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Valuation of Internet Stocks—An IPO Perspective

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ABSTRACT

We empirically investigate valuations of Internet firms at various stages of the initial public offering (IPO) from two perspectives. First, we examine the association between the valuation of Internet IPOs and a set of financial and nonfinancial variables, which prior anecdotal or empirical evidence suggests may serve as value drivers. Second, we document differences in IPO valuations between Internet and non-Internet firms as well as across different stages in the IPO process—i.e., initial prospectus price, final offer price, and first trading day price—within each set of firms. Our primary two conclusions are as follows. First, there are noticeable differences between valuations of Internet and non-Internet firms, especially at the prospectus and final IPO stage. Specifically, the valuation of non-Internet firms generally follows the conventional wisdom regarding valuation: positive earnings and cash flows are priced, while negative earnings and negative cash flows are not. The valuation of Internet firms, however, departs from conventional wisdom, with earnings not being priced, and negative cash flows being priced perhaps because they are viewed as investments. This difference between the two classes of firms may be expected, given the age and unique nature of the Internet industry. Second, there are significant differences between the initial valuation of firms at the prospectus and IPO stage and their valuation by the stock market at the end of the first trading day. For non-Internet firms, the difference is largely ascribed to the relative offering size. For Internet firms, however, the differences are with respect to positive cash flows, sales growth, R&D, and high-risk warnings, in addition to the relative offering size.

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1. Introduction

Since its onset in 1994, the New Economy Internet industry has exhibited unprecedented growth in the number of firms and market capitalization. In 1994, two Internet companies went public, raising less than 65 million dollars; in 1999, 192 Internet firms went public, raising over 14 billion dollars. While the rich valuations observed in late 1999 (e.g., unusually high market to book and market to sales ratios) imply that the market expected Internet companies to grow rapidly, the vast majority has yet to show a profit. This makes traditional valuation methods based on metrics such as earnings and book values less applicable to Internet firms and has lead researchers to search for alternative value drivers for Internet firms (Hand [2000a], Demers and Lev [2001], Trueman et al. [2000]).

In this paper, we focus on the valuation of Internet firms at the initial public offering (IPO) stage. We examine this issue from two viewpoints. First, we examine the association between the valuation of Internet IPOs and a set of financial and nonfinancial variables, which prior anecdotal or empirical evidence suggests may serve as value drivers. Second, we document differences in IPO valuations between Internet and non-Internet firms as well as across different stages in the IPO process (i.e., final offer price and first trading day price) within each set of firms.

The analyses are performed at three distinct points in time—when an IPO is initially priced, when the IPO is actually carried out, and finally at the end of the IPO's first day of trading. The first two points in time pertain to how IPOs are priced, while the last pertains to how they are received by the stock market in their debut.

Our analyses involve three types of explanatory variables. The first, a set of financial variables, includes earnings, cash flows, sales, and book values. The second, a set of nonfinancial variables, includes relative offering size (*FLOAT*) and a measure capturing the relative position of the final offer price relative to its initial price range (*PARTIAL*).[1] The third type of explanatory variables is primarily a set of control variables shown by prior research to be important in explaining IPO valuations.

We find significant differences between the valuation of Internet firms and non-Internet firms especially at the initial IPO pricing stage and at the time of the IPO. Earnings are significant only for the IPOs of non-Internet firms, and not for Internet firms. While positive cash flows are significant for both samples, negative cash flows are significant only for Internet firms, perhaps because for these firms they are viewed as investments. IPOs of Internet firms also receive higher multiples of positive cash flows and sales than non-Internet firms. Finally, sales growth and relative offering size (*FLOAT*) are important only for Internet firms.

[1] As explained later in detail, the measure capturing the relative position of the final offer price with respect to its initial price range is used only when the price at the end of the first day of trading is the dependent variable.

There are also differences in valuations between Internet and non-Internet firms at the end of the first trading day. However, the differences here are primarily in the relative importance of the variables, not in which of the variables are significant. Specifically, the stock price is insignificantly related to any of the financial variables for either sample. The non-financial variables, *FLOAT* and *PARTIAL*, are significant in both samples. However, they play a much greater role in the valuation of Internet firms.

The next section reviews prior research, provides brief background on the Internet industry, and outlines the IPO process. Section 3 develops the hypotheses. Section 4 describes the sample selection procedure and reports summary statistics for and pair-wise correlation among all variables used in the analysis. Section 5 outlines the tests and discusses the results. Section 6 concludes the study with a summary of our findings.

2. *Prior Research, Background on the Internet Industry, and the IPO Process*

2.1 PRIOR RESEARCH

In this section we review two types of literature. The first concerns Internet industry-related valuation relevance studies, and the second pertains to the valuation of non-Internet IPOs. With respect to the former, Hand [2000a] demonstrates that financial statement data of Internet firms—core net income (defined as net income less special items) and pre-income book values—are value-relevant during the period 1997 to mid-1999. Specifically, he finds that the market values of Internet firms are linear and increasing in their book equity and concave and increasing in positive core net income, but concave and decreasing in negative core net income. Unlike Hand [2000a], Trueman et al. [2000], who used different samples, time periods and functional forms, find a significant negative, not positive, association between earnings and Internet firms' market prices. After decomposing earnings into its components, however, they find gross profits to be significantly positively associated with prices.

Demers and Lev [2001], Hand [2000b], and Rajagopal et al. [2000] investigate the value relevance of Web traffic for Internet companies. They find that measures of web traffic, particularly those indicating "reach" (percentage of a web site's visitors relative to the total web-surfing population), are value-relevant, but the book value of equity and current and expected future earnings dominate web traffic measures in explaining Internet companies' market values. Schwartz and Moon [2000] use real-options theory and capital-budgeting techniques to demonstrate that the valuations of Internet companies may be rational if growth rates in revenues are sufficiently high and volatile.

IPO valuation has been investigated by prior research using samples of non-Internet firms. Klein [1996] empirically investigates the usefulness of prospectus information in valuation of IPOs in the period 1980–1991 (i.e.,

before the inception on the Internet industry). She finds that offering price and after-market price (price one week after the IPO) are related positively to earnings per share, book value of equity per share, the amount of equity retained by insiders, the prestige of the underwriter and whether the offering is a bundled offering (i.e., an inseparable package of common stock and warrants) or not. She also finds that price is negatively related to whether the prospectus cover displays an explicit reference to the risk of the offering. Kim and Ritter [1999] use comparable firm multiple techniques and apply them to the prospectus's earnings, book value and sales numbers to calculate value estimates for non-Internet IPOs. They predict and find that valuation errors increase at three different stages of IPOs—the preliminary offer price, the final offer price and the first market price. Their explanation is that additional information that gets revealed during the IPO process leads to the price changes.

2.2 THE INTERNET INDUSTRY

By March 2000, six years since its inception (and just before its meltdown), the Internet industry had become the second leading technology industry in terms of wealth creation with a total market value exceeding the $1 trillion mark, only slightly trailing the more mature software industry. It consists of over 400 publicly traded companies in the U.S. Internet firms operate in a wide variety of sectors; Wall Street Research Net partitions the industry into 13 sectors.[2]

Valuing technology stocks is a formidable task due to their massive investments in intangible assets (e.g., R&D) whose values are typically hard to ascertain. Valuing Internet stocks is even more difficult because not only do they invest heavily in intangible assets (e.g., developing new technologies and a critical mass of clientele), but they actually attempt to transform the way in which business is transacted. In addition, the vast majority of Internet companies have been generating significant, and often growing, losses. This lack of profitability further contributes to the substantial uncertainty that has surrounded the valuation of Internet stocks virtually since the inception of the industry. A case in point: *Business Week*, in its December 14, 1998 issue, provides excerpts of an e-mail message from an apparently confused investor posted at Internet.com, "I have some Internet stocks . . . I'd sure like to buy more. But I'll think to myself, these stocks are ridiculously high, they CAN'T go higher. BUT THEY DO. . . I can't bear missing out on the excitement. But I also can't connect reality to what I see in the stock valuations."

2.3 THE IPO PROCESS

For a company, going public typically marks the transformation from startup adolescence to corporate adulthood. Once a public company goes

[2] Go to http://www.wsrn.com/apps/internetstocks/ for more details.

TABLE 1
IPOs in the Ten-Year Period 1990–1999

	All firms[1]		Internet firms[2]	
Year	Number of offerings	Dollar value (millions)	Number of offerings	Dollar value (millions)
1990	158	4,627.20	1	50.40
1991	380	16,350.29	0	0.00
1992	528	29,359.18	2	64.60
1993	628	38,524.67	0	0.00
1994	539	31,619.41	2	46.40
1995	557	31,769.75	2	86.44
1996	786	36,955.88	19	484.72
1997	603	38,449.88	29	853.69
1998	362	49,992.37	42	2,132.32
1999	545	104,982.06	192	14,247.42
Total	5,086	382,630.69	289	17,965.99

[1] Data source: www.marketdata.nasdaq.com.
[2] Data source: www.Internet.com (1996–1998) and www.Internetnews.com (rest of the years).

public it commands, among other things, a publicly traded stock that can be used as a currency to finance acquisitions. This benefit may explain why, in the ten-year period 1990–1999, more than 5,000 firms went public, raising nearly 400 billion dollars (see table 1).

Once a company's board of directors has decided to go public, the company hires an investment banker to underwrite the offering. The company then drafts the prospectus, the only document a company can use to communicate with potential investors during an IPO. The prospectus contains, among other things, financial information about the company and the terms of the offer. In a firm commitment offer, the terms of the offer include the offer price, which is stated in the form of a range whose midpoint is the expected offer price. Upon completion, the prospectus is filed with the Securities and Exchange Commission (SEC).[3]

The time from the filing of the prospectus to the final offer date is the "waiting period." The underwriter uses the waiting period to gather information about the demand for the issue from investors through nonbinding indications of interest. If demand for the issue is greater (lower) than expected, the final offer price will be set higher (lower) than the expected offer price disclosed in the prospectus. To induce truth-telling by investors with good information in the waiting period, the expected profit of truth tellers must be higher than that of the liars. If shares of the issue are rationed, this must be obtained by underpricing.[4]

[3] Section 5(b) of the Security Act of 1933 requires issuing firms to file an S-1 registration form with the SEC prior to the sale of securities to the public. The first part of the S-1 form is the prospectus.

[4] Changes in the offer price are often accompanied by parallel revisions in the number of shares being offered.

It is a well documented fact that IPOs tend to be underpriced, i.e. they tend to trade significantly above their offer price in their debut (see, Ibbotson and Ritter [1995] for a review of the literature on underpricing). Benveniste and Spindt [1989], who develop a model of pricing and allocation rules used by underwriters of IPOs to induce truth-telling by investors, predict that IPOs priced toward the upper bound of their offer range are likely to be more underpriced than other IPOs. The intuition underlying this prediction follows because if the potential underpricing at the expected offer price is relatively large, a firm is able to increase its final offer price and still have more underpricing than other firms with less initial underpricing. Consistent with this prediction, Hanley [1993] documents a positive association between the stock price change of IPOs on their first trading day and the ratio of the final offer price to the expected offer price disclosed in the prospectus.

Leland and Pyle [1977] show that the percentage of shares offered to the public, which potentially may serve as a signal of the unobservable information of the entrepreneurs about the future prospects of their company, is an important value driver. On a related note, Shleifer [1986] finds that stocks with lesser supply are likely to be priced higher. Schultz and Zaman [2001] find evidence that suggests Internet firms do not go public simply as a vehicle for founders to bail out. They find strong evidence that managers of Internet firms go public in order to grab market share.

3. Dependent and Independent Variables

This study examines value drivers underlying the initial price in the prospectus, i.e., the midpoint of the range of the offer price disclosed in the prospectus (*PROSPPRICE*), the final offer price (*IPOPRICE*), and the price at the end of the first trading day (*ENDPRICE*) using a sample of Internet IPOs and a control sample of non-Internet IPOs. It also tests for differences in the importance of the value drivers across the two samples.

Our tests evaluate the ability of five major financial variables—earnings per share (*EPS*), operating cash flow per share (*CFOPS*), sales per share (*SALESPS*), book value per share (*BVPS*), and the annual sales growth (*SGR*)—to explain the cross-sectional variation in *PROSPPRICE*, *IPOPRICE* and *ENDPRICE*. We select these five explanatory variables because prior research has shown that these variables are important for equity valuation. We also consider the level of R&D per share (*RDPS*) as an additional explanatory variable because our sample firms are likely to be R&D intensive.

Our tests also consider one non-financial variable, *FLOAT*, for *PROSPPRICE* and *IPOPRICE*, and two non-financial variables, *FLOAT* and *PARTIAL*, for *ENDPRICE*, because prior literature has demonstrated their importance for IPO pricing. In addition, we control for a variety of variables shown by prior IPO literature to be important for IPO pricing. Below we develop predictions regarding the relation between each of the explanatory variables and our three dependent variables.

3.1. FINANCIAL VARIABLES

3.1.1. Earnings and Cash Flows. In equity valuation, the most commonly used financial variables are earnings and cash flows. For example, earnings are used in the ubiquitous P/E ratios (and more recently P/E to growth ratios, i.e., PEG), and cash flows are used in methods of valuation such as the discounted cash flow (DCF) model. Prior research has shown asymmetries in the relations between market values of equity and positive and negative earnings (see, e.g., Hayn [1995], and Hand [2000]). These asymmetries follow because positive earnings are likely to persist, while negative earnings are likely to be transitory and thus less informative about future earnings and cash flows (Basu [1997]). We hence break up our measures for earnings and cash flows into positive and negative components by interacting them with a dummy variable. We also use these two dummy variables as fixed effects to allow the intercept to vary across positive and negative earnings and cash flows.

3.1.2. Sales and Sales Growth. In the absence of a history of profits and meaningful book values, conventional wisdom suggests that investors rely on revenue as an important financial value driver. The following excerpt perhaps best highlights this: "... revenues are the lifeblood of these companies and their stocks because earnings often are nonexistent. Investors want growth at Internet firms. When they can't look at earnings, they look for go-go revenue growth" (see, *The Wall Street Journal* [2000a]). This conventional wisdom is supported by empirical findings in Davis [2001], which indicate that revenues are value relevant for Internet firms.

The importance revenue plays in the valuation of Internet firms and the problems associated with revenue reporting practices in this industry have not gone unnoticed by regulators. According to *The Wall Street Journal* [2000b], "A top rule-making panel at the Financial Accounting Standards Board is considering whether the rules should be changed to restrict Internet businesses from including in revenue figures the entire value of product sales or services they arrange between suppliers and buyers online. To the Securities and Exchange Commission and the FASB, it is called 'grossing up' revenue. To many dot-com companies, it is a vital part of their financial health, at a time when they have no profits to show."

We use two revenue-based variables: sales per share for the year just prior to the IPO (*SALESPS*) and annualized sales growth in the years prior to the IPO (*SGR*).

3.1.3. Book Values. In addition to the "flow" variables discussed above, we also include one stock variable, book value of equity. Research in Internet valuation (see, e.g., Hand [2000a]) has indicated that negative book values may have very different valuation implications than positive book values for Internet firms. Negative book values may indicate investments in R&D and other intangibles over the years leading to the IPO and thus may be valued by the stock market. To consider this possibility, we break up book value into

positive and negative components using a dummy variable. We also use this dummy variable as a fixed effect to allow the intercept to vary across positive and negative book values.

3.2 NON-FINANCIAL VARIABLES

3.2.1. FLOAT. *FLOAT* represents the amount of shares sold in the IPO as a percentage of total shares outstanding. Results in prior research imply that FLOAT and our dependent variables will be negatively related. For example, the supply and demand hypothesis implies that stocks with lesser supply are likely to be priced higher (see Shleifer [1986]). Leland and Pyle [1977] and Schultz and Zaman [2001] have shown that greater relative insider ownership (i.e., low *FLOAT*) should be a positive signal to investors because it indicates that the IPO is not simply a vehicle for the founders to bail out. Greater insider ownership (low *FLOAT*) may indicate a higher stock price for yet another reason. It may point to lower agency costs, as the interests of managers and shareholders are better aligned.

3.2.2. PARTIAL. For the regressions for *ENDPRICE*, we include an additional non-financial variable, *PARTIAL*. This variable measures the position of the final offer price relative to the expected price at the time the prospectus was filed. We add this variable because prior research has shown theoretically (see Benveniste and Spindt [1989]) and empirically (see Hanley [1993]) that this variable is an important predictor for IPOs' first-day stock price performance. Specifically, this prior research has demonstrated that IPOs priced toward the upper bound of their offer range are likely to be more underpriced than other IPOs.

3.3 CONTROL VARIABLES

3.3.1. Research and Development. Statement of Financial Accounting Standard (SFAS) No. 2 requires immediately expensing research and development costs. However, prior studies (see, e.g., Lev and Sougiannis [1996]) have found that R&D has long lived benefits and is value-relevant for valuation purposes. Given this finding and the fact that our sample firms are likely to be R&D intensive, we include R&D as an explanatory variable.

3.3.2. Major Underwriter. Titman and Trueman [1986] posit that firms expecting relatively high growth or low risk in earnings and/or revenues will signal this favorable information to outside investors by selecting a more "prestigious" underwriter, who would present more accurate prospectuses than a less prestigious underwriter. This implies that, other things being equal, hiring a large underwriter will result in a higher valuation of the IPO. Empirical support for this hypothesis is provided by Klein [1996]. We thus control for the type of the underwriter by using *MAJ_UND* as a dummy explanatory variable, which is equal to 1 if the lead underwriter is a large underwriter, and 0 otherwise.

3.3.3. High Risk Warning. Klein [1996] finds that firms that issued a boldface warning on their cover page to the effect that the IPO is a high risk

investment commanded lower IPO prices and lower prices after the IPO as well. We define *HIRISK* as a dummy variable equal to 1 if the prospectus's cover page has a boldface risk warning, and 0 otherwise.

3.3.4. Nature of Offering. Often, bundled offerings to public investors are inseparable packages of common stock and warrants. Prior literature (see, e.g., Schultz [1993] and Klein [1996]) has found that firms with bundled offerings appear to be more risky and receive lower valuations. *WARRANT* is set equal to 0 if the offering is an equity offering only and 1 if the offering is a bundled offer.

3.3.5. Level of NASDAQ. The inflation-adjusted level of the NASDAQ index (*NASD_ADJ*) is included as an explanatory variable to control for the market and economy-wide sentiment prevailing at the time of the IPO. If the market-wide sentiment is trending higher, the IPO price should also be higher. We define *NASD_ADJ* as the inflation-adjusted level of the NASDAQ index.

4. Data

4.1 SAMPLE SELECTION

Our sample covers the 42-month period from January 1996 to June 1999. Our sample period begins in January 1996 because there were hardly any Internet firms in the public domain before that time (see table 1). The list of Internet firms was obtained from www.Internet.com, a well-established web site for information on all aspects of Internet firms as well as IPO information for both Internet and non-Internet firms. This web site classifies a firm as an Internet firm primarily on the basis of the 51-percent test (i.e., if 51 percent or more of its revenues come from the Internet).

Table 2 summarizes the effects of the sample-selection criteria on the sample size. The initial sample taken from www.Internet.com consists of 233 Internet companies that filed an IPO prospectus with the SEC during our sample period. We dropped 22 firms as they cancelled their plan to go public, reducing our sample size to 211 firms that went public during our sample period. We dropped 21 firms due to our inability to find their prospectus on www.edgar-online.com, the source from which we obtained financial information, decreasing the sample size to 190 firms. We lost 23 firms because we were unable to obtain their CUSIPs needed for retrieving their day 1 end stock price, and we lost an additional 17 firms due to missing information in the prospectus required for the calculation of sales growth, reducing the sample size to 150.

Prior studies of IPO pricing usually exclude certain types of IPOs and certain sectors in order to obtain a more homogeneous sample. We thus verified that these 150 IPOs are not equity carve-outs, best-efforts IPOs, financial companies, reverse LBOs, or issues raising less than $5 million.

We attempted to match the 150 firms to non-Internet non-financial but otherwise similar firms using the following two criteria: (1) the IPO date, and

TABLE 2
Sample Selection

Criterion	Number of firms
Internet IPOs between 1/96 and 6/99, listed on www.Internet.com	233
Withdrawn	22
Internet IPOs that went public	211
IPO prospectus unavailable	21
Internet IPOs that went public with prospectus available	190
CUSIP unavailable	23
IPO data required for the analysis are unavailable from the prospectus	17
Internet IPOs that went public with available data for offer price regressions	150
An IPO match unavailable*	41
Internet IPOs with valid matches and offer price	109
Valid day-one-end price unavailable	11
FINAL SAMPLE	98

*Firms were matched on IPO date and IPO size in dollars.

(2) the IPO size (defined as the product of the number of shares offered and the final offer price). Criterion (1), requiring that the date of the Internet IPO and that of its match be within three days of each other, is meant to control for possible time-period and stock-market-wide effects. Criterion (2) is meant to control for a possible size effect. We were unable to find matches for 41 of the 150 firms, leaving us with 109 Internet firms. For 11 of these 109 firms, we were unable to find a valid day 1 end price, either because it was not available or because more than one day elapsed between the day of the IPO and the first trading day. This left us with 98 Internet firms and 98 non-Internet control firms for our tests.[5]

4.2 DESCRIPTIVE STATISTICS

Table 3 provides descriptive statistics for our sample firms for Internet firms and non-Internet firms separately. Consider first the descriptive statistics for firm characteristics. Notwithstanding our efforts to minimize differences through the matching procedure, there remain marked differences between the test and control samples with respect to firm size and profitability. Specifically, while, as expected, all sample IPO firms are relatively small, Internet IPO firms are statistically significantly smaller than their non-Internet counterparts. For example, the means of Sales and Total Assets are, respectively, $11.30 and $29.82 for the Internet sample, vis-à-vis $176.59 and $290.67, respectively, for the non-Internet sample (all figures in millions). In addition, Internet firms have, on average, statistically significantly fewer

[5] Our Internet sample and control sample have very similar industry distribution. The dominant SIC code is 73 (business services including computer software). Prior to 1999, 42 out of 53 Internet firms and 36 out of 53 non-Internet firms belonged to SIC 73. Post 1999, 38 out of 45 Internet firms and 31 out of 45 non-Internet firms belonged to SIC 73.

TABLE 3
Descriptive Statistics

	Internet (n=98)		Non-Internet (n=98)		Difference	
Variable	Mean	Median	Mean	Median	T Stat	Z Stat[1]
Firm Characteristics						
Sales	11.30	5.75	176.59	20.60	−2.04**	−5.85***
Total Assets	29.82	17.37	290.67	26.57	−2.29**	−3.53***
Net Income	−6.98	−3.86	−2.24	0.09	−1.59	−5.68***
Cash from Operations	−4.34	−2.10	17.32	0.28	−2.55**	−5.54***
Book Value of Equity	−0.84	1.14	10.95	1.49	−0.86	−1.27
Shares Outstanding	21.4	16.7	22.7	13.6	−0.30	1.57
Number of Employees	194	136.00	1049	227.00	−2.222**	−4.01***
Offer Characteristics						
IPO Size	53.5	45.0	87.1	39.2	−1.35	0.79
Shared Offered	3.81	3.40	5.71	3.31	−1.73*	−0.08
IPO Min. Offer Price	11.53	11.00	11.38	11.00	0.27	−0.07
IPO Max. Offer Price	13.27	13.00	13.08	13.00	0.31	−0.04
IPO Offer Price Range	1.74	2.00	1.67	2.00	0.693	−0.59
PROSPPRICE	12.40	12.00	12.23	12.00	0.29	−0.04
IPOPRICE	13.39	13.00	12.17	12.50	1.93*	1.71*
ENDPRICE	24.87	17.88	15.03	13.47	4.76***	3.50***
Independent Variables						
EPS	−0.66	−0.61	−0.14	0.05	−4.46***	−5.99***
CFOPS	−0.38	−0.39	0.41	0.06	−4.91***	−5.65***
SALESPS	1.22	0.69	6.81	2.93	−4.77***	−7.72***
BVPS	−0.07	0.07	0.32	0.13	−1.76*	−1.28
SGR	88.3%	75.4%	36.1%	32.0%	4.95***	5.56***
FLOAT	23.6%	21.8%	29.6%	28.1%	−3.32***	−3.27***
PARTIAL	1.074	1.077	0.998	1.000	3.92***	4.62***
RDPS	0.10	0.06	0.14	0.03	−1.61	1.02
MAJ_UND	46.8%		33.0%		−2.14**	
HIRISK	44.4%	0.0%	36.7%	0.0%	1.10	1.10
WARRANT	7.07%	0.00%	7.14%	0.0%	−0.02	−0.02

Sales, Total Assets, Net Income, Cash from Operations and Book Value in millions of dollars. Shares Outstanding measured immediately after the IPO. Shares outstanding and shares offered in millions of shares.

[1] Z Statistic is computed using the Wilcoxon Signed Rank test for difference in medians. Significant using a two tailed test at ***1% level, **5% level, *10% level.

Definition of Variables

EPS	Earnings per share for the year just prior to the IPO
CFOPS	Cash Flow From operations per share for the year just prior to the IPO
SALESPS	Sales per share for the year just prior to the IPO
BVPS	Book Value per share for the year just prior to the IPO
SGR	Annual Sales Growth in the years prior to the IPO
FLOAT	Percentage of shares outstanding offered in the IPO
RDPS	R&D per share
MAJ_UND	Dummy Variable for major underwriter
HIRISK	Firms with high risk warnings on page one of their prospectuses
WARRANT	IPOs that featured multiple components in addition to stock, such as warrants
PARTIAL	Offer price scaled by the midpoint of the offer range

employees than non-Internet firms (194 employees vs. 1049 employees). This difference may follow (partially) because Internet firms are designed to run virtual operations. Internet firms are also statistically significantly less profitable and generate less cash from operations than their non-Internet

matches: the means of Net Income and Cash from Operations for the former are, respectively, $–6.98 and $–4.34, and $–2.24 and $17.32 for the latter (all figures in millions).

Still, our matching procedure is successful in generating test and control samples that are similar in certain offer characteristics. Both sets of firms had, on average, around 22 million shares outstanding before the IPO, and Internet IPOs are only slightly smaller than non-Internet IPOs in terms of number of shares offered (3.81 million vs. 5.71 million). The IPO price range (i.e., the difference between the minimum and maximum anticipated offer prices disclosed in the prospectus) and the minimum and maximum offer prices themselves are also very similar. The mean IPO offer price is $13.39 for Internet firms and $12.17 for non-Internet firms. The average day 1 end price, however, is higher for Internet firms ($24.87 vs. $15.03). Thus, while the market reacts positively, on average, to all IPOs in their debut (the well-known underpricing phenomenon), this positive reaction is more pronounced for Internet IPOs than for non-Internet IPOs.

Table 3 also provides descriptive statistics for the dependent and explanatory variables used in our regressions. The differences between Internet firms and non-Internet firms with respect to the per-share values of sales, book values, earnings, and cash from operations are in the same direction as those observed in the "Firm Characteristics" section of table 3, which reported the nonscaled values of these variables. Briefly, on a per share basis Internet companies are smaller and less profitable than their non-Internet counterparts. The data further indicate that Internet IPO firms exhibit statistically significantly greater annual sales growth than non-Internet firms (88.3% vs. 36.1%).

The two samples also differ significantly with respect to *FLOAT* (the mean percentage of shares offered in the IPO). *FLOAT* is statistically significantly lower for Internet firms (23.6% vs. 29.6%). In addition, Internet (non-Internet) firms have mean *PARTIAL* of 1.074 (0.998). This implies that underwriters initially have an unbiased or perhaps even somewhat optimistic estimate of the final offer price of non-Internet IPOs.[6] Conversely, for Internet IPOs, whose final offer prices are likely to be above the midpoints of their price ranges, underwriters initially underestimate investors' demand for these stocks, an indication of the optimism and momentum surrounding Internet IPOs for the time period being analyzed.

The two samples are statistically significantly different with respect to the prestigious underwriter variable, *MAJ_UND*. For the Internet firms, 46.8% of the firms chose a prestigious/large underwriter, while only 33% of the non-Internet sample did the same. This could be because Internet firms were smaller and less profitable and needed to be associated with a large underwriter in order to successfully complete an IPO. An alternate explanation

[6] Recall that *PARTIAL* is computed as the IPO offer price divided by the midpoint of the IPO range. A value of one thus means that the final offer price equals the midpoint of the IPO price range.

is that during the height of the Internet craze, the big underwriters were more interested in Internet firms and non-Internet firms found it difficult to hire prestigious underwriters.

Finally, the two samples are quite similar with respect to R&D and the two control variables for risk—*HIRISK* and *WARRANT*. For the Internet firms, 44.4% had the high-risk warnings on page 1 of the prospectus, while 36.7% of the non-Internet sample had the high-risk warnings. The difference is, however, not statistically significant. Both samples have a little over 7% of the IPOs being bundled offerings, i.e., combining an equity issue with an issue of inseparable warrants.

4.3 CORRELATIONS AMONG THE EXPLANATORY VARIABLES

Table 4 reports pair-wise correlations between all variables used in the regressions. panels A and B present the correlations for Internet and non-Internet firms respectively. Figures above (below) the diagonal are Pearson (Spearman-rank-order) correlations.

For Internet firms, earnings per share (*EPS*) and cash flow per share (*CFOPS*) are highly correlated (Spearman correlation, 0.63). These variables are our alternative performance measures and are never used in the same regression. The correlations among the other explanatory variables are generally rather low; the highest correlation is between *FLOAT* and *WARRANT* (Pearson correlation, 0.364). For non-Internet firms, the highest correlation is between *CFOPS* and *SALESPS* (Pearson correlation, 0.422). Overall, the relatively low correlations among the explanatory variables used simultaneously in the regressions increase confidence that multicollinearity is not a serious problem for our data. For both samples, as may be expected, *PROSPRICE* and *IPOPRICE* are highly positively correlated and both variables are correlated with *ENDPRICE*, albeit to a lesser extent. Additionally, the dependent variables are correlated with many of the explanatory variables in the predicted direction. Obviously, these correlations must be interpreted with caution, as they may be biased due to a correlated-omitted-variables problem.

5. Tests and Results

5.1 REGRESSIONS FOR PROSPPRICE

Table 5 presents the regression results for *PROSPPRICE*, which is the midpoint of the pricing range from the prospectus. We estimate three alternative specifications with earnings, cash flows, and sales as our performance measures. The dependent variables and all financial explanatory variables are expressed on a per share basis.[7] The regressions are carried

[7] In an effort to alleviate heteroskedasticity, we use shares outstanding as the deflator. Tests for heteroskedasticity fail to reject the null of homoskedasticity for all models. Note that our sample firms have large unrecorded intangible assets, which make total assets an inappropriate deflator. Indeed, when total assets are used as a deflator, homoskedasticity is rejected.

TABLE 4

Correlation Matrix

Pearson Correlations above Diagonal and Spearman-Rank Correlations below Diagonal

	PROSPPRICE	*IPOPRICE*	*ENDPRICE*	*SALESPS*	*EPS*	*CFOPS*	*BVPS*	*SGR*	*FLOAT*	*RDPS*	*MAJ_UND*	*HIRISK*	*WARRANT*	*PARTIAL*
Panel A: Internet Firms ($n=98$)														
PROSPPRICE		0.938***	0.630***	0.115	−0.116	−0.151	0.003	0.230**	−0.428***	0.116	0.153	−0.194*	−0.251**	0.135
IPOPRICE	0.930***		0.756***	0.063	−0.030	−0.088	0.010	0.283***	−0.455***	0.161	0.074	−0.272***	−0.258**	0.463
ENDPRICE	0.731***	0.843***		−0.077	−0.005	0.065	0.099	0.316***	−0.464***	0.213**	−0.014	−0.352***	−0.215**	0.506***
SALESPS	0.114	0.063	−0.056		0.085	−0.090	0.112	−0.180*	0.059	−0.057	0.180*	0.177*	−0.061	−0.078
EPS	−0.206**	−0.137	−0.122	0.204**		0.547***	0.123	−0.049	0.037	−0.134	−0.099	−0.107	−0.019	0.234**
CFOPS	−0.255***	−0.157	−0.033	0.078	0.631***		0.205**	−0.029	−0.014	−0.044	−0.064	−0.067	−0.039	0.136
BVPS	−0.012	−0.024	0.080	0.041	0.122	0.168		0.001	−0.196**	−0.134	0.174*	0.154	−0.101	0.005
SGR	0.139	0.188*	0.270***	−0.284***	−0.075	−0.014	0.097		−0.181*	−0.064	−0.056	−0.112	0.062	0.244**
FLOAT	−0.399***	−0.455***	−0.562**	0.052	0.049	−0.009	−0.128	−0.318***		−0.163	−0.234**	0.303**	0.364**	−0.203**
RDPS	0.013	0.084	0.223**	0.142	−0.145	−0.003	−0.060	−0.018	−0.254**		0.044	0.019	−0.097	0.157
MAJ_UND	0.151	0.054	0.061	0.148	−0.148	−0.061	0.228**	−0.044	−0.184*	0.086		0.055	−0.063	−0.155
HIRISK	−0.192*	−0.277***	−0.350***	0.136	−0.013	−0.089	0.164	−0.134	0.356***	−0.099	0.113		0.070	−0.260***
WARRANT	−0.259**	−0.266**	−0.303***	−0.055	−0.040	0.011	−0.175	0.050	0.261**	−0.065	−0.082	0.070		−0.120
PARTIAL	0.201*	0.472***	0.515***	−0.030	0.109	0.071	−0.065	0.090	−0.238**	0.223**	−0.184*	−0.225**	−0.177	

Panel B: Non-Internet Firms ($n = 98$)

	PROSPPRICE	*IPOPRICE*	*ENDPRICE*	*SALESPS*	*EPS*	*CFOPS*	*BVPS*	*SGR*	*FLOAT*	*RDPS*	*MAJ_UND*	*HIRISK*	*WARRANT*	*PARTIAL*
PROSPPRICE		0.931***	0.563***	0.392***	0.013	0.348***	−0.028	0.147	−0.024	−0.044	0.161	−0.371***	−0.449***	−0.083
IPOPRICE	0.898***		0.742	0.298***	0.053	0.297***	−0.041	0.163	−0.123	−0.007	0.188*	−0.372***	−0.429***	0.275**
ENDPRICE	0.611***	0.810***		0.043	0.072	0.091	−0.088	0.216**	−0.312	−0.054	0.145	−0.316***	−0.282***	0.510***
SALESPS	0.419***	0.340***	0.148		0.022	0.422***	−0.111	−0.108	0.153	−0.136	−0.029	−0.199**	−0.149	−0.179*
EPS	0.112	0.092	0.078	0.350***		0.253**	0.247**	−0.108	0.010	−0.248**	−0.065	−0.056	−0.041	0.074
CFOPS	0.380***	0.383***	0.221**	0.416***	0.396***		0.059	−0.046	0.116	−0.095	−0.026	−0.195	−0.114	−0.068
BVPS	−0.020	−0.056	−0.067	0.015	0.303***	0.215**		−0.040	0.273	−0.093	−0.088	−0.117	−0.078	−0.046
SGR	0.058	0.119	0.185*	−0.161	−0.181	−0.140	0.010		−0.153	0.092	0.124	−0.069	−0.254**	0.058
FLOAT	−0.064	−0.191*	−0.422***	0.182*	0.083	0.073	0.012	−0.234**		−0.100	−0.202**	−0.039	0.064	−0.248**
RDPS	−0.113	−0.025	0.027	−0.362***	−0.304***	−0.246**	−0.167	0.221**	−0.304***		0.029	0.174*	−0.081	0.095
MAJ_UND	0.134	0.164	0.222**	−0.022	−0.084	−0.003	−0.071	0.169	−0.201**	0.184*		0.009	−0.162	0.112
HIRISK	−0.386***	−0.402***	−0.344***	−0.198*	−0.036	−0.140	−0.111	0.006	0.058	0.198*	0.078		0.282	−0.026
WARRANT	−0.424***	−0.410***	−0.382***	−0.365***	−0.158	−0.187*	−0.139	−0.282**	0.120	−0.070	−0.173	0.282***		0.019
PARTIAL	−0.094	0.312***	0.539***	−0.240**	−0.043	−0.040	−0.080	0.204**	−0.267**	0.217**	0.128	0.025	0.041	

Significant using a two tailed test at ***1% level, **5% level, *10% level.

Definition of Variables

PROSPPRICE	Midpoint of the range of the offer price disclosed in the prospectus
IPOPRICE	Final offer price
ENDPRICE	Price at the end of the first trading day
EPS	Earnings per share for the year just prior to the IPO
CFOPS	Cash Flow From operations per share for the year just prior to the IPO
SALESPS	Sales per share for the year just prior to the IPO
BVPS	Book Value per share for the year just prior to the IPO
SGR	Annual Sales Growth in the years prior to the IPO
FLOAT	Percentage of shares outstanding offered in the IPO
RDPS	R&D per share
MAJ_UND	Dummy Variable for major underwriter
HIRISK	Firms with high risk warnings on page one of their prospectuses
WARRANT	IPOs that featured multiple components in addition to stock, such as warrants
PARTIAL	Offer price scaled by the midpoint of the offer range

TABLE 5

Regression for PROSPPRICE (Midpoint of Pricing Range)

(*t*-statistics in parentheses, $n = 98$)

	Model 1: EARNINGS			Model 2: CASH FLOW			Model 3: SALES		
	Internet	Non-Internet	Diff^{+}	Internet	Non-Internet	Diff^{+}	Internet	Non-Internet	Diff^{+}
INTERCEPT	6.18*	10.14***		5.41*	11.45***		7.41**	11.03***	
	(1.92)	(3.95)		(1.86)	(4.41)		(2.43)	(4.52)	
POSEPS	−1.002	2.57**	0.083						
	(−0.30)	(2.29)							
NEGEPS	−0.94	−0.76	0.137						
	(−1.58)	(−1.27)							
POSCFO				1.74	0.58*	0.071			
				(1.51)	(1.92)				
NEGCFO				−3.29***	0.08	<0.001			
				(−3.97)	(0.08)				
SALESPS							0.35*	0.10***	0.002
							(1.91)	(3.09)	
POSBV	0.15	0.07	0.942	0.28	0.16	0.767	0.01	0.22	0.779
	(0.22)	(0.27)		(0.44)	(0.59)		(0.02)	(0.84)	
NEGBV	−0.29	−0.79	0.193	0.02	−0.58	0.320	−0.40	−0.49	0.404
	(−0.54)	(−1.38)		(0.05)	(−1.02)		(−0.78)	(−0.86)	
SGR	0.63	0.20	0.253	0.71*	0.71	0.120	0.81**	0.64	0.091
	(1.57)	(0.26)		(1.92)	(0.93)		(2.02)	(0.86)	
FLOAT	−10.04**	0.72	0.014	−8.30**	−1.45	0.018	−10.36**	−0.99	0.009
	(−2.40)	(0.26)		(−2.18)	(−0.52)		(−2.57)	(−0.37)	
RDPS	1.49	−0.05	0.938	0.58	−0.16	0.989	1.94	0.05	0.852
	(0.45)	(−0.05)		(0.19)	(−0.15)		(0.60)	(0.05)	
MAJ_UND	2.51**	1.96*	0.030	2.16*	1.62	0.063	2.12*	1.73	0.069
	(2.11)	(1.69)		(1.96)	(1.41)		(1.80)	(1.53)	
NASD_ADJ	0.003**	0.001	0.020	0.003***	0.000	0.082	0.002**	0.000	0.048
	(2.51)	(0.78)		(2.65)	(0.35)		(2.26)	(0.56)	
HIRISK	0.03	−1.72**	0.131	−0.72	−1.64**	0.103	−0.06	−1.59**	0.183
	(0.04)	(−2.14)		(−0.89)	(−2.06)		(−0.08)	(−2.03)	
WARRANT	−1.11	−4.83***	0.015	−1.12	−4.44***	0.023	−1.09	−4.51***	0.016
	(−0.72)	(−3.08)		(−0.78)	(−2.81)		(−0.72)	(−2.99)	
Adjusted R^2	20.75%	28.47%		32.3%	30.61%		23.44%	31.62%	

$^{+}$Difference between Internet and non-Internet firms using an *F* test (*p*-value reported). Significant using a two tailed test at ***1% level, **5% level, *10% level.

Definition of Variables

POSEPS	*EPS* * Dummy for positive earnings
NEGEPS	*EPS* * (1-Dummy for positive earnings)
POSCFO	*CFO* per share * Dummy for positive cash flow
NEGCFO	*CFO* per share * (1-Dummy for positive cash flow)
SALESPS	Sales per share
POSBV	Book Value per share * Dummy for positive Book Value
NEGBV	Book Value per share * (1-Dummy for positive Book Value)
SGR	Annual Sales Growth in the years prior to the IPO
RDPS	Research and development per share
FLOAT	Percentage of shares outstanding offered in the IPO
MAJ_UND	Dummy Variable for major underwriter
NASD_ADJ	Level of NASDAQ adjusted for inflation
HIRISK	Firms with high risk warnings on page one of their prospectuses
WARRANT	IPOs that featured multiple components in addition to stock, such as warrants

out separately for the two subsamples of Internet and non-Internet firms. *F* Tests are performed to compute the significance of the differences in the coefficient estimates between Internet firms and non-Internet firms.[8]

Results for the first specification, with earnings as the performance variable, indicate that earnings are insignificant for Internet firms, while positive earnings (*POSEPS*) are strongly significant for non-Internet firms. All the other accounting variables—positive book values (*POSBV*), negative book values (*NEGBV*), and sales growth (*SGR*) are insignificant for both sets of firms. *FLOAT*, however, is significantly negative for Internet firms and insignificant for non-Internet firms.

Among the control variables, the inflation-adjusted level of the NASDAQ (*NASD_ADJ*) has a significantly positive coefficient for Internet firms only. The coefficient estimate on *MAJ_UND* is significantly positive for both samples but is higher for the Internet sample, indicating that firms with prestigious underwriters get higher IPO valuations at the prospectus stage than firms with small underwriters, and that this difference in pricing is more pronounced for Internet firms. *HIRISK* has a significant negative coefficient for non-Internet firms only, indicating that the offering prices of only non-Internet firms are discounted for issuing high-risk warnings. *WARRANT* too has a significant negative coefficient only for non-Internet firms. R&D (*RDPS*) is insignificant for both sets of firms.

The second regression uses cash flows as the performance measure. The coefficient on positive cash flow (*POSCFO*) is significant only for non-Internet firms. Thus, at the early stage of an IPO both earnings and cash flows matter only for pricing of non-Internet IPOs. In addition, for Internet firms the coefficient on negative cash flow (*NEGCFO*) is significantly negative, while for non-Internet firms this coefficient is insignificant. One way to interpret this finding is that negative cash flows for Internet firms are viewed as investments, perhaps because they are driven largely by cash outlays on customer development and other intangible assets that are expected to yield high returns in the future. Positive book values and negative book values continue to have insignificant coefficients for both samples. Sales growth (*SGR*) is now marginally significant for Internet firms, though the difference in coefficients between Internet and non-Internet firms is insignificant.

As before, *FLOAT* has a significantly negative coefficient for Internet firms and insignificant coefficient for non-Internet firms and the difference between the two coefficients is highly statistically significant.

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[8] To test the differences between coefficients, we re-estimate the regression using the entire sample and interacting each explanatory variable with a dummy variable for Internet and non-Internet firms. For each explanatory variable we thus obtain two coefficient estimates, one for the Internet firms and the other for non-Internet firms. We then use an *F* test to test for equality between these two estimates. Note that in general tests for differences in R^2 between two models are legitimate only when the dependent variable is the same. In our case, not only are the dependent variables not the same, they differ substantially in their variation. For example, the standard deviations for non-Internet firms and Internet firms are, respectively, 4.14 and 4.70 for *IPOPRICE* and 8.11 and 18.89 for *ENDPRICE*.

The results for the five control variables: *MAJ_UND*, *NASD_ADJ*, *RDPS*, *HIRISK*, and *WARRANT*, are similar to those for the specification with earnings.

The third specification uses sales per share (*SALESPS*) as the performance measure. Unlike the other two performance measures, *SALESPS* is not partitioned because it is always nonnegative. The coefficient estimate on *SALESPS* is positive and significant for both Internet and non-Internet firms. However, the coefficient on *SALESPS* is significantly greater for Internet firms than for non-Internet firms. This implies that Internet IPOs receive higher sales multiples than other non-Internet IPOs. Sales growth (*SGR*) continues to be significantly positive only for Internet firms, and the coefficient is now significantly different from that for non-Internet firms. Positive and negative book values are insignificant for both classes of firms. As before, *FLOAT* is significantly negative only for Internet firms, and significantly greater than that for non-Internet firms. The results for the control variables are similar to those of prior specifications.

To summarize, at the prospectus stage, positive cash flows, sales, and sales growth are the important financial variables for Internet firms, but earnings are not. In addition, Internet firms' negative cash flows are viewed as investments. For non-internet firms, all three performance measures—positive earnings, positive cash flows, and sales—are important. Book values appear to be unimportant for both sets of firms. *FLOAT* is a critical non-financial variable only for Internet firms. High-risk warnings issued by Internet firms are not priced at the prospectus stage but are priced for non-Internet IPOs. This last finding may be a reflection of the Internet euphoria the market was going through during our sample period. Finally, market sentiment (level of NASDAQ) plays a role in the pricing of Internet IPOs alone.[9]

5.2 REGRESSIONS FOR IPOPRICE

Table 6 presents the regression results for the final offer price, *IPOPRICE*. As before, we estimate three alternative specifications with earnings, cash flows, and sales as our performance measures.

The results for both Internet firms and non-Internet firms are quite similar to those reported above for *PROSPPRICE*. The only noticeable difference

[9] It is arguable that *FLOAT* and *PROSPPRICE* are simultaneously determined, which calls for using the two-stage least-squares method (2SLS) rather than ordinary least squares (OLS). To test the sensitivity of our results, we replicate the tests reported in table 6 using 2SLS. In the first stage we regress *FLOAT* on *PROSPPRICE* and current ratio, a proxy for a firm's cash needs, and in the second stage we re-estimate the three models after replacing *FLOAT* with its fitted values obtained from the first stage. The results from the first stage indicate that *FLOAT* is related positively to *PROSPPRICE* and negatively to the current ratio. Still, the results from the second stage (not tabulated for parsimony) were generally similar to those reported in table 6. One exception was that *FLOAT*, while retaining its sign, becomes marginally insignificant. In addition, we replicate this 2SLS procedure on a model without the five control variables. For this model, the results of the second stage were similar to those reported in table 6 with no exceptions.

TABLE 6

Regression for IPOPRICE

(*t*-statistics in parentheses, $n = 98$)

	Model 1: EARNINGS			Model 2: CASH FLOW			Model 3: SALES		
	Internet	Non-Internet	Diff$^+$	Internet	Non-Internet	Diff$^+$	Internet	Non-Internet	Diff$^+$
INTERCEPT	4.89	11.59***		3.60	12.28***		5.71*	11.72***	
	(1.36)	(4.25)		(1.10)	(4.50)		(1.69)	(4.52)	
POSEPS	−1.66	2.08*	0.303						
	(−0.44)	(1.74)							
NEGEPS	−0.65	0.07	0.865						
	(−0.98)	(0.12)							
POSCFO				2.25*	0.402	0.136			
				(1.74)	(1.26)				
NEGCFO				−3.32***	0.85	0.001			
				(−3.58)	(0.78)				
SALESPS							0.38*	0.07**	0.017
							(1.87)	(2.19)	
POSBV	0.54	0.11	0.775	0.69	0.16	0.531	0.40	0.23	0.669
	(0.71)	(0.37)		(0.95)	(0.59)		(0.54)	(0.80)	
NEGBV	0.009	−0.63	0.460	0.38	−0.39	0.589	−0.04	−0.34	0.788
	(0.02)	(−1.03)		(0.67)	(−0.65)		(−0.07)	(−0.56)	
SGR	0.96**	0.29	0.074	1.05**	0.67	0.038	1.14**	0.62	0.028
	(2.14)	(0.36)		(2.51)	(0.83)		(2.57)	(0.77)	
FLOAT	−11.94**	−1.87	0.008	−9.63**	−3.91	0.006	−11.81***	−3.62	0.003
	(−2.55)	(0.64)		(−2.25)	(−1.34)		(−2.64)	(−1.28)	
RDPS	4.25	0.34	0.532	2.94	0.21	0.684	4.43	0.37	0.456
	(1.14)	(0.29)		(0.86)	(0.18)		(1.23)	(0.32)	
MAJ_UND	2.47*	2.10*	0.048	2.15*	1.88	0.053	2.06	1.96	0.076
	(1.86)	(1.70)		(1.74)	(1.56)		(1.57)	(1.63)	
NASD_ADJ	0.004***	0.001	0.003	0.004***	0.000	0.008	0.004***	0.001	0.005
	(3.29)	(0.82)		(3.60)	(0.60)		(3.19)	(0.74)	
HIRISK	−0.38	−1.98**	0.093	−1.24	−2.04**	0.030	−0.55	−1.91**	0.097
	(−0.40)	(−2.32)		(−1.37)	(−2.44)		(−0.60)	(−2.30)	
WARRANT	−1.11	−4.75***	0.042	−1.11	−4.21**	0.071	−1.11	−4.28***	0.048
	(−0.64)	(−2.85)		(−0.69)	(−2.54)		(−0.65)	(−2.67)	
Adjusted R^2	29.41%	24.09%		39.32%	27.98%		32.56%	27.17%	

$^+$ Difference between Internet and non-Internet firms using an F test (p-value reported). Significant using a two tailed test at ***1% level, **5% level, *10% level.

Definition of Variables

POSEPS	*EPS* ∗ Dummy for positive earnings
NEGEPS	*EPS* ∗ (1-Dummy for positive earnings)
POSCFO	*CFO* per share ∗ Dummy for positive cash flow
NEGCFO	*CFO* per share ∗ (1-Dummy for positive cash flow)
SALESPS	Sales per share
POSBV	Book Value per share ∗ Dummy for positive Book Value
NEGBV	Book Value per share ∗ (1-Dummy for positive Book Value)
SGR	Annual Sales Growth in the years prior to the IPO
RDPS	Research and development per share
FLOAT	Percentage of shares outstanding offered in the IPO
MAJ_UND	Dummy Variable for major underwriter
NASD_ADJ	Level of NASDAQ adjusted for inflation
HIRISK	Firms with high risk warnings on page one of their prospectuses
WARRANT	IPOs that featured multiple components in addition to stock, such as warrants

between the determinants underlying *PROSPRICE* and *IPOPRICE* is that positive cash flows lose their significance for non-Internet firms and become marginally significant for Internet firms. Thus, as may be expected, the value drivers underlying the initial prospectus price and the final

offer price are similar, although the weight ascribed to each variable may change in response to new information gathered during the waiting period.

5.3 REGRESSIONS FOR ENDPRICE

ENDPRICE is the closing stock price at the end of the first trading day as defined by *CRSP*, which is typically the average of the closing bid and ask prices. As before, we run three alternative specifications with earnings, cash flows, and sales as our alternative performance measures. We add an additional explanatory variable, *PARTIAL*, to control for the IPO underpricing resulting from the partial adjustment of the offer price to new information gathered by the underwriter in the waiting period.

Table 7 presents the regression results for *ENDPRICE*. For both Internet firms and non-Internet firms, earnings are insignificant as are the other two performance measures, cash flows and sales. Positive book value (*POSBV*) is positive and generally marginally insignificant for the Internet firms and insignificant for non-Internet firms. Comparing *POSBV* across the two samples, however, shows a significantly greater coefficient for positive book values for Internet firms across all specifications.

Sales growth (*SGR*) has a significant positive coefficient in all specifications for Internet firms, while it is insignificant for non-Internet firms. As expected, the coefficient on *SGR* for Internet firms is significantly greater, indicating that the stock market attaches a higher multiple for sales growth for Internet firms.

For both samples, *FLOAT* has significantly negative coefficients in all specifications. For Internet firms, the relative offering size, which was strongly associated with IPO pricing at the initial prospectus stage and the final IPO stage, continues to be important. As hypothesized, and similar to the results for *PROSPPRICE* and *IPOPRICE*, this effect is statistically significantly stronger for Internet firms than for non-Internet firms.

In addition, consistent with findings of prior research, *PARTIAL* is positive and highly significant in all three specifications for both samples. Furthermore, as expected, *PARTIAL* has a significantly higher coefficient for Internet firms, indicating the strong momentum surrounding Internet stocks in the time period analyzed.

R&D per share (*RDPS*) has generally a (marginally) significant positive coefficient for Internet firms and insignificant coefficient for non-Internet firms. *WARRANT* has a significantly negative (insignificant) coefficient for non-Internet (Internet) firms, indicating the market's preference for non-bundled issues for non-Internet firms. Unlike the earlier regressions for *PROSPPRICE* and *IPOPRICE, HIRISK* is significantly negative for both Internet and non-Internet firms. Hence, while high-risk warnings were ignored in the initial and subsequent pricing of Internet IPOs, the stock market does factor these warnings in during the first trading day for non-Internet as well as for Internet IPOs. The dummy for major underwriters (*MAJ_UND*) and

TABLE 7
Regression for ENDPRICE
(*t*-statistics in parentheses, $n = 98$)

	Model 1: EARNINGS			Model 2: CASH FLOW			Model 3: SALES		
	Internet	Non-Internet	Diff[+]	Internet	Non-Internet	Diff[+]	Internet	Non-Internet	Diff[+]
INTERCEPT	−34.92**	−13.29*		−30.47*	−11.73		−27.10*	−14.01*	
	(−2.09)	(−1.76)		(−1.91)	(−1.58)		(−1.70)	(−1.99)	
POSEPS	−10.32	2.11	0.935						
	(−0.76)	(1.02)							
NEGEPS	−3.93	0.31	0.277						
	(−1.61)	(0.27)							
POSCFO				1.28	0.20	0.634			
				(0.25)	(0.36)				
NEGCFO				−5.01	1.68	0.393			
				(−1.39)	(0.85)				
SALESPS							0.28	0.04	0.769
							(0.37)	(0.76)	
POSBV	5.32*	−0.07	0.028	4.21	0.01	0.035	4.50	0.04	0.039
	(1.88)	(−0.13)		(1.47)	(0.04)		(1.61)	(0.09)	
NEGBV	−0.31	0.281	0.949	−0.29	0.38	0.987	−0.59	0.46	0.981
	(−0.14)	(0.26)		(−0.13)	(0.36)		(−0.27)	(0.43)	
SGR	3.27*	1.57	0.022	3.89**	1.74	0.008	3.75**	1.86	0.011
	(1.95)	(1.09)		(2.34)	(1.22)		(2.22)	(1.34)	
FLOAT	−43.94**	−10.05*	0.020	−40.83**	−11.15**	0.002	−42.00**	−11.57**	0.002
	(−2.59)	(−1.95)		(−2.46)	(−2.13)		(−2.52)	(−2.29)	
PARTIAL	39.51***	29.21***	<0.001	36.43***	28.76***	<0.001	37.20***	29.87***	<0.001
	(3.25)	(5.25)		(3.06)	(5.29)		(3.12)	(5.60)	
RDPS	24.23*	−2.31	0.096	21.84	−2.44	0.089	24.62*	−2.32	0.061
	(1.76)	(−1.10)		(1.61)	(−1.20)		(1.80)	(−1.14)	
MAJ_UND	2.53	1.54	0.753	1.65	1.38	0.777	2.03	1.43	0.808
	(0.53)	(0.72)		(0.34)	(0.64)		(0.42)	(0.67)	
NASD_ADJ	0.009*	0.002	0.099	0.008	0.002	0.095	0.007	0.002	0.132
	(1.78)	(1.51)		(1.60)	(1.34)		(1.49)	(1.46)	
HIRISK	−5.68*	−3.37**	0.030	−6.36*	−3.65**	0.022	−5.62	−3.42**	0.038
	(−1.66)	(−2.27)		(−1.80)	(−2.44)		(−1.63)	(−2.34)	
WARRANT	−0.30	−6.29**	0.662	−0.90	−6.17**	0.740	−1.12	−5.83**	0.577
	(−0.05)	(−2.18)		(−0.14)	(−2.09)		(−0.18)	(−2.07)	
Adjusted R^2	43.07%	40.48%		43.45%	40.59%		42.24%	41.49%	

[+] Difference between Internet and non-Internet firms using an F test (p-value reported). Significant using a two tailed test at ***1% level, **5% level, *10% level.

Definition of Variables

POSEPS	*EPS* ∗ Dummy for positive earnings
NEGEPS	*EPS* ∗ (1-Dummy for positive earnings)
POSCFO	*CFO* per share ∗ Dummy for positive cash flow
NEGCFO	*CFO* per share ∗ (1-Dummy for positive cash flow)
SALESPS	Sales per share
POSBV	Book Value per share ∗ Dummy for positive Book Value
NEGBV	Book Value per share ∗ (1-Dummy for positive Book Value)
SGR	Annual Sales Growth in the years prior to the IPO
RDPS	Research and development per share
FLOAT	Percentage of shares outstanding offered in the IPO
PARTIAL	Offer Price scaled by midpoint of offer range
MAJ_UND	Dummy Variable for major underwriter
NASD_ADJ	Level of NASDAQ adjusted for inflation
HIRISK	Firms with high risk warnings on page one of their prospectuses
WARRANT	IPOs that featured multiple components in addition to stock, such as warrants

the control for the level of the NASDAQ are generally insignificant for both Internet and non-Internet firms.[10]

It is interesting to note that our results for non-Internet firms are by and large consistent with those in Klein [1996], who used a sample of non-Internet IPOs in the period 1980–1991. Like us, Klein documents, among other things, that the final offer price and the initial market price are positively related to the proportion of equity retained by the entrepreneurs (1-*FLOAT*), negatively related to whether an offering has other bundled elements (*WARRANT*), negatively related to high risk warnings (*HIRISK*) and positively related to the presence of a prestigious underwriter (*MAJ_UND*). The robustness of the results enhances confidence in the validity of our findings and makes it less likely that our findings are obtained by chance.

5.4 ΔPRICE REGRESSIONS

So far we formally tested for differences in valuations between Internet and non-Internet firms at the IPO stage and at the first trading day. In this section, we test for valuation differences between the IPO price, *IPOPRICE*, and the stock price set by investors at the end of the first trading day, *ENDPRICE*, within each set of firms. To this end, we estimate the regressions with the stock-price change in day 1 (i.e., Δ*PRICE* defined as the difference between *ENDPRICE* and *IPOPRICE*) as the dependent variable. As before, for both Internet and non-Internet firms we run three specifications with earnings, cash flows, and sales as our alternative performance measures.

Table 8 presents the results. Other than *PARTIAL*, all explanatory variables in the current regression appeared in both the *IPOPRICE* and *ENDPRICE* regressions, and thus the coefficient on each of these variables in the current regression (approximately) measures the difference between the corresponding coefficients in the two price regressions.[11] For example, the difference between the coefficients on *POSBV* for Internet firms reported in tables 6 and 7 is 4.78 (i.e., 5.32–0.54), which is close to the value of this coefficient (4.99) reported in table 8.

None of our performance measures are significant for either sample. *POSBV* is highly significant and positive in all specifications for Internet firms. Thus, while book values of all sample firms are insignificant at the prospectus and IPO pricing stages, investors of Internet firms do perceive

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[10] To assess the possibility that our results were obtained by chance, we replicate the tests reported in Table 7 using the closing price at the end of day 7 as the dependent variable. Notwithstanding active trading in our sample firms' stocks during this seven-day period as evidenced by a substantial share turnover and variation in cumulative stock returns, the results were nearly identical. Specifically, the signs of all parameter estimates remain unchanged and the changes in the magnitudes of the estimates as well as in the R^2s were small. The only noticeable difference is that the variables *SGR* and *HIRISK* become marginally insignificant for the Internet sample primarily due to increased standard errors.

[11] The relation holds only approximately for most but not all variables due to the inclusion of *PARTIAL*.

TABLE 8

Regression for Day 1 Price Difference (ΔPRICE)

(*t*-statistics in parentheses, $n = 98$)

	Model 1: EARNINGS		Model 2: CASH FLOW		Model 3: SALES	
	Internet	Non-Internet	Internet	Non-Internet	Internet	Non-Internet
INTERCEPT	−28.71**	−17.61***	−23.70*	−18.31***	−24.00*	−17.95***
	(−2.06)	(−3.26)	(−1.77)	(−3.53)	(−1.82)	(−3.49)
POSEPS	0.37	−0.80				
	(0.04)	(−0.58)				
NEGEPS	−2.02	0.348				
	(−1.01)	(0.46)				
POSCFO			2.46	−0.45		
			(0.62)	(−1.11)		
NEGCFO			0.31	0.313		
			(0.11)	(0.26)		
SALESPS					−0.04	−0.04
					(−0.07)	(−0.95)
POSBV	4.99**	−0.29	4.91**	−0.32	4.86**	−0.34
	(2.33)	(−0.78)	(2.27)	(−0.89)	(2.28)	(−0.93)
NEGBV	0.35	0.31	−0.02	0.29	0.08	0.19
	(0.21)	(0.49)	(−0.02)	(0.46)	(0.05)	(0.29)
SGR	2.78*	1.32	3.015**	1.15	2.94**	1.12
	(1.91)	(1.24)	(2.08)	(1.09)	(2.01)	(1.07)
FLOAT	−29.48**	−9.24**	−30.75**	−8.59**	−30.97**	−8.55**
	(−2.04)	(−2.46)	(−2.11)	(−2.3)	(−2.15)	(−2.29)
PARTIAL	30.05***	20.35***	26.78***	20.38***	27.76***	20.43***
	(2.89)	(4.91)	(2.61)	(5.00)	(2.73)	(5.07)
RDPS	20.20*	−1.91	21.76*	−1.92	21.74*	−2.03
	(1.69)	(−1.22)	(1.84)	(−1.27)	(1.84)	(−1.35)
MAJ_UND	−0.10	0.07	0.03	0.26	−0.10	0.14
	(−0.03)	(0.04)	(0.01)	(0.16)	(−0.03)	(0.09)
NASD_ADJ	0.005	0.002	0.005	0.002*	0.005	0.002
	(1.12)	(1.45)	(1.08)	(1.67)	(1.03)	(1.53)
HIRISK	−5.74*	−1.48	−5.68*	−1.63	−5.503*	−1.54
	(−1.93)	(−1.34)	(−1.84)	(−1.46)	(−1.85)	(−1.4)
WARRANT	−0.18	−0.44	−0.04	−0.44	−0.28	−0.63
	(−0.03)	(−0.21)	(−0.01)	(−0.22)	(−0.05)	(−0.31)
Adjusted R^2	36.71%	32.3%	36.29%	32.94%	36.67%	33.45%

[+] Significant using a two tailed test at ***1% level, **5% level, *10% level.

Definition of Variables

POSEPS	*EPS* ∗ Dummy for positive earnings
NEGEPS	*EPS* ∗ (1-Dummy for positive earnings)
POSCFO	*CFO* per share ∗ Dummy for positive cash flow
NEGCFO	*CFO* per share ∗ (1-Dummy for positive cash flow)
SALESPS	Sales per share
POSBV	Book Value per share ∗ Dummy for positive Book Value
NEGBV	Book Value per share ∗ (1-Dummy for positive Book Value)
SGR	Annual Sales Growth in the years prior to the IPO
RDPS	Research and development per share
FLOAT	Percentage of shares outstanding offered in the IPO
PARTIAL	Offer Price scaled by midpoint of offer range
MAJ_UND	Dummy Variable for major underwriter
NASD_ADJ	Level of NASDAQ adjusted for inflation
HIRISK	Firms with high risk warnings on page one of their prospectuses
WARRANT	IPOs that featured multiple components in addition to stock, such as warrants

them important. In addition, *FLOAT* has a significantly negative coefficient for both samples. This indicates that *FLOAT* gains added significance above and beyond the role it plays in the initial IPO pricing stages. *PARTIAL*, our proxy for the IPO underpricing, is significantly positive for both samples, confirming our earlier results. *SGR* has a positive coefficient for Internet firms, indicating that growing firms receive a more positive reaction from the stock market at their debut. Among the control variables, *R&D* and *HIRISK* are significant only for Internet firms. This indicates that the stock market does give credence to R&D and high-risk warnings for Internet firms. Overall, the results show that for non-Internet firms, the first day price reaction is related only to *FLOAT*, while for Internet firms, the first day price reaction is related to five variables: *POSBV*, *SGR*, *FLOAT*, *RDPS*, and *HIRISK*.

5.5 SENSITIVITY TESTS

In addition to the tests described above, we perform a battery of sensitivity tests to verify the robustness of our results. The main sensitivity tests, whose results are not tabulated for the shake of brevity, are outlined below.

In addition to OLS regressions, we also run generalized least squares (GLS) specifications for our regressions to account for any possible clustering in time in our IPO sample. Our GLS results are nearly identical to the OLS results.

Prior studies (e.g., Demers and Lev [2001], Hand [2000b], Rajagopal et al. [2000, and Kozberg [2001]) have examined the relevance of web traffic measures for valuation of Internet firms and obtained mixed results. If web-traffic measures are correlated with our independent variables, our results can be biased. We use Nielsen net ratings to come up with measures of web traffic. Factor analysis yields two factors—*REACH*, which measures the size of the market that accesses a web site, and *STICKINESS*, which measures how long users stay on a given site. We add these two web-traffic measures to our regressions, setting them to zero for firms for which web traffic is not a meaningful metric (38 out of our 98 firms). *REACH* is insignificant in all our regressions, while *STICKINESS* is significant only in the regression for *ENDPRICE*, and only when *SALESPS* is used as the performance measure. None of the other results are affected in any manner.

Finally, in our original tests, we base our specification for *PARTIAL* on the Benveniste and Spindt [1989] model, which assumes that the partial adjustment of the final offer price to information gathered in the waiting period is based on private information only and is uncorrelated with any public information, such as prospectus data. Loughran and Ritter [2001], however, use prospect theory to show that *PARTIAL* may also be related to public information. To assess the possible effect of the correlations between *PARTIAL* and public signals on our findings, we interact *PARTIAL* with our financial statement variables. The results were essentially unaltered and none of the interactions were significant.

6. *Conclusion*

We examine the association between financial and non-financial variables and IPOs' initial prospectus price, final offer price, and initial stock market price, using a sample of Internet firms (the test sample) and a matched-pair sample of non-Internet firms (the control sample). Our focus is on whether the value drivers underlying these prices differ between Internet firms and non-Internet firms, and whether the valuation changes across different stages in the IPO process.

Our primary two conclusions are as follows. First, there are noticeable differences between valuations of Internet and non-Internet firms, especially at the prospectus (*PROSPPRICE*) and IPO (*IPOPRICE*) stage. Earnings matter only for IPOs of non-Internet firms. While positive cash flows are important for both samples, negative cash flows are significant only for Internet firms. Internet firms also get much higher multiples of positive cash flows and sales in their IPO valuation. Among the non-financial variables, the relative offering size (*FLOAT*) is important only for Internet firms, while risk warnings and offer characteristics matter only for non-Internet firms.

Analyzing the day one end price (*ENDPRICE*) indicates that conventional financial variables such as earnings, cash flows, sales, and book values are insignificant, whereas non-financial variables such as *PARTIAL*, *FLOAT*, and *HIRISK* are important for both samples, albeit more so for Internet firms. Taken together, these findings suggest that financial variables play a greater role in valuation of non-Internet firms, while nonfinancial variables play a greater role in valuation of Internet firms.

Second, there are significant differences between the initial valuation of firms at the prospectus and IPO stage and their valuation by the stock market at the end of the first trading day. For non-Internet firms, the difference is largely ascribed to *FLOAT*. For Internet firms, however, positive cash flows, sales growth, R&D, and high-risk warnings are all important in addition to *FLOAT*.

Our results indicate that the valuation of non-Internet firms generally follows the conventional wisdom regarding valuation: positive earnings and cash flows are priced while negative earnings and negative cash flows are not. The valuation of Internet firms, however, departs from conventional wisdom, with earnings not being priced and negative cash flows being priced perhaps because they are viewed as investments. This difference between the two classes of firms may be expected, given the age and unique nature of the Internet industry.

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