Book Building versus Auction Selling Methods: A Study of U.S. IPOs

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Abstract

This study documents differences between two widely-known IPO selling methods: auction method and book-building method for a sample of U.S. IPOs. We employ a matched firm technique to compare the two IPO selling methods and empirically test hypotheses relating to advantages and disadvantages of the two selling methods. Our sample comprises all auction IPOs in the U.S. between January 1999 and December 2004. Our results indicate that in comparison to matched book-building IPOs, auction IPOs are less underpriced and thus leave less money on the table for the issuers, and have lower underwriter spreads. On the other hand, we find support for the free-rider problem, i.e. the placing of excessive bids by investors in IPO auctions in hopes of securing underpriced shares, and a lack of aftermarket price support and analyst coverage for auction IPOs. Moreover, bookbuilding IPOs tend to outperform auction IPOs over the long term, exhibit lower aftermarket volatility, and insiders of auction IPOs lock up both a higher fraction of their shares and for a longer period of time.

JEL Classification: G12

Keywords: Initial Public Offerings; IPO Auctions

1. Introduction

Our study is inspired by two recent events: (1) the successful and highly publicized IPO of Google which was only the eleventh firm in recent U.S. history to choose to sell its shares through an auction rather than through a traditional bookbuilding arrangement, and (2) the recent surge in IPO-related securities class action filings, alleging misconduct on behalf of the underwriters in the selling of IPO shares under these bookbuilding arrangements. In the book building method, the underwriter selects investors to whom IPO shares will be allocated at the offer price; the underwriter thus controls investor selection, and share allocation. In the auction method, however any investor can bid the price and quantity of shares sought in the IPO. After all bids have been collected the underwriter (in conjunction with the issuer) can determine the offer price at which the quantity of shares offered will equal the quantity of shares demanded by investors.

In recent years, almost all of the leading Wall Street investment banks have been accused of unfair IPO allocation schemes in connection with more than 300 IPOs. In these lawsuits, plaintiffs contend that the underwriters engaged in illegal tactics by soliciting and receiving kickbacks in exchange for allocations of portions of a company's shares sold in the IPO, required tie-in purchases creating an artificial demand for the stock, and artificially inflated the price of the stock through "laddering" (requiring purchases by IPO share recipients of additional stock in the aftermarket at escalating prices). The proliferation of these laddering schemes has led to calls by government agencies and regulatory bodies, including the SEC and NASD, to seek modifications or alternatives to the book building method to sell IPO shares to the public.

While IPO auctions have been gradually disappearing around the world and have been replaced by the bookbuilding method in many countries, IPO auctions first emerged in the U.S. in 1999. Although in recent years only a handful of U.S. firms have decided to use auctions as their

preferred choice of going public, the most celebrated IPO auction has been that of Google in 2004. Given Google's success it is likely that auctions may gain additional market share and may at some point again become a viable alternative to the book building method in the U.S.

There is a substantial extant literature that has empirically examined the benefits and disadvantages of IPO auctions vis-à-vis bookbuilding IPOs. More recently several authors have examined theoretically the choice of IPO selling method – fixed price offer, bookbuilding, and auctions. These three methods have been frequently used internationally. Fixed price offers and bookbuilding methods are the two non-auction IPO selling methods. The recent emergence of IPO auctions in the U.S. provides a unique setting to evaluate the predicted impacts of models of IPO selling method design. Specifically, our study addresses the following questions:

- Was the choice of auctions beneficial, i.e. did these firms raise more money? Did they leave less money on the table, i.e. were they less underpriced? If so, were there any other costs associated with the auction? What was the underwriter spread? Were there any reputational effects. i.e. did the auction IPO firms receive poorer analyst coverage?
- How did the auction IPO firms perform in the long-run? Does the stylized long-term underperformance that has been documented for bookbuilding IPOs also apply to auction IPOs?
- Do auction IPOs succeed in retaining longer-term investors? Do auction shares have a lower turnover and less return volatility in the IPO aftermarket? Do auction IPOs have more moral hazard problems?

Despite our small sample size our results are very consistent and provide interesting insights into the U.S. IPO market and into the differences between the two selling methods. We employ a matched firm technique and a series of univariate tests to investigate the differences between auction and bookbuilding IPOs. In addition, our small sample size allows for a firm-by-firm discussion of

special circumstances that surrounded its IPO and special events that occurred in the IPO aftermarket. Our firm-specific discussions reveal several important facts that are usually not addressed in large-sample studies.

Our results indicate that compared to bookbuilding IPOs, auction IPOs exhibit: lower underwriter spreads, smaller underpricing, smaller IPO proceeds, and higher trading turnover. We also find weak evidence that bookbuilding IPOs outperform auction IPOs over an eighteen-month post-IPO period, and that bookbuilding IPOs also exhibit lower return volatility. We also find that bookbuilding IPOs exhibit greater and more positive analyst coverage. Additionally, auction IPOs exhibit a longer lockup period, and a higher percentage of insider shares under lockup than bookbuilding IPOs.

The remainder of this paper is organized as follows. In the next section, we discuss the related literature. In Section 3, we describe the data collection process, discuss our variable selection, and provide descriptive statistics. In Section 4, we present our methodology and discuss our empirical results, and Section 5 provides concluding remarks.

2. Literature review

2.1. Auctions are less popular around the world

IPO auctions have been used repeatedly in many different countries and most if not all countries have abandoned them. Degeorge, Derrien, and Womack (2004) provide evidence that in France where in the 1990s the IPO market was roughly equally split between auction and bookbuilding IPOs, auctions are now virtually extinct. In Japan, from April 1989 through September 1997, IPO shares were sold via an auction method; in September 1997 the bookbuilding method was made widely-available to Japanese startups. When bookbuilding was made available to issuers, IPO auctions instantaneously disappeared (see Kutsuna and Smith (2001)). Sherman (2005) reports that in

virtually all countries where bookbuilding has been introduced recently, pre-existing auction mechanisms have disappeared or have lost significant market share. The rarity of IPO auctions is not due to unfamiliarity, however. Auctions were used in Italy, Portugal, Switzerland and the U.K. in the 1980s and in Singapore in the 1990s, but were voluntarily abandoned in all of these countries even before bookbuilding was introduced. Argentina abandoned auctions for privatization IPOs after a bad experience in 1992. After many years of experimentation, issuers in Taiwan have largely given up on auctions to return to the public offer method.

Israel is the only country in which auctions are currently the primary IPO method. Bookbuilding is not allowed in Israel, so we cannot tell what method issuers would choose if they were given a choice. Hybrid bookbuilding/auctions have been used in Chile (because of regulations requiring an auction tranche). It is possible that IPO auctions will be used in Peru in the future, although bookbuilding has been gaining popularity there. Because IPO markets in Peru, Chile, and throughout South America have had little activity for the past few years, it is hard to predict whether auctions will reemerge in that region once the markets recover.

Out of more than 40 countries that allow for both types of selling methods there is no country in which auctions are dominant. A recent exception to the disappearance of IPO auctions is the use of uniform price auctions to sell IPO shares through the Internet. W.R. Hambrecht distributed its eleventh U.S. IPO through an online auction in August 2004, while Ord Minnett's eCapital distributed shares in two Australian IPOs through a similar method. Both underwriters used uniform price, sealed bid dirty auctions,[1] although eCapital called its process a "book build." In South Korea,

[1] W.R. Hambrecht allows dirty auctions at the discretion of the issuer, but only one issuer has exercised this option. A Dutch auction is an open, descending bid auction, such as the method that is often used to sell flowers and produce in the Netherlands. First a high price is called out, and then progressively lower prices are called until someone agrees to purchase at least some of the units. These units are sold at that price and then the auction is restarted often at many different prices. Therefore, the closest sealed-bid equivalent to a Dutch auction would be a discriminatory, not a uniform price, auction.

several direct public offerings have used internet auctions, although this method cannot legally be used if the company wants to list on the KSE or KOSDAQ.

2.2. Why is bookbuilding so widely used?

Sherman (2005) argues that bookbuilding reduces risk for both issuers and investors. Bookbuilding gives underwriters control over the allocation of shares. The ability to allocate shares makes the advance gathering of indications of interest possible. The underwriter's discretion in allocating shares can be used to favor regular investors, allowing the underwriter to average returns over time. Sometimes, underwriters require investors to participate in an unwanted offering to remain part of the group that will participate in future offerings. The threat of cutting an investor off from future offerings can be used to reduce the chance that the current issue will fail. Since underpricing must be sufficient to compensate investors for their costs of evaluating an IPO firm, bookbuilding can be used either to minimize underpricing, or to induce investors to more carefully evaluate the issue, resulting in a more accurate issue price. Furthermore, IPO proceeds are expected to be higher in bookbuilding because there may be a greater likelihood of undersubscription in an auction. With bookbuilding, the underwriter co-ordinates the number of investors that will participate, guaranteeing that a sufficient number of investors are involved.

Chammaneur and Liu (2003) develop a theoretical model of IPO selling method choice between fixed price offers and auctions. In a two period model the firm seeks to maximize expected proceeds from sale of a fraction of the equity at the beginning of the first period and the remaining equity in a secondary market offering in the second period. Insiders have private information and investors must incur costs to evaluate true quality of IPO firm. Their model predicts that low quality firms will use fixed price offers, and high quality firms (associated with low information costs) will

use the auction method. The auction method results in a lower mean and variance of underpricing than that for fixed price offers.

Degeorge, Derrien, and Womack (2004) study French IPO data and observe that auction IPOs exhibit lower underpricing than book building IPOs. They hypothesize that the higher costs of bookbuilding IPOs are a quid pro quo to favorable post-IPO analyst coverage and find that bookbuilding issuers are more likely to be followed and positively recommended by the lead underwriters and are also more likely to receive "booster shots" post issuance if the shares have fallen. Even non-underwriters and analysts appear to promote bookbuilding issues more, but only when their underwriters stood to gain from acquiring shares in future issues from the recommended firm's lead underwriter. Bookbuilding issuers also appear to garner more press in general (but only after they have chosen bookbuilding, not before). They do not find any evidence that companies choosing bookbuilding benefit from the additional promotion they enjoy. Bookbuilding offerings do not exhibit better long-term performance, are priced at lower multiples, and have lower stock price performance in the year following favorable recommendations.[2]

2.3. Advantages of auctions

Derrien and Womack (2003) use French data and report that both the mean and the variance of underpricing are lower in IPO auctions compared to those sold through bookbuilding. Jenkinson and Mayer (1988) show that, in British privatizations, the extent of underpricing was much lower in the auction sample than in the non-auction sample. Jenkinson (1990) and Kaneko and Pettway (1996, 2003) compare underpricing for Japanese IPO auctions and non-auctions and find that underpricing

[2] Dunbar (2000) shows that investment banks lose future business if they underprice too much, Beatty and Welch (1996) and Krigman, Shaw, and Womack (2001) show that in the 1990s, the largest and most reputable underwriters have the highest underpricing. In fact, Krigman, Shaw, and Womack find that firms switching underwriters have far lower underpricing than those that do not switch when conducting their first seasoned deal. See Michaely and Womack (1999) for other aspects of this agency cost. Cliff and Denis (2004) provide evidence consistent with the hypothesis that issuers use IPO underpricing to "purchase" analyst coverage.

in IPO auctions is much lower. Lin and Sheu (1997), Liaw, Liu, and Wei (2001), and Ritter (2003) study IPOs in Taiwan; Aggarwal, Leal and Hernandez (1993), and Celis and Maturana (1998) consider IPOs in Chile; MacDonald and Jacquillat (1974), Jacquillat (1986), and Degeorge, Derrien and Womack (2004) examine IPOs in France; and Kandel, Sarig, and Wohl (1999) evaluate IPOs in Israel. All of these studies document that the extent of IPO underpricing in IPO auctions is much lower than under non-auction mechanisms. Auctions are designed to put more shares into the hands of most individual investors and eliminate the near-certain first-day gains for "hot" IPOs that became a central feature of recent investment scandals. The auction approach threatens to minimize the key role that investment bankers have played in deciding who gets highly coveted IPO shares. It leaves issuers and underwriters with little or no control because the allocation of shares is based on current bids, without regard to any past relationship between certain bidders and the auctioneer.

2.4. Why have auctions been so unpopular for new issues?

Sherman (2005) suggests two major problems with IPO auctions. The underwriter cannot control entry to the auction, therefore guaranteeing the "right" number of participants, and cannot give an appropriate number of investors an incentive to carefully evaluate the offering.

2.4.1. Undersubscription

Many IPO auction failures have been blamed on either too many or too few bidders entering the auction. Jenkinson and Mayer (1988) report that half (3 out of 6) U.K. privatization tenders between 1982 and 1987 were undersubscribed, while one was 500% oversubscribed. In 1994, the auction tranche of Sunright, the last IPO auction is Singapore, was 82% undersubscribed (i.e. bids equaled only 18% of available shares); even though the public offer tranche a few days earlier had been oversubscribed. In August of 2000, the Chunghwa Telecom IPO auction in Taiwan was only 72% subscribed, leaving 80.8 million shares unsold.

One would think that the risk of undersubscription would more or less disappear with a large number of bidders, due to the "law of large numbers". However, the number of bids must be compared to the number of eligible bidders. For Taiwan's discriminatory IPO auctions, the average number of bidders is around 1,150 (Liaw, Liu and Wei (2001)). More than 16 million adults are eligible to bid in each auction. Hence, if the participation rate of the eligible population shifts by just seven-one thousandths of one percent in either direction, bids will either almost double or almost vanish. Moreover, a large average number of bidders will not eliminate the risk of undersubscription if there is some coordination, or "leakage" of information (Chowdhry and Sherman (1996)).

The lack of investor coordination in auctions leads to increased risk for both issuers and investors. Both sides must make decisions without knowing how many bidders will choose to participate. Ex post, there may be too few entrants and the offering may fail, or there may be too many entrants that bid away all of the potential profits, preventing investors from recovering their information costs (Levin and Smith (1994)).

2.4.2. Free-riders

Too many entrants to an auction will not be a problem if each of the bidders has carefully evaluated the offering and chosen a reasonable bid price. Since auctions such as the W.R. Hambrecht "Open IPO" are open to all, including free-riders with little understanding of the value of the offering, too many entrants can greatly distort the offering price, leading to overpricing and the subsequent first week crash that has been observed in IPO auctions. Under bookbuilding, underwriters devote substantial time and effort to withholding shares from those who will "flip" or "stag" them. Although the underwriter wants liquidity in the aftermarket, flippers are a problem, not primarily because they are willing to sell shares quickly, but because they are trying to take advantage of the high average initial returns of IPOs without giving the underwriter anything in

exchange. In other words, they are free-riders, and much of the investment bank's effort is devoted to weeding them out of the investor pool.

Although underwriters are free to do road shows and to ask for indications of interest even under the auction mechanism, without the ability to make allocations dependent on the information reported, there is no way for underwriters to give investors the incentive to accurately report their information. In addition, the underwriter has virtually no power to block free-riders. If potential investors expect IPO shares to be underpriced, they can avoid the cost of evaluating an issue by simply placing an extremely high bid. In a uniform price auction, this guarantees that they will receive shares at the "market clearing" price from the auction. Nevertheless, if too many bidders follow this strategy, the shares will be overpriced.

One prominent example for the free-rider problem occurred in Argentina in March 1992. The "disastrous" Telecom privatization was blamed on free-riders in the "Dutch" auction system, who raised their offer bids to make sure they would get shares. Many retail investors, upset at losing money on what had seemed like a sure thing, pulled out of the stock market completely, causing a market crash, subsequent extreme volatility and the cancellation of up to 20 other planned equity issues. As a result, Argentina gave up on IPO auctions and began using bookbuilding for privatizations.

2.4.3. Overpricing

There are many examples of overpricing in uniform price IPO auctions. Jenkinson and Mayer (1988) report that, of 26 mostly uniform price tender offers in the United Kingdom from 1983-1986, the average initial return was -2.2%. Therefore, on average the price fell when trading began, in spite of the fact that U.K. tenders often "left something on the table" by pricing below the market-clearing level. In Singapore in 1994, people joked that IPOs had been struck with "tenderitis" – a tendency for

shares sold through uniform price auctions (tenders) to trade below their auction price within their first few days of trading. Lee, Lin and Liu (2003) show that in Taiwan, auctions with low institutional participation have had large negative initial returns and fewer bidders, relative to auctions with more institutional participation and positive initial returns.

In bookbuilding, the issuer and underwriter have substantial control over information acquisition, but little or no control in the auctions. This control can be used either to maximize expected proceeds from the current offering, or to induce investors to more carefully evaluate the issue, resulting in a more accurate aftermarket price. The disadvantage of auctions is not that they always lead to either too much or too little valuation (or underpricing), it is that they seldom, except by chance, lead to the optimal level (Sherman (2005)).

2.4.4. Volatile trading

IPO auctions can lead to more volatile trading. The risk is that the pricing could be determined by crowd psychology, complicating the underwriters' traditional system of stabilizing a new issue's price by bidding for shares that come up for sale in the first few days of trading. Underwriters often pledge to buy shares of an IPO if the stock begins trading down. If selling gets out of hand, it could be very costly for the underwriters. For example, Salon.com came to market in a 1999 Dutch auction. Without underwriter efforts to prop up the stock, Salon fell 50 cents a share, to $10, on the first day of trading, and eventually declined by more than 40% over the next several months.

2.5. The Proceeds Puzzle

Sherman (2005) argues that expected IPO proceeds under bookbuilding are strictly higher because auctions sell fewer shares on average and have a higher probability of undersubscription. In contrast, in the Chemmanur and Liu (2003) model, the issuer is maximizing the sum of expected

proceeds from selling a fraction of the firm in the primary (IPO) offering in the first period and proceeds from selling the remainder of the firm in the secondary market in the second period. They show that for high quality firms that will use the auction method IPO proceeds from the primary offering will be greater since the auction will ensure a higher offering price and lower underpricing. For a fixed price offer that will be used by lower quality firms, the offer price and proceeds will be lower and underpricing will be higher in the primary offering.

Summary: The substantial literature on auction and bookbuilding methods for IPO thus offers the following generalizations:

(1) Auctions are likely to exhibit less underpricing than bookbuilding methods for IPOs.

(2) Auctions are likely to exhibit more return volatility than bookbuilding methods for IPOs.

(3) Auctions are likely to exhibit smaller long-run returns than bookbuilding IPOs.

(4) Auctions are likely to be of lower quality firms relative to bookbuilding IPO firms.

In this study we examine the evidence relative to the above generalizations for U.S. firms that have elected to either use the auction method or bookbuilding method to conduct IPOs.

3. Data

3.1. Sample selection and description

We start our sampling process by constructing a comprehensive data set that includes information on all U.S. IPOs filed between January 1999 and December 2004 as listed in the Securities Data Company (SDC) New Issues database. For each IPO we collect the date of the IPO filing, company identification information, the firm's SIC code, the initial exchange on which the firm was listed, the lead underwriter, the underwriter spread, the number of shares issued, the offer price, and the initial pricing range. We access the SEC 'Edgar' database to collect information from the firms' S-1 filings and prospectuses to confirm and complete our data set.

First-day closing prices, adjusted daily returns, volume, and shares outstanding from the IPO date to December 2004 are obtained from the Center for Research in Security Prices (CRSP). We measure IPO underpricing as the percentage return from the SDC offer price to the first closing price on CRSP. We exclude ADRs, reverse LBOs, spinoffs, IPOs by financial firms, limited partnerships, real estate investment trusts (REITs), closed-end funds, and unit offerings. Finally, we exclude firms that have no closing prices within three days of the SDC issue date.

We collect information on analyst recommendations for a one-year period following each IPO from Thomson Financial's I/B/E/S-Firstcall analyst-by-analyst database. For each recommendation, we collect the date, the type of recommendation (classified by I/B/E/S as strong buy, buy, hold, underperform, and sell), and the name of the analyst who issued the recommendation. Information on trades and quotes is taken from the New York Stock Exchange Trade and Quote (TAQ) database, which also provides information on intraday price and volume data. We access press releases from Bloomberg, the Wall Street Journal, and Lexis/Nexis to identify all IPO auctions during our sample period. Each of these sources identified the same eleven U.S. IPOs as being sold via auctions.

Before we present the results of our empirical analysis, we take an initial look at the IPO auctions that have taken place in recent years and ultimately comprise our auction sample. With the exception of Google, all of the eleven firms that chose to go public via auctions[3] chose W.R. Hambrecht & Co. as a lead underwriter for their IPO.[4] Founded in 1998 by William R. Hambrecht,

[3] Note that Instinet, in its May 23, 2001, IPO, sold 17.5% of its total offering of $464 million through an auction tranch. The auction process was managed by W.R. Hambrecht and was employed solely for the purpose of determining the allocation among prospective investors of the shares to be distributed through the auction process. The majority of shares (82.5%) were sold under the traditional bookbuilding method which was managed by Credit Suisse First Boston. Because the auction tranch represents only a small portion of Instinet's total offering and because the bookbuilding process was used for the actual price discovery, we exclude Instinet's IPO from our sample.

[4] The lead underwriters for Google were Morgan Stanley and Credit Suisse First Boston. W.R. Hambrecht was only part of the underwriter syndicate.

W.R. Hambrecht & Co. has been a pioneer in IPO auctions and underwrites IPOs through the so-called Open IPO system, which it describes as "an innovative auction process for distributing stock to individuals and institutions through a more efficient and equitable process".[5]

An Open IPO auction is generally open for bids by prospective investors for 35 weeks prior to the effective date of the offering. The prospectus for an Open IPO offering will include the number of shares being sold, and a suggested price range for the shares. Once the bidding has concluded, the Open IPO auction assembles the bids and, starting from highest to lowest, finds the first bid price that will sell all of the shares in the offering; this is the market clearing price. The issuing company and underwriters then decide the price at which the company will offer the shares, taking a number of business and economic factors into account in addition to the clearing price. The company may choose to sell shares at the clearing price, or it may offer the shares at a lower offering price; in the latter case if the number of shares bid for exceeds the number of shares in the offering, the latter are allocated on a pro-rata basis.

*** Insert Table 1 about here ***

Table 1 provides an overview of our IPO auction sample. An initial look reveals no apparent time or industry trends, i.e. the number of IPOs that chose to go public via auctions over time has been relatively constant since the induction of the Open IPO process and represents firms from a variety of different industries. As in the "mainstream" IPO market, technology firms make up the majority of our sample.

We note that a large number of the auction sample firms (three out of eleven) were acquired within only a short period after their IPO. Andover.net was acquired by VA Linux on February 3, 2000, within less than two months after its December 8, 1999, IPO. Similarly Nogatech, a producer of semiconductors, was listed for only five months before being acquired by Zoran on October 24,

[5] As stated on W.R. Hambrecht's website www.Open IPO.com (accessed May 2005).

2000. Finally, Ravenswood Winery, the first firm to go public via Hambrecht's Open IPO process, was acquired approximately 27 months after its IPO by Constellation Brands. Although the timing of the latter acquisition is not unusual, the almost immediate acquisitions of Andover and Nogatech are highly uncommon.[6]

Finally, we note that the underwriting spreads, i.e. the underwriting discounts, for our sample are relatively low. While Chen and Ritter (2000) observe a clustering of spreads around the seven percent mark, most IPOs in our sample have lower spreads, particularly Google which offered an underwriter spread of only 2.8 percent. Although we will investigate this issue in more detail below, it appears that IPO auctions are also cheaper in terms of these spreads than traditional bookbuilding IPOs.

4. Methodology and results

4.1. Matching technique

We perform a series of univariate tests for various variables in our data set. We define variables as they arise. A comprehensive list of the variables used in this study, together with data sources, is provided in the appendix. To ensure that our results are not driven by variations in IPO characteristics over time or across industries, we employ a matched firm technique following the approach by Bhabra and Pettway (2003). For each firm that went public via an auction, we identify similar firms that went public under the traditional bookbuilding method. To be included in our matched sample, a bookbuilding firm must have had its IPO during the same year as the auction firm and must belong to the same industry. We use three-digit SIC codes to distinguish between

[6] Firms that know or anticipate that they will be acquired have little incentive to use underpricing for either of these reasons and may choose IPO auctions to avoid leaving too much money on the table. While Andover's case may be special as we discussed before, Nogatech fits the picture very well. The firm went public in May 2000, at the height of the hot IPO market. But while similar semiconductor firms had a first-day return of more than eighty percent during that year, Nogatech was *overpriced* by more than 21 percent.

industries. By matching firms by IPO year, we avoid comparing firms that may have gone public during the "hot" IPO market of 1999/2000 with firms that went public during the relatively cold 2001-2004 market. In addition, by matching by industry, we control for cross-sectional differences in underpricing and other IPO characteristics.

4.2. Univariate comparison of auction and bookbuiding IPO firms

We characterize auction and bookbuilding IPOs along various dimensions in Table 2. We examine the relation between choice of auction method and underwriter reputation using the Carter and Manaster (1990), and Carter, Dark and Singh (1998) reputation rankings as revised by Ritter.[7] Ritter's rankings range from 1.1 (lowest) to 9.1 (highest). Compared to W.R. Hambrecht's ranking of 7.1 we observe that comparable firms that choose to go public via bookbuilding do so through somewhat higher-ranked underwriters (median = 8.1). If underwriter ranking serves as a certification of IPO firm quality, then the results suggest that bookbuilding IPOs ought to have higher quality than auction IPOs.[8]

To investigate whether technology companies preferably choose to go public via auctions or bookbuilding, we adapt the breakdown of Loughran and Ritter (2004) and Cliff and Denis (2004) and

[7] We thank Jay Ritter for making this data available on his website (http://bear.cba.ufl.edu/ritter/rank.pdf). If there is more than one lead underwriter, we calculate the average reputation of the lead underwriters. The same data has been used in Loughran and Ritter (2004).

[8] Beatty and Ritter (1986) provide evidence that high quality underwriters are able to more accurately price an IPO and minimize uncertainty surrounding the offering. Interestingly, this expectation is not fulfilled when comparing the underpricing returns for auction and bookbuilding IPOs (presented in Table 3), i.e. despite the higher ranking of their underwriters, the bookbuilding IPOs in our sample show a significantly higher degree of underpricing and have a higher standard deviation of underpricing returns (not reported).

categorize firms as technology (tech) focused or not.[9,10] We observe that technology firms are significantly more likely to choose bookbuilding as a going-public method.

*** Insert Table 2 about here ***

To examine pre-IPO pricing decisions, we calculate the offer price revision from the midpoint of the initial filing range to the final offer price for each firm. We observe that auction firms show a high propensity for downward offer price revisions (-14.43% on average) than bookbuilding firms (2.85%). The difference is particularly significant in the median (p-value = 0.0077). This is interesting as it suggests that demand for auction firms may, on average, have been lower than was initially expected. Another reason for the downward price-revisions may be that the firms and their underwriters wait for the auction clearing prices to be determined and then decide to create some artificial underpricing. As the median underpricing in Table 3 suggests, this can only partially explain the -18.18% median offer price revision we observe here.

We also examine underwriter spreads for auction and bookbuilding IPOs. Our results suggest a significant difference in underwriter spreads between auction and bookbuilding IPOs. Consistent with Chen and Ritter (2000), we observe that for bookbuilding IPOs most underwriter spreads are clustered around seven percent. The underwriter spreads for auction IPOs tend to be significantly lower. In fact, only three of our eleven auction IPOs have underwriting spreads of seven percent. The underwriting spreads for all other IPOs are lower, with Google paying an underwriting discount of only 2.8 percent. Besides leaving less money on the table (see Table 3 below), this means that firms that choose to go public via an auction also save on underwriting fees, making auctions financially appealing for the issuer in terms of direct and indirect costs.

[9] Loughran and Ritter (2004) and Cliff and Denis (2004) categorize firms with the following SIC codes as tech firms: 2833, 2834, 2835, 2836, 3571, 3572, 3575, 3577, 3578, 3661, 3663, 3669, 3674, 3812, 3823, 3825, 3826, 3827, 3829, 3841, 3845, 4812, 4813, 4899, 7370, 7371, 7372, 7373, 7374, 7375, 7377, 7378, 7379.

[10] Note that for this comparison we relax our matching criteria and only match by year, not by industry.

Furthermore, we consider stock turnover, measured as the proportion of shares traded at least once during a given period. We hypothesize that auction IPOs display higher volatility in secondary market trading as the pricing could be determined by "crowd psychology" that impedes the underwriters' traditional system of stabilizing a new issue's price by bidding for shares that come up for sale in the first few days of trading. We use stock turnover to proxy for this volatility. Our calculations are similar to those of Lowry and Shu (2002), and Turtle and Walker (2005) in that we calculate turnover as the proportion of shares traded during the one-year period starting one month after the IPO.[11] Indeed, we observe a significantly higher turnover for auction IPOs.

4.2. A detailed look at underpricing and IPO proceeds

In Table 3, we provide a detailed analysis of underpricing returns for auction and matched bookbuilding IPOs. Interestingly, we observe that firms like Ravenswood Winery, and Peet's Coffee & Tea, which – at least for IPO investors – belong to industries that under the traditional bookbuilding method are rarely underpriced (the median underpricing percentage of the matched samples for both firms are zero), they provided investors with reasonable returns (3.62 percent and 17.25 percent). With the exception of Andover.net, whose performance could be viewed as an anomaly every other firm that went public via an auction exhibited lower underpricing than average of its matches, and in many cases was even negative.[12] As a result, the mean and median

[11] We divide NASDAQ volume by a factor of two to adjust for the NASDAQ volume definition. For more detail, please refer to the appendix.

[12] Andover.net, a developer of Linux software, experienced a first-day run-up of more than 252 percent. Surely, an issuer may choose an offering price below the clearing price to leave a "good taste in the mouth of investors" and receive some positive news coverage, but Andover's 252 percent underpricing seems vastly misaligned with the concept of maximizing an issuer's proceeds. Boehmer and Fishe (2004) address the very same question and discuss some of the exceptional circumstances surrounding Andover's IPO. In their opinion, the reason for Andover's large run-up was the fact that although the auction revealed a market-clearing price that was considerably higher than the maximum offer price the firm had indicated in its prior filing with the SEC, it did not amend its registration statement, which would have postponed its IPO until the amendment would have been approved by the SEC. VA Linux, another Linux software company, was scheduled to go public the next day, and Boehmer and Fishe argue that the fear of directly competing with VA Linux prompted Andover to go ahead with its IPO and leave more money on the table than it would have otherwise.

underpricing percentage for our sample of auction firms lies considerably below the sample average for matched bookbuilding firms, particularly if we exclude Andover from our analysis.[13]

*** Insert Table 3 about here ***

Our results are consistent with Derrien and Womack (2003) who use French IPO data and find that mean underpricing in auctions is lower than for bookbuilding IPOs, and with Jenkinson and Mayer (1988) who observe similar results for British privatizations.

Thus for our sample the sum of median underwriting spread and median underpricing is 9.62% for auction IPOs; the corresponding figure for bookbuilding IPOs is 15.57%. Do bookbuilding issuers that incur higher issuer costs also receive greater benefits relative to issuers in auction IPOs? Cliff and Denis (2004) find that underpriced issues are more likely to receive analyst coverage; Lowry and Shu (2002) argue that underpricing serves to reduce a firm's litigation risk or provide easier access to capital in secondary equity offerings. Finally, higher underpricing allows for an increased use of spinning, the practice where by investment bankers allocate underpriced IPOs to high-profile customers to garner potential future business. With the exception of litigation risk, which we briefly discuss here, we examine these factors in our subsequent analysis.

Despite the relatively lower underpricing (or indeed overpricing) of most auction IPOs, not a single issuer has been sued under Section 11 of the 1933 Securities Act to date.[14] In our matched bookbuilding sample, on the other hand, we observe a litigation rate of 7.2 percent. While our auction IPO sample is too small to make any inferences with respect to litigation risk, we conjecture that as long as an issuer chooses an offering price that falls at or below the auction clearing price it will be harder for potential plaintiffs to allege deliberate mispricing under the auction mechanism.

[13] Note that in Table 3 and later tables we calculate aggregate sample means and medians by equally-weighing the means and median of the individual matching groups.

[14] Based on information provided by Stanford Law School's Securities Class Action Clearinghouse (http://securities.stanford.edu).

Other allegations, including the misrepresentation or omission of material information, however, can be equally brought under both types of selling methods.

As discussed earlier, the extant literature is divided when it comes to the question which firms – auction or bookbuilding – should command higher offering proceeds. On one hand, Sherman (2005) argues that IPO proceeds should be higher under the bookbuilding method because there is a greater chance of undersubscription in an auction. Chemmanur and Liu (2003) argue that for high quality firms (those with lower firm evaluation costs), auctions will lead to lower underpricing and higher proceeds. For low quality firms (those with high firm evaluation costs) there will be larger underpricing and smaller IPO proceeds. Chammanur and Liu do not directly address bookbuilding IPOs in their paper.

To provide some U.S. evidence for this puzzle, Table 4 provides a detailed comparison of offering proceeds by industry. We aggregate firms by three-digit SIC codes and calculate mean and median offering proceeds for each industry.[15] Again, we distinguish between auction and matched bookbuilding IPOs and test for the significance of differences in means and medians between the two groups.

*** Insert Table 4 about here ***

With the exception of one industry (computer and data processing services) we observe that proceeds for auction IPOs are always smaller than for matched bookbuilding IPOs. Indeed, the only firm that breaks the pattern is Google. Not surprisingly, our aggregate sample statistics suggest that median proceeds are significantly lower for auction IPOs (p-value=0.0028). Mean proceeds also become significantly different if Google is excluded.

[15] Note that for redEnvelope (SIC code: 5947) and Overstock.com (SIC code: 5999) we use two-digit SIC codes due to a lack of matching firms with the same three-digit SIC code.

While Google's IPO seems to suggest otherwise, the consistently lower proceeds we observe in the remainder of our auction sample are highly consistent with Sherman's (2005) model. It remains to be seen whether undersubscription remains a problem in future offerings or whether Google's success has – at least temporarily – opened up the auction market for larger firms and has sparked investor interest in future auction IPOs.

4.3. Long term performance and return volatility

Sherman (2005) predicts that auctions open to greater numbers of potential bidders may lead to inaccurate pricing, and high after market volatility. The bookbuilding method enables the issuer to control entry to the auction and allow investors to earn a reasonable return to compensate them for their evaluation efforts. Thus the bookbuilding method should lead to higher long term returns and lower after market volatility than the auction method.

*** Insert Table 5 about here ***

Table 5 presents detailed long-term return and volatility statistics for each firm in our auction sample. The table contains unadjusted raw returns for the auction IPO firms and unadjusted returns for the matched bookbuilding IPO firms. In addition, we provide aggregate results for our auction and bookbuilding sample.[16] While the performance differences in the long-term are insignificant, we observe that within a time frame of 18 months, auction IPOs significantly underperform their matched bookbuilding peers. The underperformance is particularly obvious and significant when examining arithmetic mean returns but is less apparent when examining geometric mean (not reported here) or median returns. In line with the turnover statistics we reported in Table 2 that suggested higher aftermarket volatility for auction IPOs, we also observe a higher return standard deviation for them. While the differences are generally insignificant, together with our turnover

[16] For brevity, we do not report detailed statistics for the individual matched samples.

results they do suggest that the lack of price stabilization measures (that are common for bookbuidling IPOs) for auction IPOs increases their price risk after the IPO. These results thus are consistent with Sherman's predictions.[17]

4.4. Analyst coverage

Degeorge, Derrien, and Womack (2004) study IPOs in France (where both auction and bookbuilding sales methods in IPOs co-existed) and hypothesize that issuers are willing to pay the higher documented direct and indirect costs of bookbuilding in exchange for increased and more favorable research coverage when they choose to go public via bookbuilding rather than an auction. To examine if their argument applies to U.S. auction IPOs, we examine the number of analyst recommendations and the type of recommendations among U.S. auction IPOs and their matched bookbuilding IPOs during periods of 1 month, 1 to 3 months, 3 to 6 months, 6 to 12 months, 12 to 18 months, and 18 to 36 months after the issue. Our results in Table 6 show that Degeorge, Derrien, and Womack's arguments also apply in the U.S. IPO market. Specifically, we observe that bookbuilding IPOs are more likely to be followed (and positively recommended) by analysts compared to auction IPOs, with median (mean) differences being significant at the five percent level in 5 (4) of the time periods we examine.

*** Insert Table 6 about here ***

Although our results suggest that bookbuilding IPOs receive more analyst coverage, they could also be caused by their higher first-day underpricing (relative to auction IPOs), which in itself

[17] We note, however, that the returns in Table 5 are unadjusted returns. Since the auction IPOs have a short post-IPO history it would have been difficult to compute risk-adjusted returns. For the matched bookbuilding firms, while the mean returns are generally positive, risk adjusting these returns will result in these returns resembling the long-run underperformance exhibited by bookbuilding IPOs. However, risk-adjusted auction IPOs would still underperform matched bookbuilding IPOs.

has been associated with greater analyst coverage (see Aggarwal, Krigman, and Womack (2002) and Cliff and Denis (2004)).

4.5. Lockup length and percentage of post-IPO insiders shares locked

Brav and Gompers (2003) argue that lockup agreements exist as a commitment device to alleviate moral hazard problems. Given firm quality, a firm whose moral hazard incentives in the aftermarket are likely to be large would have to accept a longer lockup and have more insider shares locked in order to convince the public to buy shares in the offering. During the period of time in which insiders are prohibited from selling equity, information about the firm's future prospects will be known through SEC filings, analyst reports, and the media. Therefore, investors would be more willing to buy into the offering knowing that the insiders will not take advantage of them. In this section, we examine if auction IPOs have greater moral hazard problems than bookbuilding IPOs.

*** Insert Table 7 about here ***

In Table 7, we find that the lockup period length of auction IPOs (mean 164 days; median 180 days) is significantly greater than that of matched bookbuilding IPOs (mean 88 days; median 66 days). Moreover, the percentage of insider shares locked for auction IPOs (mean 73%; median 69%) is significantly higher than that of bookbuilding IPOs (mean 63%; median 61%). Our result suggest that if auction IPOs are potentially more plagued by moral hazard problems, insiders in auction IPOs appear to be willing to have longer lockups in order to sell equity to the public. If IPO auction firms are potentially subject to greater information asymmetry problems, they utilize longer lockup periods and have higher fraction of insiders' shares locked. Brav and Gompers (2003) also argue that IPOs that are backed up by higher ranking investment bankers and venture capitalists will not need longer lockups because insiders of these firms are less likely to engage in opportunistic insider sales. Their

argument is consistent with our earlier results showing that auction IPOs are underwritten by lower ranking investment banks than bookbuilding IPOs.

5. Conclusions

The recent history of IPO selling methods clearly reveals that the bookbuiliding method has become the dominant IPO selling method internationally. Concerns regarding bookbuilding relate to the significant observed underpricing (issuers leaving "too" much money on the table), and the reported abuses associated with the ability of underwriters to allocate IPO shares to selected investors. In recent years almost all of the leading Wall Street investment banks have been accused of unfair IPO allocation schemes in connection with more than 300 IPOs. For example, it was reported in the Wall Street Journal in 2002 that the SEC had asked NASD and the NYSE to "look not just at how IPOs are allocated, but also how they are priced." In the U.S. while the bookbuilding method is the dominant IPO selling method, the recent revelations of bookbuilding IPO abuses have led to calls for greater use of the auction method in IPOs.

Sherman (2005) develops a model of choice among IPO selling methods and concludes that this choice depends on information collection, associated costs of evaluation of the IPO firm, and whether bidding for IPO shares can be controlled. Her model shows that the bookbuilding method is associated with lower underpricing, greater IPO proceeds, and smaller after market volatility relative to the auction method. She also concludes that IPO selling methods cannot be judged solely on the basis of extent of underpricing.

We study all of the 11 auction IPOs in the U.S. between January 1999 and December 2004; with the exception of Google all these IPOs chose to go public through W.R. Hembrecht and company's Open IPO system. We examine the performance of these IPOs relative to that of a sample of matched bookbuilding IPOs over this same time period. Our results indicate that relative to

bookbuilding IPOs, auction IPOs exhibit lower underwriter spreads, smaller underpricing, smaller average IPO proceeds, and greater trading turnover. There is weak evidence that bookbuilding IPOs outperform auction IPOs over an 18-month period following IPO, and that bookbuilding IPOs may also exhibit lower return volatility than auction IPOs. We also find consistent with the French evidence in Degeorge, Derrien, and Womack (2004), that bookbuilding IPOs are more likely to be followed and positively recommended by analysts compared to auction IPOs. Additionally, we find that the lockup period length of auction IPOs is significantly greater than that of matched book building IPOs, and the percentage of insider shares locked up in auction IPOs is significantly higher than for bookbuilding IPOs.

From the viewpoint of persistence of selling methods, the bookbuilding method has "won" relative to the auction method (or fixed price offers). More recently the Wall Street Journal reported in November 2005 about the rationale for Morningstar Inc. to use the W.R. Hembrecht Open IPO auction method for its IPO. Steve Kaplan, Professor of Finance at the University of Chicago, and a director of Morningstar suggested that a rationale for Morningstar Inc's choice of the auction method was that the observed IPO underpricing, together with the 7% underwriter spread in the standard bookbuilding IPO, enabled underwriters and their "customers collectively to keep as much as 20% or more off the top of every IPO." The tangible benefits resulting from these higher direct and indirect costs appear to be uncertain, however. Our study does also document greater and more positive post-IPO analyst coverage for bookbuilding IPOs. However, given the well-known long-run underperformance of bookbuilding IPOs, the superior price discovery properties of the bookbuilding IPO method may be problematic.

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Appendix: Variable Definitions

Variable	Data Sources	Description
Underpricing	SDC, CRSP	Percentage return from offer price (SDC) to first-day closing price (CRSP)
Proceeds	SDC	IPO proceeds, calculated as number of IPO shares issued * offer price
Underwriter rank	Ritter	Scale for underwriter reputation following Ritter, ranging from 1.1 (worst) to 9.1 (best)
Tech dummy	SDC	Tech dummy (=1 if the firm is a technology firm); We follow Loughran and Ritter (2004) and Cliff and Denis (2004) who categorize firms with the following SIC codes as tech firms: 2833, 2834, 2835, 2836, 3571, 3572, 3575, 3577, 3578, 3661, 3663, 3669, 3674, 3812, 3823, 3825, 3826, 3827, 3829, 3841, 3845, 4812, 4813, 4899, 7370, 7371, 7372, 7373, 7374, 7375, 7377, 7378, 7379
Offer price revision	SDC, Prospectuses	Percentage revision in offer price from midpoint of initial filing range to final offer price
Underwriter spread	SDC, Prospectuses	Gross underwriter spread, in percent
Non-exchange-traded dummy	SDC	Exchange dummy (=1 if the firm does *not* trade on NYSE, AMEX or NASDAQ)
Turnover	CRSP	$1-\prod_{t=1}^{365}(1-\frac{\text{volume traded}_t}{\text{total shares}_t})$, i.e. the proportion of shares traded, computed for a one-year period after the IPO. If the firm was acquired during that period or if the firm traded for less than one year, we calculate the annualized turnover between the firm's IPO date and its last available trading day. We divide NASDAQ volume by a factor of two to adjust for the NASDAQ volume definition.
Block sale ratio	TAQ	The sell-signed trading volume on the first two days of trading after the issue, divided by the number of shares offered in the IPO where the sell volume is executed in blocks of 3,500 shares or more.
Number of analyst recommendations	I/B/E/S-Firstcall	Number of analyst recommendations during a given period, as reported by I/B/E/S-Firstcall
Analyst recommendation	I/B/E/S-Firstcall	Analyst recommendation for the firm ranging from 1 (strong buy) to 5 (sell). Average analyst recommendations are calculated as $\overline{REC_{i,t}} = \sum_{j=1}^{N} REC_{i,j,t}$ where $REC_{i,j,t}$ is the recommendation for firm i by analyst j at time t, as reported by Firstcall

Table 1: Our IPO Auction Sample

This table provides an overview of the eleven IPO auctions that were filed during our 1999-2004 sample period. For each firm, we report the IPO date, ticker symbol, the composition of the underwriting syndicate, the number of shares offered, the offer price, the initial offer range, the total amount of capital raised, the underwriter discount (spread), and information on the firm's industry. In addition, the last column provides updates on acquisitions that took place until December 2004. Information in the last column is based on news releases on Bloomberg and in LEXIS/NEXIS. The information in all other columns is based on data from IPO prospectuses or data provided by the SDC New Issues database.

Issuer	Issue Date	Ticker Symbol	Lead Underwriter(s)	Co-Manager(s)	Shares Offered (Mill.)	Offer Price ($)	Initial Offer Range ($)	Total Raised ($ Mill.)	Spread	SIC Code	Industry	Acquisitions
Ravenswood Winery	4/9/1999	RVWD	WR Hambrecht & Co	-	1.0	10.5	10.5-13.5	10.5	4%	2084	Wines, Brandy, and Brandy Spirits	Acquired by Constellation Brands (STZ) on July 2, 2001.
Salon.com	6/22/1999	SALN	WR Hambrecht & Co	Daiwa Securities (New York)	2.5	10.5	10.5-13.5	26.3	5%	7372	Prepackaged Software	
Andover.net	12/8/1999	ANDN	WR Hambrecht & Co	Advest Inc DLJdirect	4	18.0	12-15	72.0	7%	7379	Computer Related Services	Acquired by VA Linux Systems (LNUX) on February 3, 2000.
Nogatech	5/17/2000	NGTC	WR Hambrecht & Co	ING Barings DLJdirect	3.5	12.0	16-16	42.0	6.5	3674	Semiconductors & Related Devices	Acquired by Zoran (ZRAN) on October 24, 2000.
Peet's Coffee & Tea	1/25/2001	PEET	WR Hambrecht & Co	Pacific Growth Equities Inc	3.3	8.0	10-14	26.4	6.5%	2095	Roasted Coffee	
Briazz	5/2/2001	BRZZ	WR Hambrecht & Co	-	2	8.0	8-12	16.0	6%	5812	Eating Places	
Overstock.com	5/29/2002	OSTK	WR Hambrecht & Co	Cantor Fitzgerald	3	13.0	12-16	39.0	4%	5999	Miscellaneous Retail Stores	
redEnvelope	9/25/2003	REDE	WR Hambrecht & Co	Pacific Crest Securities	2.2	14.0	12-16	30.8	6%	5947	Card and Gift Shops / Museum Stores	
Genitope	10/30/2003	GTOP	WR Hambrecht & Co	Punk, Ziegel & Co Brean Murray & Co	3.7	9.0	11-11	33.3	7%	2830	Drugs	
New River Pharmaceuticals	8/5/2004	NRPH	WR Hambrecht & Co	First Albany Capital Wells Fargo Securities Punk, Ziegel & Co	4.2	8.0	10-14	33.6	7%	2834	Pharmaceutical Preparations	
Google	8/19/2004	GOOG	Morgan Stanley Credit Suisse First Boston	Goldman, Sachs & Co Citigroup Lehman Brothers Allen & Company JP Morgan UBS Investment Bank WR Hambrecht & Co Thomas Weisel Partners	19.61	85.0	108-135	1,666.4	2.8%	7375	Information Retrieval Services	

Table 2: Univariate Comparison of Auction and Bookbuilding IPO Firms

We consider firms that went public in the U.S. between January 1999 and December 2004. We compare the characteristics of eleven firms which went public under an IPO auction arrangement with a sample of matched firms that went public via a bookbuilding contract. To be included in our matched sample, a bookbuilding firm must have had its IPO during the same year as the auction firm and must belong to the same industry. We use three-digit SIC codes to distinguish between industries. In one case in which there are no matching firms with the same three-digit SIC code, we relax our industry classification and use a two-digit SIC code. For each variable, we report means and medians. For dummy variables, we report percentage distributions. In the last column, we present p-values for a t-test of differences in means and a Wilcoxon test of differences in medians.

Variable	Auction IPOs mean median	Matched Bookbuilding IPOs mean median	Tests of differences means (p-value) medians (p-value)
Underwriter rank	7.30 7.10	7.80 8.10	0.0695 0.0153
% of tech firms	54.55%	74.25%	0.0265
Offer price revision	-14.43% -18.18%	2.85% -5.00%	0.0208 0.0077
Underwriter spread	5.57% 6.00%	7.03% 7.00%	0.0029 0.0011
Turnover	0.79 0.74	0.55 0.51	0.0217 0.0169

Table 3: Underpricing

We examine first-day underpricing returns for IPO auctions and matched bookbuilding IPOs. To be included in our matched sample, a bookbuilding firm must have had its IPO during the same year as the auction firm and must belong to the same industry. We use truncated three-digit SIC codes to distinguish between industries. In one case in which there are no matching firms with the same three-digit SIC code, we relax our industry classification and use a two-digit SIC code. We calculate first-day underpricing as the percentage return from the SDC offer price to the first-day closing price reported on CRSP. In the last four rows, we report the mean and median underpricing for both groups and provide test results for a t-test for the significance of differences in means and a Wilcoxon test for the significance of differences in medians.

Issuer	Issue Date	Underpricing	Matched Firm Underpricing (N, mean, median)
Ravenswood Winery	4/9/1999	3.62%	5 0.20% 0.00%
Salon.com	6/22/1999	-4.19%	210 76.73% 46.51%
Andover.net	12/8/1999	252.11%	210 76.73% 46.51%
Nogatech	5/17/2000	-21.58%	47 47.73% 15.06%
Peet's Coffee & Tea	1/25/2001	17.25%	3 0.12% 0.00%
Briazz	5/2/2001	0.37%	9 10.69% 8.57%
Overstock.com	5/29/2002	0.23%	13 9.19% 5.26%
redEnvelope	9/25/2003	3.93%	137 62.06% 33.36%
Genitope	10/30/2003	11.11%	73 19.75% 4.00%
New River Pharmaceuticals	8/5/2004	-11.25%	73 19.75% 4.00%
Google	8/19/2004	18.04%	137 62.06% 33.36%
Mean Underpricing		24.51%*	35.00%
Median Underpricing		3.62%	8.57%
t-Test (p-value)		0.5990**	
Wilcoxon Test (p-value)		0.0816	

* Mean Underpricing without Andover.net: 1.75%
** p-value without Andover.net: 0.0326

Table 4: Comparison of Offering Proceeds

We examine differences in offering proceeds for IPO auctions and matched bookbuilding IPOs by industry. Offering proceeds are reported in $ million. To be included in our matched sample, a bookbuilding firm must have had its IPO during the same year as the auction firm and must belong to the same industry. We use truncated three-digit SIC codes to distinguish between industries, with the exception of SIC codes 5947 and 5999 for which we use two-digit SIC codes due to a lack of matching firms with the same three-digit SIC code. For each industry we report the number of observations (N), as well as mean and median proceeds for both auction and bookbuilding IPOs. In the last three rows, we report aggregate sample statistics for both groups and provide test results for a t-test for the significance of differences in means and a Wilcoxon test for the significance of differences in medians.

Truncated SIC Code	Industry Description	Auction IPOs (N, mean, median)	Matched Bookbuilding IPOs (N, mean, median)
208	Beverages	1 10.50 10.50	5 127.16 91.40
209	Misc. food and kindred products	1 26.40 26.40	3 140.46 132.00
283	Drugs	2 33.45 33.45	73 71.36 63.00
367	Electronic components and accessories	1 42.00 42.00	47 156.67 84.00
581	Eating and drinking places	1 16.00 16.00	9 177.63 72.00
59	Retail stores	2 34.90 34.90	13 89.64 80.40
737	Computer and data processing services	3 588.23 72.00	347 70.48 51.20
Entire sample		11 181.48 33.30	497 82.19 89.64
t-Test (p-value)		0.6034	
Wilcoxon Test (p-value)		0.0028	

Table 5: Long-Term Performance and Volatility Statistics

We examine the long-term performance and return volatility of issuing firms over various time horizons after their IPO for both IPO auctions and matched bookbuilding IPOs. Returns are calculated relative to the first-day closing price. Return volatility is based on daily closing price data during the period and is reported in brackets below. To be included in our matched sample, a bookbuilding firm must have had its IPO during the same year as the auction firm and must belong to the same industry. We use three-digit SIC codes to distinguish between industries. In one case in which there are no matching firms with the same three-digit SIC code, we relax our industry classification and use a two-digit SIC code. For each auction IPO we report long-term performance measures over various time horizons, ranging from 1 to 36 months after the firm's IPO. Mean returns and standard deviation (in a bracket) are reported. In the last five rows, we calculate the geometric mean return, median return, and the standard deviation of returns for both auction and matched bookbuilding firms. In addition, we provide test results for a t-test and Wilcoxon test for the significance of differences in mean and median returns, respectively, and for an F-test for the significance of differences in standard deviations. Note that in some cases long-term returns could not be calculated because the firms have not traded long enough or because they have been acquired.

Issuer	Issue Date	1-Month Return	3-Month Return	6-Month Return	12-Month Return	18-Month Return	24-Month Return	36-Month Return
Ravenswood Winery	4/9/1999	-2.94% (0.92%)	-3.49% (0.67%)	-2.30% (0.61%)	-2.30% (1.01%)	25.28% (1.64%)	166.45% (3.44%)	n.a.
Salon.com	6/22/1999	13.80% (6.93%)	-41.20% (5.93%)	-39.40% (6.41%)	-86.20% (7.51%)	-93.70% (7.18%)	-97.70% (10.10%)	-99.40% (10.81%)
Andover.net	12/8/1999	-38.47% (10..84%)	-40.83% (8.96%)	n.a.	n.a.	n.a.	n.a.	n.a.
Nogatech	5/17/2000	-26.57% (8.60%)	-37.51% (7.12%)	n.a.	n.a.	n.a.	n.a.	n.a.
Peet's Coffee & Tea	1/25/2001	-9.38% (12.29%)	3.30% (8.14%)	-15.67% (6.07%)	27.29% (4.84%)	41.58% (4.49%)	44.24% (4.19%)	88.06% (3.69%)
Briazz	5/2/2001	-37.86% (6.15%)	-70.73% (7.47%)	-89.91% (8.01%)	-83.44% (7.68%)	-89.54% (8.59%)	-97.88% (10.73%)	-98.51% (11.21%)
Overstock.com	5/29/2002	-9.22% (3.16%)	-57.72% (4.70%)	-2.73% (6.41%)	-0.77% (7.51%)	32.98% (7.18%)	155.49% (10.10%)	n.a.
redEnvelope	9/25/2003	-10.24% (3.29%)	9.35% (4.08%)	-37.11% (4.71%)	-41.51% (4.09%)	n.a.	n.a.	n.a.
Genitope	10/30/2003	25.00% (6.66%)	20.30% (5.50)	-5.00% (4.50%)	30.00% (3.82%)	n.a.	n.a.	n.a.
New River Pharmaceuticals	8/5/2004	2.67%	89.60%	n.a.	n.a.	n.a.	n.a.	n.a.

		(3.90%)	(3.65%)					
Google	8/19/2004	17.10% (2.54%)	66.99% (3.65%)	n.a.	n.a.	n.a.	n.a.	n.a.
Auction Firms (Arithmetic Mean Return, Median Return, Average Standard Deviation)		-6.92% -9.22% (5.93%)	-5.63% -3.49% (5.57%)	-27.45% -23.87% (5.45%)	-22.42% -2.30% (4.93%)	-16.68% 25.28% (5.46%)	34.12% 44.24% (6.73%)	-36.62% -98.51% (8.57%)
Matched Bookbuilding Firms (Arithmetic Mean Return, Median Return, Average Standard Deviation)		4.52% 2.61% (5.27%)	3.96% 7.19% (5.35%)	-6.86% -12.74% (4.96%)	10.91% 23.33% (5.14%)	13.41% 31.86% (4.76%)	9.80% 21.77% (5.04%)	9.10% 0.74% (4.30%)
t-Test (p-value) for mean returns		0.0573	0.0377	0.0224	0.0159	0.0843	0.5298	0.7701
Wilcoxon Test (p-value) for median returns		0.1577	0.2501	0.7491	0.4057	0.7540	0.9168	0.5127
F-Test (p-value) for standard deviations		0.1190	0.2567	0.0767	0.1802	0.5540	0.2828	0.6203

n.a. = not available

Table 6: Analyst Coverage Post-IPO

We examine analyst coverage during various time periods after a firm's IPO. We present results for IPO auctions and matched bookbuilding IPOs. To be included in our matched sample, a bookbuilding firm must have had its IPO during the same year as the auction firm and must belong to the same industry. We use truncated three-digit SIC codes to distinguish between industries. In one case in which there are no matching firms with the same three-digit SIC code, we relax our industry classification and use a two-digit SIC code. For each group we report the average number and type of analyst recommendations measured on a scale of 1 (strong buy), 2 (buy), 3 (hold), 4 (underperform), and 5 (sell) over various time horizons, ranging from 1 to 36 months after the firm's IPO. Data on analyst recommendations is based on Thomson Financial's I/B/E/S-Firstcall database. Test results for a t-test and Wilcoxon test for the significance of differences in means and medians, respectively, are reported in the last row. Note that some long-term statistics are based on fewer observations because the firms have not traded long enough or because they have been acquired.

	Number of Analyst Recommendations							Type of Recommendation						
	Period after IPO (Months)							Period after IPO (Months)						
	0-1	1-3	3-6	6-12	12-18	18-24	24-36	0-1	1-3	3-6	6-12	12-18	18-24	24-36
Ravenswood Winery			1		2					2		2		
Salon.com			1	3	1					1	2.7	2		
Andover.net		3	1						1.3	4				
Nogatech		2							1.5					
Peet's Coffee & Tea	1	1		3	5	4	7	2	1		1.7	2	1.5	2
Briazz				2							2.5			
Overstock.com		1	1	2	3	2	13	2	2.0	1.5	3.7	3	2.2	
redEnvelope		3	4	1	6		n.a.		2.3	3.2	3	2		n.a.
Genitope		4	2	1		n.a.	n.a.		1.25	1.5	1		n.a.	n.a.
New River Pharmaceuticals		4		2	n.a.	n.a.	n.a.		1.5		2	n.a.	n.a.	n.a.
Google	10	25	20	6	n.a.	n.a.	n.a.	2.8	3	2.55	2.7	n.a.	n.a.	n.a.
Mean	1.00	3.91	2.73	1.82	1.89	0.75	2.86	2.27	1.70	2.25	2.40	2.2	1.83	2
Median	0	2	1	2	1	0	0	0	1.5	2	2.58	2	1.83	2
Mean of Matched Firms	2.23	4.63	3.89	3.56	2.14	2.09	3.67	1.68	2.05	3.21	2.44	1.92	2.36	1.83
Median for Matched Firms	2	5	4	4	2	2	3	1.80	1.76	3.48	2.66	1.76	2.12	1.60
t-Test (p-value)	0.053	0.044	0.054	0.057	0.047	0.015	0.126	0.238	0.064	0.246	0.153	0.174	0.039	0.177
Wilcoxon Test (p-value)	0.054	0.050	0.035	0.068	0.159	0.175	0.092	0.082	0.045	0.070	0.298	0.241	0.035	0.193

Table 7: Lockup Length and Post-IPO Insider Shares Locked

We examine the length of the lockup period and the proportion of insider shares locked up during the lockup. We present results for IPO auctions and matched bookbuilding IPOs. To be included in our matched sample, a bookbuilding firm must have had its IPO during the same year as the auction firm and must belong to the same industry. We use truncated three-digit SIC codes to distinguish between industries. In one case in which there are no matching firms with the same three-digit SIC code, we relax our industry classification and use a two-digit SIC code. The percentage of insider shares locked is the fraction of shares held by insiders after the IPO that are subject to lockup restrictions. Lockup days are the length of the lockup period. Test results for a t-test and a Wilcoxon test for the significance of differences in means and medians, respectively, are reported in the last two rows.

		Percentage of Insider Shares Locked		Lockup Days	
Issuer	Issue Date	Auction IPOs	Matched Bookbuilding IPOs	Auction IPOs	Matched Bookbuilding IPOs
Ravenswood Winery	4/9/1999	78.02	55.14	90	65.74
Salon.com	6/22/1999	76.7	63.37	90	75
Andover.net	12/8/1999	125.22	65.43	180	59.16
Nogatech	5/17/2000	56.88	61.25	180	87.84
Peet's Coffee & Tea	1/25/2001	55.33	43.87	180	135
Briazz	5/2/2001	56.46	49.16	180	85.41
Overstock.com	5/29/2002	67.18	54.12	180	72.18
redEnvelope	9/25/2003	74.13	69.32	180	63.96
Genitope	10/30/2003	77.21	65.97	180	125.78
New River Pharmaceuticals	8/5/2004	69.38	74.12	180	133.42
Google	8/19/2004	65.185	55.19	180	110.56
Mean		72.88	63.07	163.64	88.38
Median		69.38	61.25	180	65.52
t-Test (p-value)		0.0850		0.0001	
Wilcoxon Test (p-value)		0.0567		0.0182	