 1997 - December 1998) IPO data sets. Firm data that is used include: sales revenue, equity to book value, shares outstanding, firm age, as well as number of employees. Issue data includes offering date, number of shares issued, amount raised, offer price, first after market price, and other offering details. Total issue cost in their research is defined as the first aftermarket price instead of actual issue price.

During the whole period, the total issue cost against the aftermarket price in book built IPOs is an average of 28,04%, whereas the auction priced cost is only 8,17%. However, the second sample (1996-1998) notes values of 15,3% and 7% respectively. The data

demonstrates that the book building method provides more flexibility, making small issues appear to be more feasible, and decreasing the cost of going public for larger companies.

The empirical analysis demonstrates that under the auctions-only system, issuers are older and larger than book built issuers. The analysis also reveals that underpricing is a substitute cost for lower fees, thus when all else being equal, increased underpricing reduces the fee as a percentage of the aftermarket price. The method used for analysis in Kenji's and Smith's study was regression analysis, with reliance on previously identified variables.

When analyzing total issue cost and issue size, it was found that issuer age, sales revenue, and equity to book value are not significantly related to the total cost of auctioned IPOs. In the book built issues, the percentage cost is less for large issuers with established track records.

In the study, the difference in equally-weighted average issue cost compares what the issue cost would have been in both book building and auction scenarios for any given company individually. Kenji and Smith found that auctioning reduces mean total issue cost by an average of 6% of the first aftermarket price. Additionally, they predicted that pricing through the auction method is projected to have resulted in lower total costs at least in 82,5% of the subsample.

In conclusion, Kenji and Smith found that under the auction method, high quality issuers had a limited ability to distinguish themselves from low quality issuers. Furthermore, the research found that small and risky firms, as a group, incur higher costs with book building, whereas larger and better-established issuers realize savings with this particular method. Overall in this sample of Japanese IPOs, the average total issue cost, measured as a percentage of the initial aftermarket price, was significantly higher in the book building regime than in the auction regime. However, it was found that aggregate underpricing would have been lower under the book building, on the basis of either the full sample, or the subsample.

4.2 Sherman and Jagannathan (2005)

In their study Sherman and Jagannathan identify the underlying reason for the relative unpopularity of auctions as a means of going public. This study appears to be the most comprehensive endeavor in terms of attempting to holistically identify the reasons auctions have not been as attractive as other means of going public. Their research studies international trends in auctions use. Here, the evidence overwhelmingly indicates that auctions have been tried in over 20 countries but are rarely used today. “In other words, out of more than 45 countries, we have not been able to find even one country in which auctions are currently the dominant method.” (Sherman and Jagannathan 2005, 14)

Sherman and Jagannathan delve into commonly used stereotypical explanations for why auctions are not used. The two most common notions are (1) auctions are not used because they are still experimental and unproven, and (2) issuers are pressured into book building due to higher fees. Nonetheless, through international research, it was proven that even in markets where auctions have been used for a long time, there was a decline in their use as soon as book building or some other method became available. For the second issue, the authors found that competition in the market would drive down prices of book building issues. Additionally, other research has shown that fixed price offers lead to even lower spreads, compared to auctions.

In their study Sherman and Jagannathan find that on a global scale initial returns are not the most important aspect of the issue for the issuer. This was evident from data collected on IPOs in Singapore, where both auctions and fixed price offers were available. In this case, statistics revealed that the fixed price method was chosen as the dominant means of going public, although auctions consistently provided lower underpricing.

Finally, the study also deemed whether any perceivable effect can be distinguished from adding modern Internet technologies to enable bidding for the IPO auction. The results illustrate that the median return for Open IPOs is 2%, which is excellent. However, the research points out that there are significant outliers in the group.

In conclusion, Sherman and Jagannathan find that auctions have been tried and tested in many markets, but have lost popularity due to poor control on the part of the issuer in terms of the price and effort that are applied. They also identify that auctions provide lower underpricing. This would imply that issuers are not only looking to optimize underpricing, but are moreover interested in other attributes of the issue. "Without some way of screening out free-riders and the unsure participation of serious investors, IPO auctions are too risky for both issuers and investors."

4.3 Kaneko and Pettway (2003)

Kaneko and Pettway attempt to provide an answer to the question "Does book building provide a better mechanism for issuing firms than auctions?" Similar to Kenji and Smith (2004), the Japanese market is used to test the assumption. The Japanese auction process uses price discriminating auctions, instead of a fixed price or market-clearing price as in the Open IPO process.

The empirical research in Kaneko and Pettway (2003) is broken up into three parts. Firstly the descriptive statistics are analyzed, which demonstrate that book building had significantly higher initial returns than auction priced IPOs. In the following part, the auctioned priced and book built IPOs are analyzed separately through regression analysis. In this section seven independent variables[17] are tested to uncover which variables have the most impact on underpricing. In the test of auctioned IPOs, it was found that market volatility of daily index returns one month prior to the issue is the most significant factor affecting underpricing. When the same regressions were run on the book built IPOs, it was found that market change three months prior to the IPO was the most significant factor affecting underpricing.

In the third part of Kaneko's and Pettway's research, regression analysis was run on both sets of data, however controlling for the different firm specific characteristics. There, it was also found that book built IPOs are underpriced significantly more than auction priced IPOs. When the book built and auctioned priced IPOs were analyzed for

[17] The seven variables are (1) expected issue size (2) present insider sales (3) underwriter reputation (4) partial adjustment phenomenon (the offer price/pre-offer formula price) (5) firm age (6) market movements three months prior to the IPO (7) market volatility one month prior to the IPO.

effects of hot and cold markets, it was found that book built IPOs are still much more frequently underpriced.

In conclusion, Kaneko and Pettway found that under all conditions and while controlling firm specific characteristics, book built IPOs were much more frequently underpriced in comparison to auctioned IPOs.

4.4 Biasis and Faugeron-Crouzet (2002)

In their research, Biasis and Faugeron-Crouzet analyze different types of IPO auctions. They study uniform price auctions, fixed price offerings, internet-based Open IPO mechanisms, and auctions such as Mise en Vente in France. These were analyzed within a uniform theoretical model. (Biasis and Faugeron-Crouzet 2002, 13-17).

In fixed price offers, Biasis and Faugeron-Crouzet found high initial returns. High returns were left both to institutional investors as well as small-uninformed investors, because of a lack of adjustment for price and demand. For uniform price auctions, underpricing was also evident, however with less underpricing than with fixed price offers.

The Mise en Vente auction is an auction type IPO procedure that is commonly used in France. This auction has a fixed market clearing price and pro rata allocation. The highest market clearing bids do not set the market-clearing price, instead it is set by a Bourse official, based on the function of demand. It is noted that an explicit algorithm that maps demand into price does not set the pricing in such cases.

The research found that for an optimal IPO auction, the IPO price must be set in a manner, which reflects the information held by investors. If this is not done as in fixed price auctions, underpricing is bound to be pervasive, whereas information gathering of the value of the stock during the IPO process is bound to be insignificant.

Biasis Faugeron-Crouzet viewed the Open IPO process as a true Dutch auction when it in fact was not. An Open IPO process is a so-called ´Dirty Dutch´ auction as coined by Sherman (1999). Much like the Mise en Vente, the fixed market-clearing price is not set

at the highest possible level, but instead it is marked down and set by the issuing company and the underwriter based on their own perception of the function of demand. Their study moreover identifies the problem of translating, i.e., mapping demand into prices and into explicit computerized rules, which occur in Mise en Vente and in Book building. The authors also highlight the importance of established relationships between bidders and underwriters. Finally, according to Biasis and Faugeron-Crouzet an established relationship can enhance the ability to extract information from investors.

4.5 Wilhelm (1999)

Wilhelm's research dwells into the issue of how the Internet has affected investment banking that has relied on relationship based production technology to date. The methodology applied in this study is based on previous research relating to investment banking. The author does not conduct his own empirical study, instead, he identifies a list of anomalies that other studies have found indicative of the phenomenon that investment banking, as we know it, could be changing.

Indications of the change in traditional investment banking according to the author are that there has been a decline in the size of underwriter syndicates and there are fewer or more dominant intermediaries in the securities underwriting business (Pichler and Wilhelm 2001, 2256).

The second observation was made on the point of low-cost communication and data processing, which might lead to a "direct marketing" business model. For example Wit Capital, a subsidiary of Goldman Sachs, seeks to identify affinity groups through data mining for a given firm's offering.

In sum, the study forecasts that new technologies will complement traditional technologies, rather than replace them, as has been witnessed with Wit Capital and W.R. Hambrecht's Open IPO.

4.6 Summary of previous research

Below is a table summarizing the findings of the five key studies in the field.

Table 3. Overview of Previous Research.

Study	**Objective**	**Conclusion**
Kenji and Smith (2004)	Attempt to uncover why book building has been used more than auctions in Japan, although auctions seem to be more beneficial to issuers.	Auctions leave less money on the table, however larger and older issuers benefit from book building, since overall issuance cost is lower for them.
Sherman and Jagannathan (2005)	A study of the underlying reasons why auctions are relatively unpopular all over the world for issuing equity, whereas they are extensively used for selling everything else.	Auctions run higher risk than book built IPOs, due to less control by the issuer of the free-rider problem, as well as less control over issue price.
Kaneko and Pettway (2003)	Examine whether book built IPOs provide a better mechanism for issuing firms compare to auctions.	Underpricing was used as a proxy, and overwhelmingly auctions were found to be more beneficial to issuers than book built IPOs.
Biasis and Faugeron-Crouzet (2002)	Compared the performance of the various auction methods through a unified theoretical model.	Fixed price auctions underprice the most, market clearing auctions also underprice but not as much as fixed price offers. An optimal solution is achieved by the Mise en Vente in France that encompasses some characteristics of the book built offers.
Wilhelm (1999)	Questions whether new communication technologies could impact traditional relationship based production technology that has been used until now in investment banking.	Results indicate that there is potential for the traditional relationship based production technology to be enhanced by Internet technologies, especially in issuing IPOs

5 Presentation of Data

This chapter presents the data applied in the empirical part of this thesis. First the data on Open IPOs will be surveyed, after which the data on the traditional book built IPOs is described. Section 5.3 includes a comparison of the two data sets. In the last part of this chapter, the different variables that are utilized in the empirical analysis of chapter 6 are presented.

Open IPOs have been used as a form of going public since September 9th 1999. Therefore, the data that is collected on book built IPOs is from this period. This far, all the Open IPOs have been listed onto the NASDAQ exchange, therefore NASDAQ IPOs are also drawn on for the book built data set. Once the data is presented, the figures attained will be explained in further detail.

5.1 Open IPO Data

The list of Open IPOs has been collected from W.R Hambrecht's Open IPO website. The data for the Open IPOs has been collected from the prospectuses of the respected IPOs (W. R. Hambrecht +CO^2). To date, there have been seventeen official Open IPOs in addition to the Google IPO. The Google issue used exactly the same pricing method as normal Open IPOs, except for the fact that its lead underwriter was not W.R. Hambrecht + CO, as in the other official Open IPOs.

Below is a list of all the Open IPOs to date. Included are the date of the issue, initial return, gross spread, total loss, age of company, % insider sales, and issue size in millions of dollars.

Table 4. A complete overview of all the Open IPO type IPOs to date.

Issue	Company	IPO date	Initial Return	Gross spread	Total loss	Age	% Insider sales	Issue Size millions
1	Salon.com	22.6.1999	-4,80%	5,0%	0,20%	4	0,00%	26,25
2	Ravenswood	4.9.1999	3,60%	4,0%	7,60%	23	0,00%	10,5
3	Andover.net	8.12.1999	252,10%	6,5%	258,60%	4	0,00%	132
4	Nogatech	17.5.2000	-21,60%	6,5%	-15,10%	7	0,00%	42
5	Peets Coffee and Tea	25.1.2001	63,30%	6,5%	69,80%	30	7,11%	26,4
6	Briazz Inc	2.5.2001	0,40%	6,0%	6,40%	6	0,00%	16
7	Overstock.com	29.5.2002	0,20%	4,0%	4,20%	5	4,89%	39
8	redenvalope	25.9.2003	3,90%	6,0%	9,90%	6	0,00%	30,8
9	Genitope corporation	20.10.2003	11,10%	7,0%	18,10%	7	0,00%	33,3
10	New River Pharmaceuticals	5.8.2004	-8,00%	7,0%	-1,00%	8	0,00%	33,6
11	Google	18.8.2004	18,00%	2,8%	20,80%	6	1,88%	1666,5
12	Bofi Holding Inc	15.3.2005	0,00%	6,0%	6,00%	6	0,00%	35,1
13	Morningstar	2.5.2005	8,40%	2,0%	10,40%	21	16,53%	140,8
14	Cryocor	14.7.2005	-1,20%	7,0%	5,80%	5	0,00%	40,8
15	Avalon	28.9.2005	-9,62%	7,0%	-2,62%	6	0,00%	28,9
16	Dover Saddlery	17.11.2005	2,50%	5,0%	7,50%	7	16,95%	27,5
17	Traffic.com, Inc	25.1.2006	0,00%	6,0%	6,00%	8	0,00%	78,6
18	FortuNet, Inc.	7.2.2006	0,01%	4,5%	4,51%	17	0,00%	22,5

The overall cost of going public has been calculated by adding the gross spread and first day returns. The rest of the data has been collected directly from a given company's final prospectus. As can be seen, there is clearly one outlier in the sample data, namely Andover.net, which was issued on December 8th 1999. The initial returns for this issue are much higher than any other returns in the whole data set, including the book built issues. The reason for the extremely high initial return, is reportedly due in part to Andover not wishing to delay the offering by re-filing at a higher price range. The market-clearing price, was $24. Should Andover.net have been priced at the market clearing price it would have had initial first day returns of 164% rather than 252% (Sherman 1999, 43).

5.2 Book built IPO Data

For the book built IPO data, only NASDAQ IPOs from 1999 to 2006 period have been considered. The 159 book built IPOs have been randomly selected from IPOs that were listed on NASDAQ over the study period. On an average, six IPOs were selected from each quarter. Since Open IPOs have not been issued continuously at equal intervals throughout this time, I have randomly selected a higher number of book built NASDAQ IPOs from periods when there have been more Open IPOs. By doing this, I have attempted to roughly include the same number of book built IPOs for each Open IPO in the same time period.

The 159 book built IPOs have been chosen using a simple random sample over the time period. The time period has been divided up into quarters of the year starting from Q3 1999 and ending in Q1 2006. Depending on the amount of open IPOs issued in any given quarter, a simple random sample has been drawn from each. Data has been collected around the Open IPO date in such a manner that there have been no strict rules on the quarter. The 159 book built IPOs are hence depictive of the whole population of book built IPOs over the period.

5.3 Descriptive Statistics

I have applied descriptive statistics for the 159 book built IPOs, 18 Open IPOs, 103 book built IPOs issued after 2001, and 14 Open IPOs issued after 2001, in addition a third data set is included, which has been controlled for outliers. As previously stated there have only been 18 Open IPO type issues to date. Naturally, this sets some limitation to the validity of the statistical test that will follow. The data has been split up into three sections: one that contains all of the data, one set that contains data after 2001, and the last data set contains the controlled data set. This is done in order to minimize the effects of the technology bubble during the 1999-2000 period. First, I will study the descriptive statistics for the whole data population, after which the statistics on the data as of 2001 will be explained, and finally the controlled data set is examined.

The table below presents descriptive statistics of the 159 NASDAQ listed book built IPOs and 18 Open IPOs for the whole data period (6.1999-2.2006) as well as 103 book

built IPOs and 16 Open IPOs as of January 2001. The final data set is a controlled data set, in which outliers have been removed.

Table 5. Descriptive statistics.

Measures	Open IPOs	Book built IPOs	Open IPOs 2001-	Book built IPOs 2001-	No Outliers Open IPOs	No Outliers Book built IPOs
Total number of IPO issues	18	159	14	103	16	149
Average first day returns	17,68%	14,56%	6,36%	8,67%	0,18%	12,36%
Median first day returns	0,30%	8,33%	0,3%	5,97%	0,10%	7,89%
Max initial returns	252,10%	81,01%	63,30%	77,97%	18,00%	60,00%
Min Initial returns	-21,60%	-49,43%	-9,26%	-49,43%	-21,60%	-24,44%
Standard deviation of initial returns	60,94%	22,23%	17,84%	15,23%	8,94%	17,52%
Total range of initial returns	273,70%	130,44%	72,56%	127,40%	39,60%	84,40%
Percent positive of initial returns	61,11%	64,29%	64,29%	71,85%	63%	75,17%
Percent negative of initial returns	27,78%	18,87%	21,43%	21,36%	31,25%	18,12%
Average wealth lost by issuing firm	23,17%	21,58%	11,84%	15,68%	5,54%	19,27%

Due to the erratic market movements during the technology bubble from 1999 to 2000, there is a much higher variance in initial returns prior to January 1st 2001 than after this

date. To accommodate for the variance in the first two years of Open IPOs the data is split into three sections, one comprising all the data from the entire sample period (1999-2006), the second section contains data only from the beginning of 2001, and the third section includes all data, however controlled for outliers. As described in Chapter 4, Kaneko and Pettway (2003) split their data into two sections in their analysis of Japanese IPOs in order to remove the effects of the technology bubble. The third data section excludes outlier values from the sample data[18]. In the section below, the data sample is assessed in terms of the three different means for surveying the sample, as described above.

When assessing the first two columns in Table 5, which represent the entire data set, the average initial return levels for the Open IPOs are slightly higher than that of the book built IPOs which, are 17,68% and 14,65% respectively. The standard deviation and total range of initial returns is much higher for Open IPOs. The percentage of positive initial returns seems to be quite similar both with book built and Open IPOs.[19] Average wealth lost by the issuer is calculated by adding the gross spread and the initial first day return percentage together. The value for the average wealth lost by the issuing firm is a few percentage points higher for Open IPOs in the whole data set.

In quantifying the data starting from the beginning of 2001 in Table 5, the values have changed, in comparison to the entire data set, especially in terms of the Open IPO issues. The average first day returns have decreased from 17,68% to 6,36%, whereas the book built first day returns have also decreased from 14,56% to 8,67%, these figures are only slightly higher than the Open IPO issues. The maximum initial returns have not significantly changed for the book built IPOs, however the maximum initial returns for the Open IPOs have dramatically decreased. Arguably, the 63,3% initial return is still an outlier, since there are only two initial returns that are over 18% for Open IPOs, and this is one of them. This value is excluded in the last data set, which controls for outliers. In the data set starting from January 1st 2001, the standard deviation of first day returns has decreased for both Open IPOs and book built IPOs, as expected. In this data set Open IPOs have a much higher decrease of standard deviation due to the exclusion of the

[18] The outliers were calculated according to the Inter Quartile Range (IQR) rule where values that are more than 1,5IQR above or below the 1st and 3rd quartiles respectively are removed. The upper limit and lower limits were 61,93% and -37,16% (Berenson, Levine,1996)(see Appendix I for more details).
[19] The reason why the book built IPOs percentage of positive returns and negative returns does not equal 100% due to the fact that there were a few issues that had initial returns of 0,00%, which are left out of the calculations.

Andover.net outlier. The total range of initial returns has remarkably decreased for the Open IPOs, whereas the total range for book built IPOs has remained approximately the same. In assessing the average wealth lost by the issuing firm, there is quite a large decrease for both methods of going public. The average wealth lost by Open IPOs (11,84%) is clearly lower then that for the book built IPOs (15,68%). The average wealth lost is calculated by adding the initial first day returns and the gross spread of the issue together.

The last two columns of Table 5 represent a data set that has been controlled for outliers (see Appendix I). Once outliers are controlled for, there is a much larger difference between the two ways of going public, as compared to the two previous data sets. The average first day returns have decreased to 0,18% for Open IPOs as compared to the 12,36% for book built IPOs. Average wealth lost by the issuing company has been decreased to 5,54% with Open IPOs, whereas it is 19,27% for the book built IPOs. One interesting difference is the much larger amount of negative initial returns with the Open IPOs as compared to the book built IPOs.[20] The standard deviation and total range of return has also decreased to half of the previous data sets with the Open IPOs.

5.3.1 Underwriter Discount (Gross Spread)

In this section the gross spreads or underwriter discounts are presented. The gross spreads have been collected from the prospectuses of the given companies presented in Sections 5.1 and 5.2. The gross spread values have been changed into a percentage value of the total issue size.[21] The reason for changing the gross spreads into a percentage of the total issue size, is to enable them to be comparable with issues of varying sizes. In addition, when the gross spread is presented as a percentage of the total issue size, it can easily be used to calculate the total wealth lost in the issue by adding the first day percentage return and gross spread (see section *2.4 Cost of Going Public*). As can be seen from Table 6, the gross spread for book built IPOs is slightly higher. Moreover Graph 1 presents the frequency of gross spreads. It should be noted that the majority of book built IPOs had a gross spread of exactly 7%. Whereas the average gross spread of Open IPOs is 5,49% of the issues value.

[20] The average of the negative returns for all Open IPOs and book built IPOs is -9,04% and -9,77% respectively.
[21] This is usually indicated by an “Underwriter Discount” per issued share on the first page of the prospectus.

The gross spreads will be assessed in the last Section of the Empirical Analysis Chapter (6.4 *Test for Significant Differences in Total Cost of Going Public*), in which the overall wealth lost by an issuing company is under scrutiny.

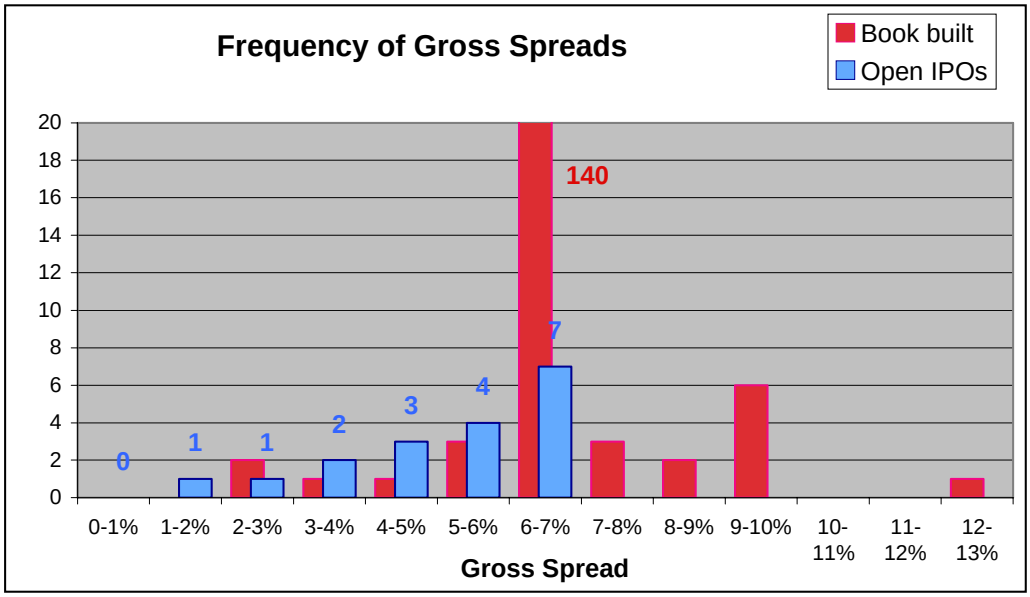
Table 6 below describes the average gross spreads as well as the standard deviations of gross spreads.

Table 6. Average gross spreads and standard deviation.

Measure	Open IPO	Book built IPO
Average gross spread	5,49%	6,99%
Standard deviation	1,51%	0,90%

Graph 1 below illustrates the distribution of gross spreads.

Graph 1. The distribution of gross spreads.



5.4 Introduction to the Applied Variables

Various variables could be identified and used for the study at hand. To maintain scope and focus, the same variables that were used by Kaneko and Pettway (2003) will be used, although excluding variables indicative of underwriter reputation and the partial

adjustment phenomenon.[22] These variables were omitted because the data is not available and due to the difficulty in determining underwriter reputation in the United States.

The five variables that will be used for this research are (1) three month market index change prior to the issue, (2) one month market volatility prior to the issue, (3) company age, (4) percentage insider sales, and (5) issue size in millions. Furthermore gross spreads will be used in the last part of Chapter 6, to compare the difference between the total cost of going public for the issuing company, which is a combination of initial return and gross spreads.

- As mentioned in the sections above, the initial returns are calculated using the issue price as stated in the prospectus and the closing price of the first day of trading.
- Gross spreads have also been collected from prospectus data. Gross spreads have been transformed into a percentage of the issue price.[23]
- Volatility of daily index returns (one month volatility) has been calculated by the variance of daily NASDAQ index returns one month prior to the offer date of any given IPO (Kaneko and Pettway 2003).[24]
- The three month percentage change in the NASDAQ index has been collected from historical index prices using the same data set as was used for the calculation of the daily variance.
- The age of the company has been calculated in years from the date of incorporation to the IPO date.
- The issue size is calculated as the log of the actual issue size.
- The percentage of insider sales variable has been calculated using prospectus data and has been transformed into a percentage of the total amount of shares that the insiders are selling, as compared to the total amount of shares.

[22] The partial adjustment phenomenon is a ratio between the suggested price developed from the price ranges provided in the enitial prospectus and actual offer price. So if an issue has a higher than 1 ratio that would mean that there has been larger demand for the issue, and hence larger first day returns. (Hanley 1993)
[23] All the prospectuses were collected from the Hoovers web site (http://www.hoovers.com/free/tools/bcl/)
[24] The source data has been gathered from the historical data from Yahoo historical prices (http://finance.yahoo.com/q/hp?s=%5EIXIC)

In sum, the initial first day returns are higher for the Open IPOs in both time periods. However, the wealth lost by the issuing company is on an average higher for book built IPOs in the second time period, starting from the beginning of 2001. In the second time period initial returns and standard deviations decrease significantly. In book built IPOs the total range of returns does not decrease by a significant amount. Finally, in the controlled data set initial returns dramatically decrease.

6 Empirical Analysis and Discussion of Findings

This chapter empirically investigates whether there is a difference in the initial returns and total cost of going public between book built and Open IPOs. The null hypothesis as presented in section 1.1, states that there are no differences in initial return nor in total cost of going public between the two studied methods. Linear regression is applied as the method of analysis. Moreover, as discussed in Chapter 4, this empirical analysis dwells on the methods and variables applied in Kaneko's and Pettway's (2003) research.

Microsoft Excel[25] has been used as a tool for producing linear regressions. The data selected for the analysis was detailed in the previous Chapter 5 *Data*. The section below will survey initial returns of Open IPOs (Section 6.1), followed by an analysis of first day returns and book built IPOs (Section 6.2). The goal of Sections 6.1 and 6.2 is to identify which independent variables affect the first day returns of a given IPO method. Section 6.3 collectively studies book built and Open IPOs, to allow for a comparison of the first day returns of the two different methods of going public (section 6.3). Finally, the last section of this chapter, Section 6.4 analyzes the total cost of going public, and whether there is a difference in the total cost of going public between book built IPOs and Open IPOs.

The variables used in the empirical analysis are:

1. Initial first day returns (IR) (dependant)
2. Three month change in the NASDAQ index prior to the issue of any given company (independent)
3. Variance of daily NASDAQ index returns for one month prior to the offer of any given firm (independent)
4. Percentage of insider sales in the issue (independent)
5. Age of a company (independent)
6. The issue size (independent)

Kaneko and Pettway (2003) applied the above variables in analyzing the difference between Japanese auction IPOs and Japanese book built IPOs. In the last part of this

[25] Microsoft Excel 2004 for Mac, Version 11.2.3

chapter, gross spreads will be combined with initial returns to provide a complete view of the price of going public between the two methods under scrutiny.

Table 7. Relationships between initial returns and the five independent variables of the selected Open IPOs

Model Number		Intercept Coefficient	Intercept P-Value	Sig. -F	F-Value	Adjusted R^2	n	% Market Change		Market Volatility		% Insider sales		LOG of age		Log of issue size	
								Coeff-icient	P-Value	Coeff-icient	P-Value	Coeff-icient	P-Value	Coeff-icient	P-Value	Coeff-icient	P-Value
1	**A**	0,1765	0,2491	**0,7445**	0,1100	-0,0552	18	0,2491	0,7445								
1	**B**	0,0628	0,2004	**0,2094**	1,7593	0,0552	14	-0,6401	0,2004								
1	**C**	-0,0012	0,9556	**0,1552**	2,2577	0,0774	16	0,3102	0,1552								
2	**A**	0,1679	0,3796	**0,9377**	0,0063	-0,0621	18			21,0486	0,9377						
2	**B**	-0,0147	0,7462	**0,0084**	9,8964	0,0552	14			199,475	0,0084						
2	**C**	0,0258	0,3588	**0,1690**	2,1032	0,0685	16			-69,437	0,1690						
3	**A**	0,1856	0,2771	**0,9056**	0,0145	-0,0615	18					-0,3337	0,9056				
3	**B**	0,0378	0,5082	**0,3707**	0,8649	-0,0105	14					0,7627	0,3707				
3	**C**	-0,0090	0,7190	**0,3060**	1,1291	0,0085	16					0,4288	0,3060				
4	**A**	0,4324	0,4340	**0,6287**	0,2431	-0,0466	18							-0,2835	0,6287		
4	**B**	-0,3668	0,0328	**0,0128**	8,5418	0,3671	14							0,4702	0,0128		
4	**C**	-0,0661	0,5002	**0,4762**	0,5359	-0,0319	16							0,0768	0,4762		
5	**A**	-0,3977	0,4555	**0,2676**	1,3194	0,0184	18									0,3492	0,2676
5	**B**	-0,0186	0,9183	**0,6383**	0,2325	-0,0627	14									0,1018	0,6383
5	**C**	-0,1408	0,0704	**0,0577**	4,2729	0,1791	16									0,0875	0,0577
6	**A**	-0,3507	0,7356	**0,9308**	0,2519	-0,2821	18	0,4167	0,8743	174,978	0,7291	-0,3051	0,9321	-0,2073	0,7861	0,3943	0,3484
6	**B**	-0,5682	0,0067	**0,0091**	6,8428	0,6920	14	0,7491	0,1072	270,447	0,0057	0,2701	0,6227	0,3031	0,0534	0,1434	0,0437
6	**C**	-0,2776	0,0453	**0,0801**	2,7693	0,3710	16	0,6384	0,0424	66,9129	0,3147	0,4363	0,2593	0,0487	0,5935	0,1203	0,0186

A	All data	**MODEL 1** IRj = aj + bj% Market Change	IRj =Initial return [(closing price-offer price)/offer price] of IPOj
		MODEL 2 IRj = aj + bj 1 month volatility	%Market Changej = 3 month percent change in daily NASDAQ Composite index
B	Data as of 1.1.2001	**MODEL 3** IRj = aj + bj % insider sales	Market Volatilityj=Variance of daily index return 1 month prior to IPO of company j
		MODEL 4 IRj = aj + bj LOG of age	% Insider salesj = % of all the companies shares that insiders are selling in their issue
C	Data that has been controlled	**MODLE 5** IRj = aj + bj LOG of issue size	LOG of agej = The LOG of the age (in years) of company j on the IPO date
		MODEL 6 IRj = all independent variables	LOG of issue size = LOG of the issue size ($ million)

6.1 Analysis of Open IPOs

This section analyzes the effect the five independent variables have on the initial returns of Open IPOs. Table 7 presents the regression results for the Open IPOs.

In Table 7, the independent variables are listed in the columns on the right. The dependant variable is the initial return level of the Open IPOs. The first five models are single regressions, measuring the sign and significance level of the relations of the independent variables and initial return free of any possible multicollinearity. Each model has been run with three different data sets: (1) A. all data, (2) B. Data as from 1.1.2001, and (3) C. A controlled data set where outliers have been eliminated. Since the population of Open IPOs is very small (N=18) the results of these tests have to be analyzed using discretion.

In Table 7, Model 1 examines the relationship between the percentage change in the NASDAQ composite index three months prior to the IPO and initial return. The significance levels (Sig. –F) indicate that there is no observable relationship between these two variables in any of the models 1 A, B, C. Kaneko and Pettway (2003, 451-452) found a positive and significant relationship between Japanese IPO auctions and initial returns. This would indicate that Open IPOs are not affected as much by the climate of the overall market as Japanese auctions as found by Kaneko and Pettway.

Model 2 in Table 7 analyzes the relationship between the variance of daily NASDAQ index returns one month prior to the IPO of a given company and initial returns. Model 2A and 2C do not have an observable relationship as indicated by the significance level. However, model 2B is significant at the 0,0084 level with a positive relationship, as indicated by the coefficient. The more variance there is in the daily index returns one month prior to a given Open IPO, the higher the first day returns are expected to be. A similar relationship was found with Japanese IPO auctions. One possible reason for higher returns with higher variance can be drawn from higher ex ante risk in pricing, which is associated with higher initial return levels as was also pointed out by Kaneko and Pettway (2003).

Model 3 in Table 7 studies the relationship between the percentage of the total amount of shares that insiders are selling in connection with initial returns. There is no observable relationship between these two variables in any of the data sets.

Subsequently, Model 4 in Table 7 studies the relationship between the age of a given company and initial returns. Model 2B indicates that there indeed is a significant relationship at the 0,0128 level. The relationship is positive indicating that older companies have higher first day returns. This contrasts standard beliefs, as usually older companies have lower first day returns as pointed out by Kaneko and Pettway (Kaneko and Pettway 2003, 451, 453, 454), who found a significant and negative relationship between first day returns and company age. That said, the reason it is assumed that older companies have lower initial returns due to the fact that they are expected to be more experienced, and thus, have less ex ante uncertainty. It should be noted that there is a very small population (N) of 14, which may distort results. Model 4A and 4C show no significant relationship.

Model 5 in Table 7 analyzes the relationship between the issue size and initial returns. Model 5A and 5B show no significant relationship. Model 5C is significant at the 0,0577 level, as it is just above the 0,05 level. The positive relationship suggests that the bigger the issue size, the higher the first day returns. This is moreover contrary to the findings by Kaneko and Pettway (Kaneko and Pettway 2003, 451, 453, 454) who found a significant and inverse relationship between issue size and first day returns. As noted above, the data population is very small and therefore is prone to provide distorted results.

Model 6 studies the relationship between all of the independent variables and first day returns. Model 6A and 6C demonstrate no noticeable relationship. However, model 6B illustrates a relationship that is significant at the 0,0091 level. The strongest relationships are found with market volatility that has a p-value of 0,0057 and a positive relationship, signifying that the higher the volatility, the higher the first day returns are expected to be. The second strongest relationship is between issue size and first day returns that has a p-value of 0,0437. This relationship is positive, meaning that the bigger the issue-size the higher the first day returns. This relationship is unexpected since Model 5, which analyzes the relationship between issue size and

first day returns does not demonstrate a significant relationship. The third strongest relationship in Model 6B is found between the age of the company and first day returns, significant at the 0,0534 level. This is slightly above the 0,05 confidence level. As in Model 4B, the relationship is positive meaning that the older a company is, the larger the first day returns. Percentage market change and percentage insider sales seem to have no effect on the initial returns in this particular model.

In summary of Section 6.1, some unexpected results were found. In all of the models (1-6) and in regard to all of the data sets (A, B, C), no relationship was found between initial returns, percentage market change, and percentage insider sales. In examining the three different data sets (A, B, C) only data set B (data as of 1.1.2001) showed a significant relationship between some of the variables and initial returns within the 0,05 level. Data sets A and C did not indicate a significant relationship at the 95% confidence level between any of the independent variables and initial returns. The lack of observable relationships could be attributed to the very small sample population and to the high variance in the sample population in data sets A and B. This can observed from the high standard deviation for the two sample data sets presented in Table 5.

When purely considering the data from a technical analysis point of view, data set B (data as of 1.1.2001) in Model 6 indicates that there is a relationship between market volatility one month before the IPO, the size of the issue, and the age of the company. As noted in the previous analyses of Models 4, 5 and 6, in the case of the issue size and company age, the relationships are positive and thus contrary to the expected result. In practice, the results from Model 6B in Table 7 indicate that the Open IPO mechanism is better at pricing smaller issues of younger companies, as compared to the IPOs of older companies and larger issues. In reality however, these results are inconclusive due to the drawbacks of the data sets. As previously identified, there are a few possible causes that could have affected the distortion of the results. As previously noted, the drawbacks include the small sample population (N=18) in addition to the data set, a significant variance indicates the presence of outliers.

Table 8. Relationship between initial returns and the five independent variables of all the book built IPOs.

Model Number		Intercept Coefficient	Intercept P-Value	Sig. -F	F-Value	Adjusted R^2	n	% Market Change		1 month volatility		% Insider sales		LOG of age		Log of issue size	
								Coeff-icient	P-Value	Coeff-icient	P-Value	Coeff-icient	P-Value	Coeff-icient	P-Value	Coeff-icient	P-Value
1	**A**	0,1261	0,0000	**0,0000**	29,3188	0,1520	159	0,6572	0,0000								
1	**B**	0,0799	0,0000	**0,0073**	7,4976	0,0599	103	0,4222	0,0073								
1	**C**	0,1182	0,0000	**0,0031**	9,0357	0,0515	149	0,3476	0,0031								
2	**A**	0,1470	0,0000	**0,3283**	0,9615	-0,0002	159			-0,0005	0,3283						
2	**B**	0,0975	0,0000	**0,3471**	0,8924	-0,0011	103			-54,306	0,3471						
2	**C**	0,1249	0,0000	**0,2647**	1,2537	0,0017	149			-0,0004	0,2647						
3	**A**	0,1509	0,0000	**0,4607**	0,5468	-0,0029	159					-0,2360	0,4607				
3	**B**	0,0830	0,0000	**0,6118**	0,2592	-0,0073	103					0,1168	0,6118				
3	**C**	0,1271	0,0000	**0,5567**	0,3470	-0,0044	149					-0,1490	0,5567				
4	**A**	0,1752	0,0000	**0,4010**	0,7093	-0,0018	159							-0,0364	0,4010		
4	**B**	0,0507	0,1307	**0,2289**	1,4652	0,0045	103							0,0434	0,2289		
4	**C**	0,1558	0,0000	**0,2635**	1,2601	0,0018	149							-0,0391	0,2635		
5	**A**	0,0339	0,7239	**0,2367**	1,4106	0,0026	159									0,0599	0,2367
5	**B**	0,0259	0,7590	**0,4648**	0,5384	-0,0045	103									0,0328	0,4648
5	**C**	0,0836	0,2743	**0,5943**	0,2850	-0,0049	149									0,0215	0,5943
6	**A**	0,0383	0,6786	**0,0000**	6,9553	0,1586	159	0,6603	0,0000	-0,0007	0,1226	-0,2122	0,4753	-0,0398	0,3192	0,0680	0,1509
6	**B**	-0,0082	0,9235	**0,1048**	1,8802	0,0414	103	0,4358	0,0171	10,7433	0,8710	0,0692	0,7617	0,0387	0,2828	0,0278	0,5363
6	**C**	0,0879	0,2597	**0,0210**	2,7494	0,0558	149	0,3651	0,0020	-0,0006	0,1271	-0,1543	0,5363	-0,0439	0,1991	0,0386	0,3349

A	All data	**MODEL 1** IRj = aj + bj% Market Change	IRj =Initial return [(closing price-offer price)/offer price] of IPOj
		MODEL 2 IRj = aj + bj 1 month volatility	%Market Changej = 3 month percent change in daily NASDAQ Composite index
B	Data as of 1.1.2001	**MODEL 3** IRj = aj + bj % insider sales	Market Volatilityj=Variance of daily index return 1 month prior to IPO of company j
		MODEL 4 IRj = aj + bj LOG of age	% Insider salesj = % of all the companies shares that insiders are selling in their issue
C	Data that has been controlled	**MODLE 5** IRj = aj + bj LOG of issue size	LOG of agej = The LOG of the age (in years) of company j on the IPO date
		MODEL 6 IRj = all independent variables	LOG of issue size = LOG of the issue size ($ million)

6.2 Book built IPOs

This section focuses on the effects of the five independent variables on the initial return of book built IPOs. Table 8 above presents the regression results for the book built IPOs.

In Table 8, the independent variables are listed in the columns on the right. The dependant variable encompasses the initial return levels of the book built IPOs. The first five models are single regressions measuring the sign and significance level of the relations of the independent variables and initial return, free of any multicollinearity between the variables. Each model has been run with three different data sets: (1) A. All the data, (2) B. Data as of 1.1.2001, and (3) C. A controlled data set where outliers have been eliminated.

Model 1 in Table 8 studies the relationship between the percentage change in the NASDAQ composite index three months prior to the IPO and initial return. The significance levels (Sig. –F) indicate that there is an observable relationship between these two variables in all of the Models 1A, 1B, and 1C. The relationship is significant at the 0,01 level in all of the models. As expected, the relationship is positive, meaning that an increase in the NASDAQ index three months prior to the IPO would affect the increase in initial return levels of the given IPO. This result is different than that which was found with Open IPOs, where no significant relationship was determined between the market change three months prior to the Open IPO and initial returns with any of the three (A, B, C) data sets. Kaneko and Pettway (2003) found similar results with Japanese book built IPOs, which had a significant and positive relationship between the three month percentage market change and initial returns. Kaneko's and Pettway's research also found that this was the most important independent variable affecting the initial returns of Japanese book built IPOs. This is in line with my research, in which the only significant variable was found to be the three month percentage market change.

In comparing the results from Table 6 Models 1A, 1B, and 1C with the results of Table 7 Models 1A, 1B, and 1C, there is an indication that the book building mechanism can not adjust for the current return expectations in the market, whereas the Open IPO mechanism is able to accommodate for market expectations under

different market conditions. Any given book built NASDAQ IPO is thus expected to have a higher initial return, permitted that the market value has been increasing for the past three months prior to the IPO. In the case of Open IPOs, there is no observable relationship between the percentage market change three months before a given Open IPO and initial return.

Contrary to the previous findings with Open IPOs, Model 2 through Model 5 in Table 8 are insignificant. The analysis of the Open IPOs demonstrate market volatility one month prior to an IPO and company age as bearing a significant relationship to initial returns in Table 7.

The results in Model 6A (all data) and 6C (data that has been controlled for outliers), which examines the relationship between initial return and all the independent variables, indicate similar results as found with Model 1 in Table 8. There is a positive and significant relationship between initial returns and the percentage market change three months prior to an IPO. Model 6B is significant at the 0,1048 level. In Models 6A and 6C the independent variables including one month volatility, percentage insider sales, age of the company, and issue size are insignificant as can be seen from their respected p-values.

In summary of Section 6.2 the only variable that has a significant effect on initial returns is that of the market change three months prior to the IPO. This is different from the results that were gained from the analysis of Open IPOs. However as noted above, this is in line with the findings of Kaneko's and Pettway's (2003) research of Japanese IPOs. Kaneko and Pettway also found a significant relationship between company age and volatility, both of which had an inverse relationship with the initial return levels.

When comparing the results from the book built regressions to the results of the Open IPO regressions, none of the models produced similar results. There is an indication that the book built mechanism is unable to accommodate for the current market climate as well as the Open IPO mechanism. This can be inferred from the significant and positive relationship between initial return levels and three month percentage market change in the book built IPOs of Table 8.

Table 9. Relationship between initial returns and the six independent variables of all IPOs.

Model Number		Intercept Coefficient	Intercept P-Value	Sig. -F	F-Value	Adjusted R^2	n	% Market		1 month volatility		% Insider sales		LOG of age		Log of issue size		Dummy variable	
								Coeff-icient	P-Value	Coeff-icient	P-Value	Coeff-icient	P-Value	Coeff-icient	P-Value	Coeff-icient	P-Value	Coeff-icient	P-Value
1	**A**	0,1335	0,0000	**0,0003**	13,5506	0,0666	177	0,5765	0,0003										
1	**B**	0,0798	0,0000	**0,0510**	3,8907	0,0243	117	0,2947	0,0510										
1	**C**	0,1066	0,0000	**0,0017**	10,1700	0,0530	165	0,3491	0,0017										
2	**A**	0,1500	0,0000	**0,4368**	0,6073	-0,0022	177			-0,0005	0,4368								
2	**B**	0,0748	0,0000	**0,3561**	0,8584	-0,0012	117			41,1550	0,3561								
2	**C**	0,1129	0,0000	**0,2871**	1,1406	0,0009	165			-0,0004	0,2871								
3	**A**	0,1543	0,0000	**0,5331**	0,3901	-0,0035	177					-0,2417	0,5331						
3	**B**	0,0783	0,0000	**0,4226**	0,6478	-0,0030	117					0,1782	0,4226						
3	**C**	0,1142	0,0000	**0,6711**	0,1810	-0,0050	165					-0,1010	0,6711						
4	**A**	0,1859	0,0002	**0,4028**	0,7034	-0,0017	177							-0,0451	0,4028				
4	**B**	0,0340	0,3052	**0,0957**	2,8221	0,0155	117							0,0595	0,0957				
4	**C**	0,1447	0,0000	**0,2415**	1,3821	0,0023	165							-0,0396	0,2415				
5	**A**	-0,0366	0,7345	**0,0813**	3,0740	0,0116	177									0,1006	0,0813		
5	**B**	0,0129	0,8617	**0,3297**	0,9583	-0,0004	117									0,0388	0,3297		
5	**C**	0,0231	0,7287	**0,1762**	1,8457	0,0051	165									0,0483	0,1762		
6	**A**	0,1768	0,0090	**0,6590**	0,1954	-0,0046	177											-0,0312	0,6590
6	**B**	0,0636	0,1287	**0,6023**	0,2731	-0,0063	117											0,0231	0,6023
6	**C**	0,0018	0,9660	**0,0069**	7,4936	0,0381	165											0,1218	0,0069
7	**A**	0,0295	0,8076	**0,0030**	3,4615	0,0774	177	0,5873	0,0002	-0,0007	0,2231	-0,0500	0,5034	-0,2527	0,3374	0,1212	0,0354	-0,0790	0,2554
7	**B**	-0,0790	0,3421	**0,0472**	2,2115	0,0590	117	0,4888	0,0052	113,373	0,0306	0,0447	0,4973	0,1481	0,2097	0,0315	0,4273	0,0351	0,4297
7	**C**	-0,0407	0,5833	**0,0009**	3,9983	0,0989	165	0,3657	0,0008	-0,0006	0,1046	-0,0417	0,6509	-0,1035	0,1982	0,0481	0,1724	0,1079	0,0150

A	All data	**MODEL 1** IRj = aj + bj% market change	IRj = Initial return [(closing price-offer price)/offer price] of IPOj
		MODEL 2 IRj = aj + bj 1 month volatility	%Market changej = 3 month percent change in daily NASDAQ Composite index
B	Data as of 1.1.2001	**MODEL 3** IRj = aj + bj % insider sales	Market volatilityj = Variance of daily NASDAQ return 1 mth. prior to IPO of companyj
		MODEL 4 IRj = aj + bj LOG of age	% Insider salesj = % of all the companies shares that insiders are selling in their issue
C	Data that has been controlled for outliers	**MODLE 5** IRj = aj + bj LOG of issue size	LOG of agej = The LOG of the age (in years) of company j on the IPO date
		MODEL 6 IRj = aj + bj dummy variable	LOG of issue size = LOG of the issue size ($ million)
		MODEL 7 IRj = all independent variables	Dummy variable = indicator dummy variable 1 for book built IPOs, 0 for Open IPOs

6.3 Test for Significant Differences in Initial Return Levels

The descriptive statistics in Section 5.3 shed some light on the differences in initial returns and spreads. The initial return levels for the book built and Open IPOs in the three different data sets are; A 14,56% and 17,68%, B 8,67% and 6,36%, and C 12,36% and 0,18% respectively. The tests completed in Section 5.3 however did not control for firm and issue characteristics. On the other hand, the regressions undertaken in Table 9, take the firm and issue characteristics into account, thereby controlling for them, while adding a dummy variable for book built IPOs. This method provides a more robust test for underpricing in comparison to simple descriptive statistics.

In Sections 6.1 and 6.2 above, the two different means for going public were analyzed. In this section, a comparison will hence be made between the Open IPOs and book built IPOs. Table 9 above depicts all independent variables that have been previously used, while introducing a dummy variable indicating the issue type used. A dummy variable 1 has been allotted to the book built IPOs. The regressions analysis is conducted using the same three data sets which are explained in Section 6.1.

Model 1 is concerned with the relationship between market return and percentage market change three months before the issue. Model 1A and 1C are significant within the 99% confidence level. Even model 1B is just outside the 0,05 level being significant at the 0,051 level. As expected, from the results found in Section 6.2, the relationship is positive. This relationship conveys that the more the NASDAQ index has risen over the past three months, the higher the initial return is expected to be.

Models 2 through Model 5 however do not indicate a significant relationship within the 0,05 level between the independent variables (Model 2 one month volatility, Model 3 percentage insider sales, Model 4 LOG of age, Model 5 LOG of issue size) and initial returns. This result is similar to those observed in Section 6.2, in which book built IPOs were analyzed.

Model 6 studies the relationship between first day returns and the type of method used for the IPO. Models 6A and 6B indicate no observable relationship between the first

day returns and the method used for going public. However, Model 6C has a significant and positive relationship between first day returns and the method used for the IPO. Model 6C is significant at the 0,0069 level. The results of Model 6C indicate that in the controlled data population, book built IPOs have an initial return that is 12,18% higher than those of Open IPOs as, witnessed from the dummy variable coefficient.

Model 7 examines the relationship between all of the variables and initial returns. Models 7A, 7B, and 7C are significant within the 0,05 confidence level. In analyzing the results individually, Model 7A seems to be most affected by percentage market change three months prior to the IPO, in which the p-value for this variable is 0,0002. This relationship is positive. The only other variable that is significant in this model is issue size, which has a positive and quite significant relationship, with a p-value of 0,0354. In this model, the method used to go public has no observable effect on initial returns. Model 7B is significant at the 0,0472 level. There is an observable relationship between percentage market change three months prior to the IPO which has a positive relationship with a p-value of 0,0052. Unlike with model 7A, there is a positive and significant relationship between the volatility of daily returns of NASDAQ index and initial returns, which has a p-value of 0,0306. Model 7B however does not indicate a relationship between issue size and initial returns, as was also found in model 7A. Model 7C is significant at the 0,0009 level. In model 7C, the most significant variables affecting first day returns are three month market change and the method used to go public. There is a positive relationship between the market change three months before the IPO and initial return in which the p-value is 0,0008. There is also a positive and significant relationship between the method used to go public and initial returns. In view of the findings above in data set C, having controlled for all the other affecting variables, initial return levels for book built IPOs are 10,79% higher compared to Open IPOs, as demonstrated with the dummy variable coefficient 0,1079. The p-value is 0,0150 for the dummy variable in Model 7C.

In summary of Table 9, two variables were found to have a consistent effect on the initial return levels, namely the percentage market change three months prior to the IPO as was observed in Models 1A, 1B, 1C, 7A, 7B, 7C, and the method used to go public as observed in Models 6C and 7C. In considering all variables and the entire

data population in Model 7A, it was found that a positive and significant relationship exists between issue size and first day returns. As noted in Section 6.1, this result is unexpected. The regression of data as of January 2001 had a significant and positive relationship between the variance of daily index returns one month prior to the IPO and initial returns. The controlled data set indicates that there is a significant relationship between the method used for going public and initial returns. Controlling for all the other variables in the controlled data set in Model 7C, it was found that book built IPOs have initial returns that are 10,79% higher then Open IPOs.

Table 10. The relationship between the total cost of going public (initial return + gross spread) and the six independent variables of all IPOs.

Model	Intercept Coefficient	Intercept P-Value	**Sig. -F**	F-Value	Adjusted R^2	n	**% Market Change** Coeff-icient	P-Value	**1 month volatility** Coeff-icient	P-Value	**% Insider sales** Coeff-icient	P-Value	**LOG of age** Coeff-icient	P-Value	**Log of issue size** Coeff-icient	P-Value	**Dummy variable** Coeff-icient	P-Value
1A	0,1117	0,3600	**0,0051**	3,2179	0,0703	177	0,5830	0,0003	-0,0007	0,2329	-0,0538	0,3048	-0,2472	0,5155	0,1067	0,0656	-0,0607	0,3850
1B	0,0025	0,9763	**0,0572**	2,1148	0,0545	117	0,4936	0,0054	113,026	0,0337	0,0418	0,2480	0,1510	0,4955	0,0172	0,6690	0,0526	0,2452
1C	0,0411	0,5820	**0,0006**	4,1879	0,1044	165	0,3587	0,0011	-0,0006	0,1140	-0,0456	0,1623	-0,0965	0,6750	0,0329	0,3534	0,1278	0,0043

A	All data
B	Data as of 1.1.2001
C	Data that has been controlled for outliers

MODEL 1
TCj = all the independent variables

TCj = Initial returns [(closing price-offer price)/offer price] + gross spread of IPOj
%Market changej = 3 month percent change in daily NASDAQ Composite index
Market volatilityj = Variance of daily NASDAQ return 1 mth. prior to IPO of companyj
% Insider salesj = % of all the companies shares that insiders are selling in their issue
LOG of agej = The LOG of the age (in years) of company j on the IPO date
LOG of issue size = LOG of the issue size ($ million)
Dummy variable = indicator dummy variable 1 for book built IPOs, 0 for Open IPOs

6.4 Tests for Significant Differences in the Total Cost of Going Public

Table 10 presents the regression results for the relationship of the total cost of going public and the six independent variables. The total cost is calculated from the first day returns and gross spreads of any given IPO. The independent variables have been explained in Section 6.1 and Section 6.3 above. The regression analysis has been conducted using the three data sets as referred to in Section 6.1.

Model 1A and 1C both indicate a significant relationship between the total cost of going public and the five independent variables. Both Models 1A and 1C are significant within the 0,01 level. Model 1A is significant at the 0,0051 level and Model 1C is significant at the 0,0006 level. Model 1B falls just outside the 0,05 confidence level with a significance value of 0,0572.

In considering the results of the three models in Table 10, out of all the independent variables in model 1A, only the three month percentage market change has a significant observable effect on the total cost of going public. The p-value for the percentage market change is 0,0003 with a positive coefficient. This suggests that the more the market value has increased during the three previous months, the higher the first day returns are expected to be for any given IPO. This relationship is mainly due to the difference in first day returns as observed in Table 8 Models 1A and 7A. The spreads are assumed to have no correlation between the market and issue related variables as can be inferred in Section 5.3, Graph 1 which illustrates that nearly all book built IPOs have a spread of exactly 7%. From the entire data set, none of the other variables showed a significant relationship with the total cost of going public. Issue size has a p-value of 0,0656, meaning that it is just outside the 0,05 confidence level. The coefficient is positive for this variable. This would imply that there is some relation between issue size and the total cost of going public, this relationship was also observed in Table 9 Model 7A.

The regression results for the data set as of January 1st 2001, Model 1B in Table 10, are very similar to those found in Model 1A in Table 10. There is a significant and positive relationship between the three month percentage market change and the total

cost of going public. However, one month volatility has a positive and significant relationship between in terms of the total cost of going public. The p-value for one-month volatility is 0,0337. This means that the higher the variance one month prior to the IPO, the higher the expected total cost of going public. Most of this relationship can be attributed to the relationship between one month volatility and initial returns. In Table 10 neither of the Models 1A nor 1B demonstrate any relationship between the method used for going public and the total cost of the issue. As has been pointed out in Chapter 5 there are a number of drawbacks to data sets A and B. Due to these reasons the results can be deemed somewhat inconclusive.

Like models 1A and 1B, Model 1C has an observable and significant relationship between three month percentage market change and the total cost of going public. Unlike in Models 1A and 1B in Table 10, the controlled data set indicates that there is a positive and significant relationship between the total cost of going public and the method used for the IPO. The p-value for the dummy variable indicating the method used to go public is 0,0042, meaning that it is within the 0,01 confidence level. The coefficient for the dummy variable is 0,1278, signifying that the total cost of going public is 12,78% higher for book built IPOs than for Open IPOs, as calculated from the total value of any given IPO. A similar relationship was found in Models 6C and 7C in Table 8, in which the initial return levels for book built IPOs were found to be 12,18% and 10,79% respectively higher with book built IPOs in comparison to Open IPOs.

In summary of Section 6.4, the results did not prove a significant difference in the total cost of going public between book built IPOs and Open IPOs in the first two data sets A and B. In Model 1A and 1B the most significant relationship in the total cost of going public, is the three month percentage index change prior to the IPO, which has a positive relationship. This relationship stems from the significant and positive relationship between first day returns and three month percentage index change as observed in Table 8 Models 1A, 1B, 7A, and 7B. It is assumed that there is no relationship between the spreads and percentage index change since most of the spreads are exactly at 7% as illustrated in Graph 1 (p. 39). Model 1C in Table 10 indicates that in addition to the three month percentage index change, there is a significant and positive relationship between the method used for going public. The

dummy variable coefficient indicates that the total cost for a book built IPO is 12,78% more of the total value of the issue in comparison to the total cost of going public with an Open IPO. This suggests that companies that have chosen Open IPOs have lost 12,78% less of the total value of the issue in comparison companies that have chosen the book building mechanism.

7 Conclusions

As presented in Chapter 1, the goal of this thesis was to question whether there are more benefits from going public through an Open IPO process as compared to going public through a traditional book building process. In view of the findings and analysis in Chapter 6, and the conceptual approach adopted, there are indications that the total cost of going public is lower with Open IPOs.

Nevertheless, the real world of initial public offerings is not sterile and controlled. Consequently, the study of public offerings poses difficulties when it comes to being an experimental science as the pricing of IPOS involves the interaction of numerous forces. The complexity of IPOs signifies that the researcher is presented with variables in large bundles that are almost inextricably intertwined. Studies such as this one, should therefore be understood as involving a trade-off between complexity and generalization.

In view of the issues raised in this study, the rareness of mainstream scholars in the field of finance to incorporate online IPO considerations in their research seems outdated.

Previous studies that have compared different ways of going public have mainly concentrated on analyzing differences between the traditional IPO auction method and book building method, none of which examined the potential effects of new communication technologies to the IPO process (Kenji and Smith 2004, Kaneko and Pettway 2003, Biasis and Faugeron-Crouzet 2002). Shermann and Jagannathan (Sherman and Jagannathan 2005, 42-43) briefly touch upon the subject in their study, which examines the initial returns of Open IPOs. Sherman and Jagannathan find that the initial mean return is very low "*only 2,0%*", in addition to stating that Open IPO mechanism has been "*extremely accurate at pricing IPOs*". At the time of their study, only 14 Open IPO type issues had been made. When comparing their results to the descriptive statistics in this study, particularly in Table 5 and Section 5.3, similar conclusions can be drawn, as the median return for all Open IPOs has decreased to 0,30% with a data population of 18 Open IPOs, whereas the median return for book built IPOs is 8,33%.

The method of analysis in this thesis was largely drawn from Kaneko and Pettay (2003), who studied the differences between Japanese IPO auctions and book built IPOs. Comparing the results of this study with those of Kaneko and Pettway, indications of similar results are apparent when comparing their results with Models 7C and 1C (data that has been controlled for outliers) in Tables 9 and 10 respectively. In my research the whole data set demonstrates no conclusive results regarding the total cost of going public and method used. Kaneko and Pettway found that book built issues had about 23,9% higher initial returns as compared to auctioned IPOs in Japan. Model 7C in Table 9 indicates that book built NASDAQ IPOs have around 10,79% higher initial returns than Open IPO auctions.

The findings in this thesis demonstrate that there are indeed differences in the first day returns and total cost of going public between book built IPOs and Open IPO auctions, however due to data constraints these results can be described as indicative, and not conclusive. Based on the descriptive statistics and empirical analysis in this study, strong indications nonetheless convey that the Open IPO mechanism can price auctions better, from the point of view of the issuer, in comparison to the book building mechanism. This conclusion can be drawn from lower mean and average initial returns as well as analysis on initial returns in a more robust setting, in which market and company specific variables have been controlled for. Open IPOs have roughly 10,79% lower initial returns. The total cost of going public through an Open IPO is around 12,78% lower, as calculated by the total value of a given IPO, in comparison to book built IPOs. The empirical results also indicated that the book building mechanism is unable to price any given offering according to the current market conditions since initial returns are expected to be higher in “hot” markets for book built IPOs, whereas no such relationship is observed with the Open IPO mechanism priced IPOs.

This study has been conducted using a very small data sample in regards to Open IPOs. In addition to the small data population the data includes a large variance adding more distortion to the already small data population. A reason for the high variance can be attributed to the technology bubble of 1999-2000. Therefore, the data

was divided into three different groups as described in Chapter 5 to control for outliers.

The cost of going public with various methods require a great deal more attention in the future. The use of new communication technologies in investment banking has unfortunately not been studied extensively to date. The effects of the use of new communication technologies in investment banking should be continuously analyzed. In light of the concluding findings, further research should be conducted to quantify the actual benefits to the issuer of variables such as, underwriter prestige, analyst coverage, and signaling. Through quantified results a more robust conclusion could be drawn from comparing different methods of going public.

Naturally, this study can be improved upon when more Open IPOs have been conducted providing a healthy data sample for the research. Hence, conducting this same study with a larger Open IPO population could provide a better understanding of the relationships involved, consequently leading to more significant and stronger results.

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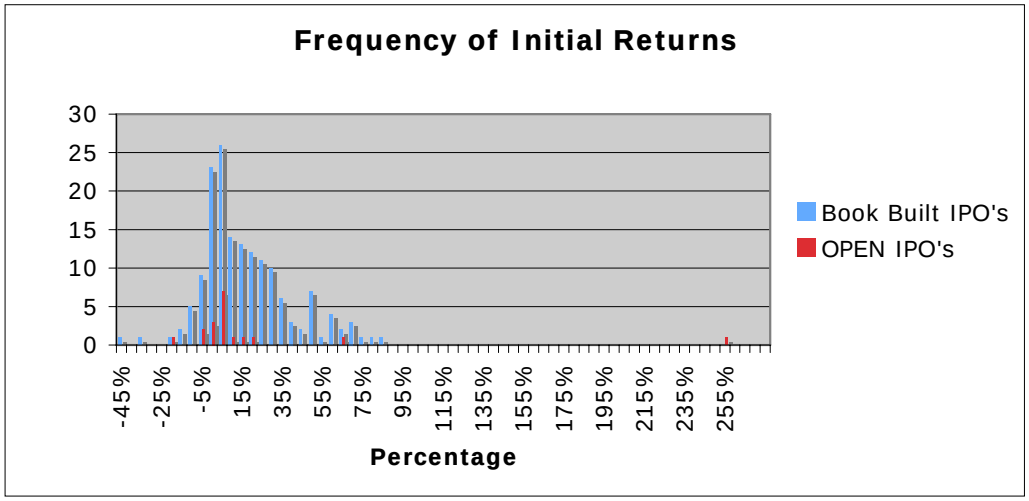
Appendix I

Table 11.
Table 11 presents the frequency of the initial returns.



As can be read from table 11 the frequency of initial returns is heavily concentrated between 0% and 10%. In the descriptive statistics section (Section 5.3) there is a presentation of the data without outliers. The outlier limits for initial returns were calculated using all the data, including the book built and Open IPO data. To calculate outliers the inter quartile ranges (IQRs) were first calculated using Excel's "QUARTILE" function. Here the first second and third quartiles were found to be (Q1) 0,00%, (Q2) 7,69%, and (Q3) 24,77%. To find the minimum and maximum limits for outliers a general rule states that anything that is more than 1,5 IQRs above and below Q1 and Q3 is an outlier. One and a half times the IQR is equal to 37,16% which is calculated by subtracting Q1 from Q3 and multiplying this by one and a half ([24,77%-0,00]*1,5=37,16%). Therefore the limits are set at -37,16% (0-24,77*1,5=-37,16%) and 61,93% (24,77+37,16=61,93%). As a result all the IPOs where the initial return did not fall in between -36,16% and 61,93% were omitted from the controlled data set in section 5.3 Table 5.