The Role of Demand-Side Uncertainty in IPO Underpricing

Philip Drake
Thunderbird, The American Graduate School of International Management
15249 N 59th Avenue
Glendale, AZ 85306
USA
drakep@t-bird.edu
602-978-7154 (phone)
602-843-6143 (fax)

James Noel
Thunderbird, The American Graduate School of International Management
15249 N 59th Avenue
Glendale, AZ 85306
USA
noelj@t-bird.edu
602-978-7280 (phone)
602-843-6143 (fax)

Abstract

This study examines whether accounting and selected data provided in an US initial public offering (IPO) issuer's S1 registration filing can predict the offer price, and the unexpected first trading day closing price. The study extends the use of accounting data and other S1 data for evaluating IPO issuer risk and uncertainty in the pre-offering assessment of IPOs. Based on Bienvensite and Spindt's [1989] demand revelation model that IPO issuers with greater demand-side uncertainty result in greater underpricing, empirical tests are conducted the role of demand-side uncertainty in IPO underpricing.

Hanley [1993] demonstrated the Bienvensite and Spindt's prediction that partial adjustments lead to greater underpricing. This study demonstrates a different prediction of the Bienvensite and Spindt's model, that IPOs with high demand-side uncertainty are more likely to have partial adjustments, and that the average level of underpricing will be higher for these firms. The empirical results strongly support this claim.

Additionally, the S1 registration data helps explains the recently observed increase in underpricing for high market share underwriters. When investor demand elicitation is important in pricing the IPO, underwriter with reputations for bringing high demand-side uncertain ty IPOs to market reward their investor clientele with greater underpricing.

Section 1.0 – Introduction

This study examines the role of accounting and selected data from the IPO's S1 registration statement in assessing risk and uncertainty of privately held companies entering the public equity market. Several branches of accounting research have examined the use of accounting information to assess risk. They establish the usefulness of accounting data to assess market betas, predict bankruptcies and other forms of financial distress and the value of accounting data in reducing capital costs for small firms. These studies provide compelling evidence that accounting data is useful in assessing risk and uncertainty

This study extends the research by examining the usefulness of accounting data and other relevant information for assessing the risk associated with IPO pricing. Bienveniste and Spindt [1989] (B-S) link uncertainty about investor interest in an IPO with underpricing, the percentage difference between the IPO offer price and the first trading day closing price. The B-S model is a demand revelation model in which underwriters elicit orders from potential investors before setting the IPO offer price. Issuers and Underwriters must pay for truthful revelation of any information held by potential investors. Bienveniste and Spindt use the revelation principal to show that underwriters do not fully adjust the offer price based upon information obtained, leaving money on the table as payment for the information. The cost of gathering investor information is the source of IPO underpricing in the B-S model. The B-S model also claims that underpricing increases as the information held by potential investors becomes more valuable. This current study asserts that while measuring the value of investor information itself is difficult, investor information is likely to be more valuable when there is more uncertainty regarding the expected first trading day closing price. This demand-side uncertainty will lead to more underpricing. Proxy variables are identified to measure this demand-side uncertainty.

When a firm decides to go public, typically there is limited information available to the potential investors and no analysts are following the firm for the financial markets. Further, the Securities and Exchange Commission (SEC) restricts the public comments and disclosures an issuer

can make once the registration process is initiated (Steinberg [1993]). The opportunity for potential investors to learn more about the issuer's future prospects by the registration statement is limited to press releases and brief discussions with senior management through the "road show." Thus, during the period between the issuer registering with the SEC to make a public offering and actual trading, the firm is afforded little opportunity for additional disclosure. Botosan [1997] demonstrated that for a set of publicly traded firms under these conditions, accounting information can reduce capital costs.

This study uses accounting data and other relevant data presented in the issuer's S1 registration statement filed with the SEC to construct measures and to compare them to a measure of the amount of first trading day price variance. Variables constructed from the S1 registration data proxy concepts such as the issuer's size, its financial distress level, growth potential, intangibles, industry, underwriter size and venture capitalist support. The results support the hypothesis that information in the S1 statement, provided weeks prior to the first trading day, explain a significant amount of the variance of the first trading day closing price.

The study further establishes that information released in the S1 registration statement can partially explain underpricing. Even after the offer price is included as an explanatory variable for underpricing, the information released in the S1 registration statement and related to demand-side uncertainty is significant in explaining underpricing.

Because IPOs with greater levels of demand-side uncertainty will, on average, have greater underpricing, it is possible that underwriters use this information to screen potential issuers of IPOs as clients. Underwriters with an advantage in eliciting demand revelation from their investor clientele will add more value to IPOs with greater demand-side uncertainty. Data is presented that underwriter market share is associated with IPOs that have greater demand-side uncertainty and this association has strengthened during the later half of the 1990's.

Section 2 discusses the Bienveniste and Spindt model and the linkage between demand-side uncertainty and underpricing. The main hypotheses are developed as extensions from the B-S

model. Section 3 describes the variables and data constructs for the hypotheses. Section 4 describes the sample and discusses the results of analyzing the relation of the demand-side uncertainty measures and underpricing. Section 5 summarizes the study.

Section 2.0 – Demand-Side Uncertainty and Underpricing

Initial public offering underpricing is well documented in the literature. Ibbotsen, Sindelar and Ritter [1994] and Ritter [1998] provide excellent summaries. Many studies explain underpricing by modeling or testing the role of information asymmetry. The information asymmetry models can be broken into two major categories; (1) investor uncertainty about the prospects of the IPO, and (2) underwriter/issuer uncertainty about potential demand for the IPO in the marketplace.[1] This study focuses on the second type of uncertainty as one aspect of IPO underpricing.

Bienveniste and Spindt [1989] (B-S) model underwriter (and IPO) uncertainty about demand and the reduction of uncertainty through the solicitation of IPO indications of interest (IOIs) from potential investors. Their analysis of the incentive compatibility constraint in a demand revelation model predicts that issuers and underwriters reward investors for truthfully revealing demand information through submission of IOIs. The individual rationality constraint requires unbiased pricing when demand information is negative. Underwriters respond to positive information by partially adjusting the offer price, with the remainder of the adjustment serving as the payment to the investors through higher first-day returns. Hanley [1993] empirically tests this assertion by examining whether a positive partial adjustment is followed by a higher than normal degree of underpricing relative to the average IPO. Her results strongly support the B-S model.

Based upon the B-S model, payments for IPO information to investors are made when the information is significantly positive, while issues are priced as accurately as possible when the information is neutral or negative. This study examines whether average underpricing is larger for IPOs with greater demand-side uncertainty, which is represented in the B-S model as the variance in

price expectations for first day IPO trading. This extension of the conclusions from the B-S model results from observing that those IPOs with offer price above the S1 filing range tend to have partial adjustments, while IPOs with the offer price below the S1 filing range have unbiased pricing. The average result of the ex ante high variance set of firms will be an increase in percentage of firms with underpricing. Intuitively, more underpricing pays for investor demand information when demand-side uncertainty about that information is high. Measures of demand-side uncertainty can identify which IPOs are more likely to have positive partial adjustments and, correspondingly, are candidates for large first-day returns.

Underwriters bring IPOs to market in several stages. This study uses the early stage information to predict offer price and first-day closing price. The early stage information is chosen based upon the anticipated usefulness in assessing demand-side uncertainty. We examine whether these variables are related to demand-side variance, and predict differences between the S1 filing range and offer price and underpricing as described above.

Figure 1 describes the principal stages of the IPO process.. First, an S1 registration statement is filed with the Securities and Exchange Commission (SEC), providing significant firm-specific information regarding its operations, financial characteristics, and legal activities. Additionally, the issuer, with guidance from its underwriter, provides a range for the offering that represents a "`bona fide estimate' of the final offer price" [Hanley, (1993)]. The SEC has ruled that no additional firm specific information can be released during the underwriting process except for normal business press releases. In the second stage, the underwriter performs additional due diligence on the issuer, industry, and market, creates the underwriting syndicate to distribute the offering, and takes the issuer's key management on a road show to present the issuer to potential investors. Potential investors then provide an IOI based upon their assessment of the firm, and the S1 offer price range. Based on investor demand and market conditions, the underwriter and issuer set the offer price. Finally, the underwriter distributes the shares among the underwriting syndicate,

who then allocate shares among the investors, and the shares start trading in the secondary market. Each of these three stages reveals different information.

This study uses the information structure in the timeline to construct variables from the S1 registration filing (denoted S1 variables) that proxy for demand-side uncertainty. These S1 variables are hypothesized to predict IPO underpricing.

Section 2.1 – Identifying Measures of Demand-Side Uncertainty

Let $\widetilde{P}_{D1}$ be a random variable representing the market price of the IPO stock as of the end of the first trading day. The theoretical construct measuring demand-side uncertainty is Variance($\widetilde{P}_{D1}$). This construct assumes knowledge of potential IPO investors expectations, which cannot be measured directly. If E($\widetilde{P}_{D1}$), were known, the variance for each observation could be estimated as $(P_{D1}$ - E($\widetilde{P}_{D1}$))^2. A technique for measuring E($\widetilde{P}_{D1}$) using ex post data is discussed in section 3.1. $(P_{D1}$ - E($\widetilde{P}_{D1}$))^2 is referred to as estimated demand-side uncertainty.

We construct proxy measures for demand-side uncertainty and compare the measures to estimated demand-side uncertainty. The proxy measures are used to predict uncertainty about investor demand for the IPO. Data is extracted from the S1 registration because the filing occurs before demand elicitation. Factors that make investor demand difficult to predict include small issuer size, issuers with high growth and intangibles, issuers requiring significant future financing, and industries which have high uncertainty. The measures of these factors are firm size (identify small firms), Book/Market ratio (growth and intangibles), the rate at which the current cash balance is used (need for future cash) and whether a firm is high tech or internet (high uncertainty industries). Finally, information about whether the IPO issuer was funded by venture capitalists (based upon the SDC database definition) is used because that the reputation of the venture capitalists would be more valuable to high uncertainty firms. Note that for this study, the claim about venture capitalists is weaker because virtually all the uncertainty reduction due to venture capitalists is issuer specific, and

not investor related. These variables, called S1 variables, should be related to the ex post measures of demand-side uncertainty.

The high demand-side variance IPOs should also price more frequently outside the S1 filing range. The discussion above motivates the following hypothesis.

H1 - S1 variables are related to estimated demand-side variance

H1 will be tested using the following specific hypotheses:

H1a – S1 variables are related to $|P_{D1} - E(\widetilde{P}_{D1})|$, and the S1 variables have the predicted signs based upon the discussion above.

H1b –S1 variables are related to $(P_{D1} - E(\widetilde{P}_{D1}))^2$, with $E(\widetilde{P}_{D1})$ measured as discussed below, and S1 variables have the predicted signs based upon the discussion above.

H1c –S1 variables predict whether the offer price is outside the S1 filing range (in a logistic regression), and the S1 variables have the predicted signs based upon the discussion above.

Section 2.2 – Demand-Side Uncertainty and First-Day Underpricing

Hanley [1993] demonstrates that partial adjustments can predict underpricing. If H1 is supported, S1 variables are useful in predicting partial adjustments, so they should also be useful in predicting underpricing. Because the partial adjustment reflects demand-side uncertainty, adding partial adjustment measures to the S1 variables should improve the prediction of underpricing, but reduce the significance of the S1 variables in predicting underpricing. The specific hypotheses are[2]:

H2a – S1 variables are useful in predicting first-day IPO underpricing, and the S1 variables have the predicted signs based upon the discussion above.

H2b – Partial adjustment information combined with S1 variables improves prediction of first-day underpricing, but the statistical significance of the S1 variables decreases.

H2c – The S1 variables as a group are significant in predicting unexpected first-day underpricing in a logistic regression even after including partial adjustment variables.

These analyses identify variables that are known at the S1 date, and are useful in predicting underpricing. In addition to the tests of the role of demand-side uncertainty tested in hypotheses 1 and 2, data will be provided illustrating how the concept of demand-side uncertainty can help to understand the role of underwriters in the IPO process.

Section 2.3 - Underwriter Size and IPO Demand-Side Uncertainty

Large underwriters[3] are likely to be more effective in eliciting demand information, and because of size, would have a lower cost to do so. If estimating demand for the IPO has high value because of demand-side uncertainty, then these offerings would benefit from large underwriters. Some of the differences in performance among underwriting firms could be due to the types of issuers that they attract. No statistical tests of the significance of any differences in demand-side uncertainty are provided because the market share of underwriters is one of the S1 independent variables in H1 and H2. Instead, demand-side uncertainty measures and underpricing will be reported by underwriter size and year. Size is measured as the ratio of the proceeds of the IPOs placed by an underwriter for a particular year divided by the total proceeds of all IPOs issued in that year.[4] The information is provided for each year, which allows the reader to examine how changes in the IPO market over time impact different size underwriters. The goal is to show that demand-side uncertainty helps to explain one aspect of the role of large underwriters

Section 3.0 – Data and Variable Definitions

The sample consists of selected data from the Securities Data Corporation (SDC) database for all firm-commitment IPOs priced between January 1990 and June, 1999, excluding unit offerings, Real Estate Investment Trusts (REITs), partnerships, offerings with proceeds over $500 million, American Depository Receipts (ADRs), and closed-end mutual funds.[5] To reduce the impact of microcap offerings, IPOs where the midpoint from the original S1 registration filing range is less than $8 are excluded (Loughran and Ritter [2000]).

The selected data falls into two categories; price data and S1 registration data. Price data include the offer price, the market price as of the close of the first day of trading, and the percentage change in the NASDAQ for the 14 days preceding and including the first day of trading. The S1 registration variables are constructed from the high and low original S1 filing price range, revenues, estimated total and primary shares offered, earnings before interest and taxes (EBIT), book value of equity, the industry of the IPO and whether the IPO has venture capital funding[6]. Excluding IPOs due to missing SDC data items, the sample is comprised of 2,694 IPOs. Table 1 presents descriptive statistics for the selected data.

Section 3.1 – Hypothesis 1 Variables and Analysis

To construct the dependant variable, estimated demand-side uncertainty, an expected price at the end of the first day of trading is constructed using data available from the S1 registration statement and current expectations regarding underpricing. On average, an IPO's offer price is lower than the price at the end of the first trading day (Ritter [1998]). The average annual level of underpricing is incorporated in the estimate of the closing price as of the first trading day. Table 2 presents descriptive statistics for the changes from the S1 midpoint to the offer price and to the closing first-day trading price for each year.

Let P_{S1} denote the midpoint of the S1 filing price range. For each IPO, $E(\widetilde{P}_{D1})$ is constructed by adjusting P_{S1} by a factor α_t for each year t so that the average across all IPOs for each year, $\alpha_t * \overline{P}_{S1,t} = \overline{P}_{D1,t}$ with the overbar indicates an average over the year for the variable, and t denoting the year index. α_t measures the average percent bias in P_{S1} as an estimate of P_{D1} for each of the ten years in our sample. This adjustment reduces the possibility that the independent variables are just explaining the bias, which is not a meaningful use of the S1 data [Loughran and Ritter (2000)].

To provide evidence on whether the S1 data is useful in explaining the demand-side uncertainty constructs, two measures of demand-side variance, $|(P_{D1} - E(\widetilde{P}_{D1})|$ and $(P_{D1} - E(\widetilde{P}_{D1}))^2$ are used in expressions (1A) and (1B), respectively:

$$ABS(demand) = \beta_0 + \beta_1 LRev_i + \beta_2 CashBurn_i + \beta_3 B2M_i + \beta_4 Internet_I + \beta_5 Tech_i + \beta_6 VC_i + \beta_7 UWMktShr_i + \beta_8 MktCond_i + \varepsilon_i \quad (1A),$$

and:

$$(demand)^2 = \beta_0 + \beta_1 LRev_i + \beta_2 CashBurn_i + \beta_3 B2M_i + \beta_4 Internet_I + \beta_5 Tech_i + \beta_6 VC_i + \beta_7 UWMktShr_i + \beta_8 MktCond_i + \varepsilon_i \quad (1B).$$

The dependent variable ABS(demand) is $|(P_{D1} - E(\widetilde{P}_{D1})|$and $(demand)^2$ is $(P_{D1} - E(\widetilde{P}_{D1}))^2$.

The primary independent variables, the S1 variables, identify IPOs for which there is significant demand-side uncertainty. They measure industry of the issuer, the size of the issuer, the need for future cash infusions for the issuer, growth, intangible assets, and credibility of the information and management of the issuer. These factors are frequently mentioned in the press, and similar to variables used in risk analysis such as prediction of financial distress. The construction of measures is each category are listed below.

Variable Name	Description
LRev	The natural log of revenues proxies for the size of the IPO. Smaller issuers to hypothesized to be associated with higher demand uncertainty.
CashBurn	The need for future cash is identified by firms that have negative earnings before interest and taxes (EBIT), and then divide EBIT by the expected market value of equity. The estimated market value of equity is computed as $(1 + \alpha_t) * \overline{P}_{S1,t}$ times the current shares outstanding plus the primary shares offered.[7] Issuers that have a larger (negative) Cash Burn Rate will need to seek additional financing sooner. These firms are hypnotized to be associated with higher demand uncertainty. Firms that have a positive EBIT have the Cash Burn Rate set to zero.
B2M	The book to expected market variable provides a measure of the issuer's intangibles and growth. This variable is measured by adding the estimated issuer proceeds ($(1 + \alpha_t) * \overline{P}_{S1,t} *$ primary

	shares offered) to the book value of equity, and dividing by the expected market value of equity (using the same computation as for the Cash Burn Rate). Firms with a lower book to market ratio are hypothesized to be associated with higher demand uncertainty.

Two proxy variables capture the issuer's industry. One identifies internet firms, and the other variable identifies high technology firms. There is some overlap between the two classifications. All other firms are classified together as a single (not internet and not high tech) industry. The two variables are:

Variable Name	Description
Internet	SDC provides a dummy variable for internet IPOs. The internet variable is hypothesized to be associated with higher demand uncertainty.
Tech	SDC provides a dummy variable for high technology IPOs. The high technology variable is hypothesized to be associated with higher demand uncertainty.

Finally, to measure credibility on information about an issuer and its management and any underwriter screening of high demand-side variance IPOs, we include the size of the underwriter, and the existence of venture capital funding as independent variables.

Variable Name	Description
VC	An indicator variable provided by SDC for IPO issuers supported by a venture capitalist. This variable is hypothesized to indicate higher demand uncertainty.
UWMktShr	For each year, the underwriter's market is measured as the total IPO proceeds for that underwriter (for the offerings for which it was the lead underwriter). The underwriter market is divided by the total proceeds of all IPOs for the year to compute underwriter market share. The underwriter's market share is positively related to reputation. Initial public offerings with high demand uncertainty are hypothesized to prefer underwriters to cost-effectively solicit information about demand.[8]

Loughran and Ritter [2000] empirically establish that market conditions immediately preceding the offer date partially explain the shift from the S1 mid-point price to the offer price. This effect is called the "hot issue market" phenomenon. To control for this, all regressions in this

study include the NASDAQ return for the 15 calendar days prior to the IPO as an independent variable.

Variable Name	Description
MktCond	The NASDAQ return for the 15 trading days prior to the first day of trading.

If the offer price is significantly different from the expected offer price, then demand-side uncertainty was likely greater. A dependent indicator variable is constructed to measure whether the offer price is outside the range that is reported in the S1 filing. This indicator variable provides another measure of demand-side uncertainty. To measure whether the independent variables can explain this aspect of uncertainty, expression (1C) is estimated as a logistic regression.

$$\text{OutsideS1Range} = \beta_0 + \beta_1 \text{LRev}_i + \beta_2 \text{CashBurn}_i + \beta_3 \text{B2M}_i + \beta_4 \text{Internet}_i + \beta_5 \text{Tech}_i + \beta_6 \text{VC}_i + \beta_7 \text{UWMktShr}_i + \beta_8 \text{MktCond}_l + \varepsilon_i \quad (1C),$$

The indicator is defined as:

Variable Name	Description
OutsideS1Range	1 (0) if the offer price is outside the S1 filing range.

Section 3.2 – Hypothesis 2 Variables and Analysis

Hypothesis 2 states that proxies of demand-side uncertainty, S1 variables, can predict underpricing. If Hypothesis 1 is supported, the S1 variables are correlated with the magnitude of the first trading day closing price from the S1 midpoint price. Hypothesis 2 establishes whether the demand-side uncertainty measures can predict the difference between the offer price and the first trading closing price, that is, underpricing.

To examine whether the S1 data is useful in explaining underpricing, the following regression is run:

$$\text{Underpricing} = \beta_0 + \beta_1 \text{LRev}_i + \beta_2 \text{CashBurn}_i + \beta_3 \text{B2M}_i + \beta_4 \text{Internet}_i + \beta_5 \text{Tech}_i + \beta_6 \text{VC}_i + \beta_7 \text{UWMktShr}_i + \beta_8 \text{MktCond}_i + \varepsilon_i \quad (2A)$$

The dependent variable for the analysis is underpricing, measured as

Variable Name	Description
Underpricing	The percentage change from the IPO offer price to the closing price on the first trading day.

The S1 data is registered with the SEC weeks prior to the final pricing of the IPO. Subsequent to that registration, the underwriter is gathering information regarding the demand for the IPO, and uses that information in the partial adjustment from the S1 midpoint price to the final offering price. Hypothesis 2 states the partial adjustment is useful in predicting underpricing and, once known, the S1 data becomes less relevant. The following regression tests the hypothesis:

$$\text{Underpricing}_i = \beta_0 + \beta_1 \text{PA}_i + \beta_2 \text{PAInd}_i + \beta_3 \text{LRev}_i + \beta_4 \text{CashBurn}_i + \beta_5 \text{B2MR}_i + \beta_6 \text{Internet}_I + \beta_7 \text{Tech}_i + \beta_8 \text{VC}_i + \beta_9 \text{UWMktShr}_i + \beta_{10} \text{MktCond}_i + \varepsilon_I \quad (2B)$$

The book to expected market is revised to reflect the actual offer price and two new variables are included in the regression (2B). The independent variables are defined as:

Variable Name	Description
B2MR	This variable is measured by adding the estimated issuer proceeds (offer price times primary shares offered) to the S1 registration book value of equity, and dividing by the expected market value of equity defined as number of shares outstanding following the IPO multiplied by the expected first trading day closing price (offer price multiplied by (1 + expected underpricing for year t, γ_t)).
PA	The offer price of the IPO less the midpoint of the S1 filing price range.
PAInd	An indicator variable taking the value of 1 when the offer price is

higher than the top of the original S1 filing price range. The B-S model states that when positive demand information is revealed the underwriter do not fully adjust the offer price.

A certain level of underpricing is typically expected as presented in Table 2, column 2. If the first day closing price is above the expected underpricing, this is referred to as "unexpected underpricing." An indicator variable is constructed to measure whether the first day closing price is above the offer price multiplied by 1 + the expected underpricing for year t, γ_t. To examine whether the independent variables can explain unexpected underpricing, expression (2C) is estimated as a logistic regression.

$$\text{Unexpected Underpricing}_i = \beta_0 + \beta_1 PA_i + \beta_2 PAInd_i + \beta_3 LRev_i + \beta_4 CashBurn_i + \beta_5 B2MR_i + \beta_6 Internet_i + \beta_7 Tech_i + \beta_8 VC_i + \beta_9 UWMktShr_i + \beta_{10} MktCond_i + \varepsilon_i \quad (2C)$$

This indicator is defined as:

Unexpected Underpricing	1 (0) if the first trading day closing price is greater than the offer price multiplied by (1 + expected underpricing for year t, γ_t).

Section 4.0 – Descriptive Statistics

Table 1, panel A reports descriptive statistics for the basic price data. The data reveal that IPOs are typically priced in the low to mid-teens. The small difference between the offer price and the S1 mid-point indicates that underwriters, at the S1 filing date, are effective at estimating the final offer price. The first trading day closing price reveals underpricing levels consistent with prior studies (Ritter [1998]).Panels B and C contain the S1 registration data descriptive statistics for the S1 data that are used to construct the independent variables. The panels report that a typical issuer is a mid-size technology firm with positive operating profits that is offering approximately 30 percent of the firm to investors at the IPO date. Initial public offerings are generally offered in a "hot issue market."

Table 2 reports the annual mean and median differences among the S1 midpoint filing range, offer price, and the first trading day closing price. The first data column is the difference from the S1 midpoint to the offer price, the partial adjustment. Except for 1999, the S1 midpoint closely approximates the offer price over time. The second data column presents the difference from the offer price to the first day closing price or underpricing, γ_t. Average underpricing increases during the sample period. The third data column reports the difference from the S1 midpoint to the first day closing price, α_t. This data element is used to construct the expected day one closing price using S1 data, $\widetilde{P}_{D1}$, which is estimated by the S1 midpoint multiplied by $1 + \alpha_t$.

Section 4.1 – Demand-Side Uncertainty and S1 Registration Information

To provide evidence on whether the S1 variables explain the estimated demand-side variance, regressions (1A) and (1B) in section 3.1 are reported in the first two data columns in Table 3. In regression (1A), the dependent variable is $|(P_{D1} - E(\widetilde{P}_{D1})|$. The S1 variables are statistically significant in explaining the dependent variable. Two of the three coefficients associated with accounting-based S1 variables are significant. Specifically, β_1 (the coefficient on LRev, the size variable) is –0.227 ($t = -3.27$, $p < 0.01$) and β_3 (the coefficient on B2M, the growth and intangibles variable) is -2.447 ($t = -7.10$, $p < 0.01$) and both are in the predicted direction. The results indicate that smaller firms and firms with greater growth and intangibles have greater variation in their first trading day closing price.

The coefficients of the remaining S1 variables are significant except the venture capitalist indicator. The internet indicator coefficient, β_4, is 5.27 ($t = 10.10$, $p < .01$) and the high technology indicator, β_5, is 0.74 ($t = 3.54$, $p < 0.01$). This result is consistent the greater demand-side uncertainty associated with high technology and the internet companies. The underwriter size coefficient, β_7, (the coefficient for UWMktShr) is 0.23 ($t = 11.68$, $p < 0.01$), indicating that IPOs brought to market by large underwriters have greater demand-side uncertainty. The coefficient for the "hot issue market" control variable, β_8, is 8.03 ($t = 3.12$, $p < 0.01$).

The other estimated demand-side variance measure, $(P_{D1} - E(\widetilde{P}_{D1}))^2$, is used in regression (1B), and the independent variables are the same as in regression (1A). The results of regression (1B) are qualitatively similar to the regression (1A) and reported in Table 3, data column 2. The coefficients of two variables, β_5, the high technology indicator, and the market condition control variable, β_8, are weaker with their significance levels declining to the ten percent level. Both regressions are consistent with the hypothesis that S1 variables are explain a significant portion of ex post measure of demand-side uncertainty.

The results of the logistic regression predicting whether the offer price is set outside the original high/low S1 filing range are presented in the third data column of Table 3. Following the B-S model, the logistic regression model tests whether the demand elicitation from IPOs with greater demand-side uncertainty, as measured by the S1 variables, results the offer prices being set outside the original S1 filing range. The regression results are significant ($\chi^2 = 88.3$, $p < .01$) and consistent with the hypothesis that S1 variables are useful in predicting whether IPOs are priced outside the S1 filing range. A naïve model (base rate) predicts an offer price outside the S1 filing range with 52.9 percent accuracy. However, the estimated logistic model, based on the S1 variables and the market condition control variable, correctly classifies the offer price relative to the S1 filing range at 57.9 percent – a 9.5 percent predictive improvement.

Within the logistic regression, the coefficient of one accounting-related variable, B2M, (book to market measure, the proxy for growth and intangible) is significant, -0.605 ($\chi 2 = 16.76$, $p < 0.01$), and is in the predicted direction. The other accounting-related variables, LRev (log of revenues), and financial distress, CashBurn (cash burn rate), were not significant.

The coefficients for the remaining S1 variables are significant, except for the high technology indicator variable. OLS regression explains the variation from the expected underpricing occurring on the first trading day while the logistic regression classifies whether the offer price is set outside the S1 filing range. This difference may explain the differences in results.

In summary, the regression results reported in Table 3 support hypothesis H1. Information released in the S1 registration statement can explain the magnitude of the changes from the expected first trading day closing price. This is consistent with that demand-side uncertainty influences the variance of expected first trading day prices. The next section reports the impact of demand-side uncertainty on price direction, including partial adjustments and IPO underpricing.

Section 4.2 – Demand-Side Uncertainty, Partial Adjustments, and Underpricing

Based upon the tests of hypothesis 1, the S1 variables are reasonable proxies for demand-side uncertainty. To test the impact of demand-side uncertainty on the level of underpricing, the first data column ofTable 4 reports the results when the S1 variables along with the "hot issue market" control variable are regressed on underpricing (Eq 2). The coefficient for each variable is significant at the one (1) percent level and in the predicted direction, except the venture capital indicator which is significant at the five (5) percent level. These results strongly support the main thesis of this study that greater demand-side uncertainty is explains a significant portion of underpricing.

Based on hypotheses 2, the coefficient for UWMktShr (underwriter market share) is positive, indicating that high reputation underwriters are associated IPOs with high levels of demand-side uncertainty. However, much of the prior IPO literature observes that high reputation underwriters are inversely related with underpricing (Beatty and Ritter [1989], Carter and Manaster [1989], Megginson and Weiss [1991]), based upon a credibility argument. Beatty and Welch [1996] initially reported a reversal in this relation between high reputation underwriters and underpricing by comparing IPO underpricing from the 1980s with the early 1990's. The reversal was attributed to changes in the economic environment (Beatty and Welch, [1996, p. 589]). In section 4.3, evidence is provided that a candidate for that change in the economic environment in an increase demand-side uncertainty over time. Assuming that large underwriters can more effectively elicit demand information from investors, the high demand-side uncertainty issuers prefer large underwriters. As a result, large underwriters will see increasing levels of underpricing over time.

The second data column in Table 4 presents the regression of underpricing on the S1 variables, the "hot issue market" variables, and two new variables – the partial adjustment, the change from the S1 midpoint to the offer price, and a partial adjustment indicator which measures the offer price is greater than the original high S1 filing price. The indicator variable is based upon the B-S model that stipulates the underpricing be paid to investors for truthfully revealing their demand. The S1 variables are based upon information from the S1 registration filed weeks prior to the final IPO pricing. The offer price reflects, among other things, the current market demand for the IPO. The inclusion of the additional variables is hypothesized to improve the model's ability to explain the underpricing.

In the updated model, the R^2 significantly improves from 19.46 percent to 36.46 percent. Combining the S1 variables with the current demand measures for the IPO improves the predictive power of the model. The coefficients for the S1 variables reveal that current demand variables reduces the significance of the S1 variables. Nonetheless, all the demand-side uncertainty coefficients remain significant at the five percent level or better, except the venture capitalist indicator coefficient. This result is consistent with an updated expectation model, with the demand information of potential investors being reflected through the offer price.

The third data column in Table 4 presents a logistic regression of the S1 variables, IPO demand variables, and "hot issue market" control variable with unexpected underpricing. To calculate the dependent variable, unexpected underpricing, the first day closing price is compared to the expected first day closing price defined as the offer price plus average underpricing for year t. The base rate prediction of 64.7 percent reflects the skewed distribution of underpricing in that one-third of new issues have significant underpricing. Consistent with the hypothesis that greater demand-side uncertainty leads to greater underpricing, the logistic model correctly classifies 76.4 percent of the unexpected underpricing, an predictive improvement of 18.1 percent.

As expected, the coefficients for the partial adjustment, β_1, and the positive partial adjustment indicator, β_2, are strongly significant at 0.4492 ($\chi^2 = 148.13$, $p < 0.01$) and 0.4881 ($\chi^2 =$

10.28, $p < 0.01$), respectively. Thus, the greater the level of a positive partial adjustment, the more likely that the first day closing price will exceed the average underpricing, consistent with the results in Hanley [1993].

Of the remaining independent variables, only the accounting related variables, including log of revenues ($\chi^2 = 8.73$, $p < 0.01$), cash burn rate ($\chi^2 = 4.83$, $p < 0.05$), book to revised market ($\chi^2 = 4.99$, $p < 0.05$), and the market condition control variables ($\chi^2 = 6.49$, $p < 0.05$) are significant. The other demand-side uncertainty variables (internet indicator, high technology indicator, venture capitalist indicator, and underwriter market share) are insignificant. One explanation for lack of significance for these demand-side uncertainty variables between the OLS regression and the logistic regression is that these variables can identify the IPO offerings with the extreme underpricing (i.e., the outliers), but are less effective for small amounts of underpricing.

Section 4.3 – An Application of Demand-Side Uncertainty to Underwriter Reputation

Beatty and Welch [1996] suggest that a change in the underlying economic environment could explain the increase in IPO underpricing of high reputation underwriters relative to low reputation underwriters during recent years. The results in sections 4.1 and 4.2 suggest this change might be an increase in the demand-side uncertainty of IPOs, combined with increasing association of these IPOs with large underwriters. This section provides descriptive evidence supporting this possibility.

Underpricing is greater during the later half of the 1990's than during the first half of 1990's. Table 5, Panel A, reports the increase in underpricing, and a corresponding increase for the absolute value of the demand-side uncertainty measure after 1994. Based upon Panel A there is a positive relation between demand-side uncertainty and underpricing that is consistent over time.

For IPOs with greater demand-side uncertainty, large underwriters have a comparative advantage in eliciting demand information from their investor clientele. This comparative advantage results from the underwriter's ability to conduct due diligence, understand market tastes (preferences), present road shows, as well as the size and sophistication of their investor clientele to

evaluate IPO issuers. Thus, underwriters may acquire IPO issuers with greater demand-side uncertainty because the underwriter can add value.

In Table 5, underwriters are divided into quartiles for each year based upon their market share for that year. Underwriters in the top quartile are classified as large underwriters, underwriters in the bottom quartile are classified as small reputation, and the underwriters in the two middle quartiles are classified as medium[9] (Dunbar [2000], Megginson and Weiss [1991], Beatty and Welch [1996]). Contrasting the measures in Panel A of Table 5 for the large and small underwriters reveals that high reputation underwriters have greater levels of partial adjustments, underpricing, and the absolute value of the demand-side uncertainty measure. In the later half of the 1990's, the difference between large and small underwriters for the Panel A measures is noticeably larger than in the first half of the 1990s. These data are consistent with large underwriters screening IPO issues based upon demand-side uncertainty.

Additional confirming evidence is presented in Panel B of Table 5. The data reveal that the S1 registration statement information is consistent with that notion that large underwriters are associated with IPOs having greater levels of demand-side uncertainty. For example, IPO average revenues, which is hypothesized to be inversely related to demand-side uncertainty, decline over time for high reputation underwriters, but remain constant for low reputation underwriters.

In summary, the data are consistent with the notion that high reputation underwriters are increasingly selecting IPO issues with greater demand-side uncertainty. During the 1990's, the result is that as demand-side uncertainty has increased, IPO underpricing increases are greater for large underwriters.

Section 5.0 Conclusions

This study empirically examines the impact of demand-side uncertainty on IPO underpricing. The Bienveniste and Spindt model [1989], which states underwriters only partially adjust the offer price upward for positive demand information to compensate investors for truthfully

revealing their information, is extended to test whether demand-side uncertainty increases are associated with underpricing increases.

Using a sample of 2,694 firm-commitment IPOs from the 1990's, demand-side uncertainty measures constructed from the S1 registration statement are significant in explaining the variation between the actual and the expected first trading day closing price (magnitude). A logistic model based on the demand-side uncertainty measures classified which IPOs are priced outside the S1 filing range better than a naïve model. These results establish that the S1 data variables are reasonable proxies for demand-side uncertainty.

Hanley [1993] demonstrated the B-S prediction that partial adjustments lead to greater underpricing. This study demonstrates a different prediction of the B-S model, that IPOs with high demand-side uncertainty are more likely to have partial adjustments, and that the average level of underpricing will be higher for these firms. The empirical results strongly support this claim.

The study also examines whether underwriter reputation (high market share) is valuable for IPOs with high demand-side uncertainty, as one of many roles played by underwriters. Demonstrating that the number of high demand-side uncertainty IPOs increases during the 1990s, the study shows that a large number of these IPOs were underwritten by large underwriters. When demand elicitation is an important function of underwriters, the underwriters with a reputation for bringing high demand-side uncertainty IPOs to market reward their investor clientele with higher initial returns. The increasing number of small, high uncertainty IPOs underwritten by large underwriters provides a possible explanation for the reversal of the inverse relation between underwriter market share and underpricing since the late 1980s. Underwriters perform many functions, and this study supports the argument that demand elicitation is currently a highly significant one.

REFERENCES

Beatty, R. and I. Welch. 1996. Issuer Expenses and Legal Liability in Initial Public Offerings. *Journal of Law and Economics* (October): 545-602.

Bienveniste, L. and P. Spindt. 1989. How Investment Bankers Determine the Offer Price and Allocation of New Issues. *Journal of Financial Economics* (October): 343-361.

Botosan, C. 1997. Disclosure Level and the Cost of Equity Capital. *The Accounting Review* (July): 323-349.

Carter, R. and S. Manaster. 1990. Initial Public Offerings and Underwriter Reputation. *Journal of Finance* 45: 1045-1067.

Cooney, J., A Singh, R. Carter, and F. Dark. 1999. The IPO Partial-Adjustment Phenomenon and Underwriter Reputation, Kansas State University working paper.

Dunbar, C. 2000. Factors Affecting Investment Bank Initial Public Offering Market Share. *Journal of Financial Economics* 55-1, 3-41.

Hanley, K. W. 1993. The Underpricing of Initial Public Offering and the Partial Adjustment Phenomenon. *Journal of Financial Economics* (October): 231-250.

Ibbotson, R.G., J.L. Sindelar and J.R. Ritter "The Market's Problems with the Pricing of Initial Public Offerings" Journal of Applied Corporate Finance (Spring 1994): 66-74.

Megginson W. and K. Weiss. 1991. Venture Capitalist Certification in Initial Public Offerings. Journal of Financial Economics (July): 879-903.

Ritter, J. 1998. Initial Public Offerings. In *Warren, Gorham, and Lamont Handbook of Modern Finance* edited by Dennis Logue and James Seward, Boston and New York: WGL/RIA.

Steinberg, M. 1993. *Securities Regulation*. New York: Matthew Bender & Co.

White, H. 1980. A Heteroscedasticity-Consistent Covariance Matrix Estimator and a Direct Test for Heteroscedasticity. *Econometrica* (May): 817-38.

Figure 1

Timeline and Information Events

Pre-S1 **Negotiations and Due Diligence**	**S1 Registration to Offer Price** **Book Building**	**Offer Price to End of Day 1** **Demand Revealed**
No restrictions on public disclosure	**Quiet Period**	**Quiet Period**
Underwriter gathers information which reduces uncertainty about IPO firm (due diligence)	Road show informs clients, and distributes Red Herring	Shares are distributed and prospectus is submitted
The underwriter finalized (usually completed first)	Investors provide indications of interest, revealing demand information	First day trading allows **all** investors to reveal demand, dramatically reducing demand uncertainty
Set S1 price.	Underwriter monitors market conditions	Underwriter clients receive excess first day returns to reward them for demand revelation
File S1, revealing underwriters, venture capitalists, industry, size, growth rate, estimated proceeds	Set offer price	

TABLE 1

Descriptive Statistics
Number of Observations = 2,694

Panel A - Price Data

	Mean	Median	75th Percentile	25th Percentile	Variance
S1 Registration Statement					
High Filing Price	13.99	13.50	16.00	12.00	11.20
Mid-Point	13.00	12.50	15.00	11.00	10.80
Low Filing Price	12.02	11.50	14.00	10.00	10.50
Offer Price	13.08	13.00	15.50	10.00	17.16
Day One Closing Price	15.59	14.00	18.38	10.75	60.51
NASDAQ Return Prior to IPO	1.04%	1.17%	3.35%	-1.18%	0.00133

Panel B – S1 Registration Data (In Millions)

	Mean	Median	75th Percentile	25th Percentile	Variance
Revenue	165.04	46.20	124.70	19.40	279,633
EBIT	10.55	4.10	11.50	0.70	4,932
Book Value of Equity	61.81	34.30	61.30	20.40	19,363
Shares Outstanding	10.60	6.40	10.96	3.98	2.38 E8
Primary Shares Offered	3.44	2.50	3.75	2.00	9.22 E6

Internet - 97 Offerings

High Technology - 1323 Offerings

Venture Capital Backed - 1199 Offerings

Panel C – Regression Variables

	Mean	Median	75th Percentile	25th Percentile	Variance
Log of Revenues	17.634	17.647	18.641	16.781	2.7538
Cash Burn Rate	(0.8627)	0.000	0.000	0.000	42.8821
Book to Expected Market	0.558	0.528	0.682	0.391	0.7775
Book to Revised Market	0.612	0.571	0.735	0.421	0.1481
Underwriter Market share	4.404%	5.142%	6.253%	0.721%	26.4414
Market Conditions	1.042%	1.173%	3.345%	(1.182%)	0.0013

Cash Burn Rate = If earnings before interest & taxes (EBIT) less than zero, then EBIT divided by expected market value of equity, otherwise 0

Book to Expected Market = (Total equity + expected proceeds) / expected market value of equity (based on S1 data)

Book to Revised Market = (Total equity + actual proceeds) / expected market value of equity (based on offer price)

Underwriter market Share = Percentage share of the total IPO proceeds for year t

Market Conditions = NASDAQ returns for 15 trading days prior to offer date

TABLE 2

Mean (Median) for Changes in S1 Midpoint, Offer Price and First Trading Day Closing Price by Year

YEAR	S1 Midpoint to Offer Price Partial Adjustment	Offer Price to First Trading Day Close Underpricing, γ_t	S1 Midpoint to First Trading Day Close α_t
1990	(0.97%) 0.00%	10.36% 5.73%	10.64% 7.49%
1991	1.71% 4.17%	11.67% 7.69%	14.78% 14.05%
1992	(4.68%) (4.06%)	9.67% 4.17%	6.23% 1.47%
1993	0.77% 0.00%	11.86% 6.00%	14.46% 7.69%
1994	(6.00%) (4.78%)	8.43% 3.57%	3.24% (1.00%)
1995	6.11% 6.38%	20.68% 12.57%	31.84% 18.75%
1996	1.43% 0.00%	16.44% 11.11%	20.70% 11.36%
1997	(1.72%) 0.00%	14.21% 10.68%	13.81% 9.24%
1998	(0.23%) 0.00%	24.48% 10.53%	28.67% 7.14%
1999	20.57% 15.39%	65.55% 31.62%	118.63% 58.70%

TABLE 3

Regressions of Demand-Side Uncertainty on S1 Registration Variables and Controls

Dependent Variable = $\beta_0 + \beta_1 LRev_i + \beta_2 CashBurn_i + \beta_3 B2M_i + \beta_4 Internet_I + \beta_5 Tech_i + \beta_6 VC_i + \beta_7 UWMktShr_i + \beta_8 MktCond_i + \varepsilon_i$

(Number of Observations Is 2,694)

	Dependent Variable		
	OLS Regressions[a]		Logistic[b]
Independent Variables	ABS(Demand)	(Demand)^2	Outside S1 Range
INTERCEPT (β_0)	7.9736	211.12	-0.1128
	(6.19)***[c]	(4.31)***	(0.04)
LOG OF REVENUES ($\beta_1 LRev_i$)	-0.2273	-10.14	0.0137
	(-3.27)***	(-3.81)***	(0.22)
CASH BURN RATE ($\beta CashBurn_i$)	0.0210	0.69	0.0064
	(1.36)	(1.17)	(0.87)
BOOK TO EXPECTED MARKET ($\beta_3 B2M_i$)	-2.4475	-60.79	-0.6047
	(-7.10)***	(-4.61)***	(16.76)***
INTERNET INDICATOR ($\beta_4 Internet_i$)	5.2679	204.73	0.9703
	(10.10)***	(10.26)***	(15.00)***
HIGH TECHNOLOGY INDICATOR ($\beta_5 Tech_i$)	0.7400	14.63	-0.0829
	(3.54)***	(1.83)*	(0.91)
VENTURE CAPITALIST INDICATOR ($\beta_6 VC_i$)	0.1466	-2.56	0.3607
	(0.72)	(-0.33)	(17.99)***
UNDERWRITER MARKET SHARE	0.2306	7.40	0.0321
($\beta_7 UWMktShr_i$)	(11.68)***	(9.80)***	(13.93)***
MARKET CONDITIONS ($\beta_8 MktCond_i$)	8.0284	189.57	3.8839
	(3.12)***	(1.92)*	(12.74)***
ADJUSTED R^2	13.87%	10.20%	4.57%
PERCENT CORRECT PREDICTION			57.9%
NAÏVE MODEL PERCENT CORRECT			52.9%

ABS(DEMAND)	=	Absolute value of the difference between actual and expected first day closing price
(DEMAND)2	=	Square of the difference between actual and expected first day closing price
OUTSIDE S1 RANGE	=	1 (0) if the offer price is outside the original S1 filing range
LOG OF REVENUES	=	Natural log of revenues
CASH BURN RATE	=	If EBIT less than zero, then EBIT divided by expected market value of equity, otherwise 0
BOOK TO EXPECTED MARKET	=	(Total equity + expected proceeds) / expected market value of equity (based on S1 data)
INTERNET INDICATOR	=	1 (0) if Internet company - Securities Data Corporation data base
HIGH TECH INDICATOR	=	1 (0) if High Tech company - Securities Data Corporation data base
VENTURE CAPITALIST INDICATOR	=	1 (0) if backed by venture capitalist - Securities Data Corporation data base
UNDERWRITER MARKET SHARE	=	Percentage share of the total IPO proceeds for year t
MARKET CONDITIONS	=	NASDAQ returns for 15 trading days prior to offer date

* Significant at the 10% level, ** Significant at the 5% level, *** Significant at the 1% level.

a Each entry in the first two data columns shows the OLS regression coefficient for each independent variable with the corresponding *t*-statistic and its significance directly below

b Each entry in the final data column shows the logistic regression coefficient for each independent variable with the corresponding χ^2-statistics and its significance directly below.

c The *t*-statistics are computed using the White [1980] adjustment to the variance-covariance matrix.

TABLE 4

Regression of Underpricing on S1 Registration Variables and Controls

Dependent Variable = $\beta_0 + \beta_1 PA_i + \beta_2 PAInd_i + \beta_3 LRev_i + \beta_4 CashBurn_i + \beta_5 B2M_i + \beta_6 Internet_i + \beta_7 Tech_i + \beta_8 VC_i + \beta_9 UWMktShr_i + \beta_{10} MktCond_i + \varepsilon_i$

(Number of Observations Is 2,694)

Variables	Dependent Variable OLS Regressions[a] - Underpricing S1 Filing Information	Information at Offering	Logistic[b] Unexpected Underpricing
INTERCEPT (β_0)	0.5666 (7.81)***[c]	0.4822 (7.52)***	1.1753 (2.90)*
PARTIAL ADJUSTMENT ($\beta_1 PA_i$)	-	0.0390 (15.16)***	0.4492 (148.13)***
POSITIVE ADJUSTMENT INDICATOR ($\beta_2 PAInd_i$)	-	0.0815 (5.26)***	0.4881 (10.28)***
LOG OF REVENUES ($\beta_3 LRev_i$)	-0.0267 (-6.79)***	-0.0220 (-6.25)***	-0.1114 (8.73)***
CASH BURN RATE ($\beta_4 CashBurn_i$)	0.0029 (3.33)***	0.0016 (2.04)**	0.0337 (4.83)**
BOOK TO EXPECTED MARKET ($\beta_5 B2M_i$)	-0.0823 (-4.22)***	-	-
BOOK TO REVISED MARKET ($\beta_5 B2MR_i$)	-	-0.0336 (-2.65)***	-0.3839 (4.99)**
INTERNET INDICATOR ($\beta_6 Internet_i$)	0.4190 (14.19)***	0.3116 (11.87)***	-0.1010 (0.14)
HIGH TECHNOLOGY INDICATOR ($\beta_7 Tech_i$)	0.0512 (4.32)***	0.0302 (2.87)**	0.1409 (1.83)
VENTURE CAPITALIST INDICATOR ($\beta_8 VC_i$)	0.0241 (2.10)**	0.0063 (0.61)	0.0973 (0.92)
UNDERWRITER MARKET SHARE ($\beta_9 UWMktShr_i$)	0.0129 (11.51)***	0.0076 (7.48)***	-0.0078 (0.54)
MARKET CONDITIONS ($\beta_{10} MktCond_i$)	1.1729 (8.04)***	0.6858 (5.20)***	3.4007 (6.49)**
ADJUSTED R^2	19.46%	36.46%	25.43%
PERCENT CORRECT PREDICTION			76.4%
NAÏVE MODEL PERCENT CORRECT			64.7%

UNDERPRICING	=	Percentage change from offer price to first day closing price
UNEXPECTED UNDERPRICING	=	1 (0) if actual day one closing price is greater than expected closing price
PARTIAL ADJUSTMENT	=	Offer price less midpoint of S1 registration filing range
POSITIVE ADJUSTMENT INDICATOR	=	1 (0) if offer price is greater than original high filing price
LOG OF REVENUES	=	Natural log of revenues
CASH BURN RATE	=	If EBIT less than zero, then EBIT divided by expected market value of equity, otherwise 0
BOOK TO EXPECTED MARKET	=	(Total equity + expected proceeds) / expected market value of equity (based on S1 data)
BOOK TO REVISED MARKET	=	(Total equity + actual proceeds) / expected market value of equity (based on offer price)

INTERNET INDICATOR	=	1 (0) if Internet company - Securities Data Corporation data base
HIGH TECHNOLOGY INDICATOR	=	1 (0) if High Tech company - Securities Data Corporation data base
VENTURE CAPITALIST INDICATOR	=	1 (0) if backed by venture capitalist - Securities Data Corporation data base
UNDERWRITER MARKET SHARE	=	Percentage share of the total IPO proceeds for year t
MARKET CONDITIONS	=	NASDAQ returns for 15 trading days prior to offer date

* Significant at the 10% level, ** Significant at the 5% level, *** Significant at the 1% level.

a Each entry in the first two data columns shows the OLS regression coefficient for each independent variable with the corresponding *t*-statistic and its significance directly below

b Each entry in the final data column shows the logistic regression coefficient for each independent variable with the corresponding χ^2-statistics and its significance directly below.

c The *t*-statistics are computed using the White [1980] adjustment to the variance-covariance matrix.

TABLE 5

Mean Statistics by Underwriter Market Share

PANEL A – Demand-Side Uncertainty Measures

Underpricing Percentage

Underwriter	1990	N	1991	N	1992	N	1993	N	1994	N	1995	N	1996	N	1997	N	1998	N	1999	N
High	12.61%	22	11.44%	66	8.38%	91	15.67%	96	9.96%	51	23.39%	98	22.62%	102	19.47%	47	39.74%	46	101.11%	43
Medium	9.09%	45	12.02%	134	11.35%	148	12.04%	193	9.23%	162	21.41%	150	15.85%	255	14.25%	171	22.40%	94	77.63%	64
Low	11.11%	10	10.70%	33	7.95%	77	8.63%	124	5.61%	74	14.51%	61	11.83%	104	9.84%	58	14.91%	55	18.44%	20
Total	10.36%	77	11.67%	233	9.67%	316	11.86%	413	8.43%	287	20.68%	309	16.44%	461	14.21%	276	24.48%	195	65.56%	127

Partial Adjustment Percentage

Underwriter	1990	N	1991	N	1992	N	1993	N	1994	N	1995	N	1996	N	1997	N	1998	N	1999	N
High	0.88%	22	4.60%	66	(3.24%)	91	5.43%	96	(2.70%)	51	7.47%	98	7.76%	102	7.32%	47	12.68%	46	34.05%	43
Medium	(1.07%)	45	1.02%	134	(2.55%)	148	0.29%	193	(6.35%)	162	7.96%	150	0.73%	255	(1.57%)	171	(1.98%)	94	16.69%	64
Low	(4.58%)	10	(1.27%)	33	(10.49%)	77	(2.06%)	124	(7.49%)	74	(0.61%)	61	(3.06%)	104	(9.49%)	58	(8.26%)	55	4.01%	20
Total	(0.97%)	77	1.71%	233	(4.68%)	316	0.77%	413	(6.00%)	287	6.11%	309	1.43%	461	(1.72%)	276	(0.23%)	196	20.57%	127

Absolute Value of Demand-Side Uncertainty

Underwriter	1990	N	1991	N	1992	N	1993	N	1994	N	1995	N	1996	N	1997	N	1998	N	1999	N
High	3.7898	22	3.1860	66	3.6938	91	4.5971	96	3.7737	51	5.9498	98	4.9495	102	4.5438	47	8.3587	46	18.6832	43
Medium	3.0025	45	2.9115	134	3.5121	148	3.3537	193	3.0562	162	4.7297	150	4.1720	255	3.1572	171	4.7343	94	14.1349	64
Low	2.0109	10	2.1994	33	2.6590	77	2.0747	124	1.8025	74	3.5537	61	2.9033	104	3.3227	58	4.2012	55	12.2632	20
Total	3.1034	77	2.8884	233	3.3565	316	3.2586	413	2.8605	287	4.8845	309	4.0578	461	3.4281	276	5.4380	196	15.3801	127

PANEL B – S1 Registration Information

Revenues Prior to Offering

Underwriter	1990	N	1991	N	1992	N	1993	N	1994	N	1995	N	1996	N	1997	N	1998	N	1999	N
High	829.6	22	298.7	66	327.5	91	408.9	96	470.3	51	377.9	98	418.4	102	331.8	47	241.2	46	210.9	43
Medium	126.6	45	133.9	134	113.0	148	112.3	193	180.4	162	89.1	150	91.8	255	108.2	171	129.4	94	139.8	64
Low	30.9	10	51.4	33	39.8	77	59.6	124	45.2	74	49.6	61	58.7	104	40.1	58	43.4	55	38.2	20
Total	315.0	77	168.9	233	156.9	316	165.4	413	197.0	287	172.9	309	156.6	461	131.9	276	125.3	195	147.9	127

Cash Burn Rate for Offerings with Negative EBIT

Underwriter	1990	N	1991	N	1992	N	1993	N	1994	N	1995	N	1996	N	1997	N	1998	N	1999	N
High	(0.0044)	22	(0.2891)	66	(0.4281)	91	(0.7998)	96	(0.1803)	51	(0.1722)	98	(2.5000)	102	(0.1197)	47	(0.3525)	46	(2.7932)	43
Medium	(0.0030)	45	(0.9586)	134	(0.7583)	148	(0.3606)	193	(0.2597)	162	(1.1673)	150	(1.7343)	255	(1.8647)	171	(0.5365)	94	(1.5412)	64
Low	(0.0043)	10	(0.1495)	33	(0.8306)	77	(0.6867)	124	(0.1510)	74	(0.2180)	61	(0.4169)	104	(1.1274)	58	(0.1878)	55	(1.5566)	20
Total	(0.0036)	77	(0.6520)	233	(0.6808)	316	(0.5606)	413	(0.2176)	287	(0.6643)	309	(1.6066)	461	(1.4126)	276	(0.3958)	195	(1.9675)	127

Book to Expected Market Value

Underwriter	1990	N	1991	N	1992	N	1993	N	1994	N	1995	N	1996	N	1997	N	1998	N	1999	N
High	0.4774	22	0.6283	66	0.6222	91	0.5446	96	0.5423	51	0.4283	98	0.4222	102	0.6444	47	0.5433	46	0.3163	43
Medium	0.6492	45	0.6106	134	0.6066	148	0.6126	193	0.5896	162	0.4773	150	0.4792	255	0.6058	171	0.5965	94	0.3526	64
Low	0.7544	10	0.5871	33	0.6257	77	0.6625	124	0.6193	74	0.5631	61	0.5700	104	0.5839	58	0.5790	55	0.3964	20
Total	0.6140	77	0.6123	233	0.6157	316	0.6118	413	0.5889	287	0.4787	309	0.4871	461	0.6077	276	0.5790	195	0.3472	127

Internet

Underwriter	1990	N	1991	N	1992	N	1993	N	1994	N	1995	N	1996	N	1997	N	1998	N	1999	N
High	0	22	0	66	0	91	1	96	0	51	3	98	4	102	0	47	6	46	14	43
Medium	0	45	0	134	1	148	0	193	2	162	5	150	12	255	5	171	10	94	17	64
Low	0	10	0	33	1	77	1	124	1	74	1	61	1	104	2	58	4	55	6	20
Total	0	77	0	233	2	316	2	413	3	287	9	309	17	461	7	276	20	195	37	127

High Tech

Underwriter	1990	N	1991	N	1992	N	1993	N	1994	N	1995	N	1996	N	1997	N	1998	N	1999	N
High	5	22	29	66	29	91	29	96	16	51	48	98	43	102	17	47	39	46	37	43
Medium	21	45	58	134	63	148	81	193	74	162	102	150	168	255	84	171	63	94	49	64
Low	5	10	12	33	34	77	45	124	28	74	22	61	54	104	25	58	29	55	14	20
Total	31	77	99	233	126	316	155	413	118	287	172	309	265	461	126	276	130	195	100	127

Venture Capitalist Backed IPO

Underwriter	1990	N	1991	N	1992	N	1993	N	1994	N	1995	N	1996	N	1997	N	1998	N	1999	N
High	12	22	33	66	41	91	46	96	18	51	46	98	40	102	10	47	17	46	27	43
Medium	24	45	82	134	85	148	108	193	68	162	86	150	133	255	57	171	36	94	43	64
Low	3	10	10	33	33	77	49	124	21	74	18	61	30	104	12	58	8	55	3	20
Total	39	77	125	233	159	316	203	413	107	287	150	309	203	461	79	276	61	195	73	127

Underwriters are classified into High, Medium, and Low based on market share by year. High underwriters are in the top quartile of market share for year t, low underwriters in the bottom quartile, and medium underwriters in the middle quartiles.

Footnotes

[1] Beatty and Ritter[1989] examined the role of ex ante uncertainty about the IPO, the supply side information uncertainty. They demonstrate that underwriters must set underpricing large enough to reward investors and small enough to satisfy the issuing firm.

[2] The hot market control variable is added to all hypothesis tests to control for market movements.

[3] The IPO literature equates underwriter market share with underwriter reputation. Carter and Manaster [1990] evaluated underwriter placement in tombstones to determine reputation effects. Others researchers use market share as an indicator of reputation. Megginson and Weiss [1991] establish that the market share measures were consistent with the Carter and Manaster ratings. Underwriters with large market share are referred to as "large underwriters," and so forth.

[4] We also classified underwriters according to their market share over the previous five years. This change had no significant effects on the descriptive statistics.

[5] For some supplemental analyses, data from 1985 through 1989 is used to estimate the market share of each underwriters.

[6] Securities Data Corporation maintains an active list of venture capitalist for which it creates its indicator.

[7] Throughout the paper, the possible effect of the overallotment option upon all the variable measurements is ignored.

[8] Another hypothesis might be that large IPOs need to use large underwriters to place their offerings. This hypothesis would reverse the expected sign for this variable. To focus on demand uncertainty, IPOs over $500,000,000 in total proceeds were eliminated from the sample group.

[9] In unreported sensitivity analysis, underwriter reputation measures were created for a five year period and by an equally weighted basis for one and five year periods. The results were qualitatively similar.