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**OPERATING MEASURES, IPO VALUATION, AND AFTER MARKET
PERFORMANCE- PERSPECTIVE FROM INTERNET BUBBLE PERIOD**

By

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Old Dominion University in Partial Fulfillment of the
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ABSTRACT

OPERATING MEASURES, IPO VALUATION, AND AFTER MARKET PERFORMANCE- PERSPECTIVE FROM INTERNET BUBBLE PERIOD

Yuhong Fan

Old Dominion University, 2005

Director: Dr. Mohammed Najand

Internet related firms experienced an extremely high degree of underpricing in the year 1999 and 2000; 40 percent more than underpricing of Non-Internet firms. Two explanations for this phenomenon are examined: the changing-risk composition hypothesis and overreaction hypothesis. Empirical tests are conducted in three stages: first trading day, short-term, and long-term performances. The results are consistent with both hypotheses, and the high initial returns for Internet firms are explainable by investors' overreaction and the firm's high uncertainties.

I dedicate this work to my daughter, my husband, and my mother-in-law
for all their love, encouragement, and unknowing sacrifices.

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1. Introduction

Internet related initial public offerings (IPOs) have begun to catch researchers' interests in the past few years, especially after the tumultuous years between 1999 and 2000, in which a large amount of Internet firms went public. These IPOs experienced extremely high initial returns; 88.6% for Internet firms and 44.7% for non-Internet firms. There are some articles that studied Internet IPOs, (such as Bartov (2002), Ljungqvist and Wilhelm (2001), Schultz and Zaman (2001), Cooper Dimitrov, and Rau (2001), and Jaggia and Thosar (2004)), but few of them try to explain the phenomenon of Internet firms earning super high initial returns in the same period that non-Internet firms earned much less initial returns. Thus, the purpose of this paper is to propose an explanation for this specific phenomenon. Two hypotheses are proposed and examined: the changing-risk composition hypothesis and the overreaction hypothesis.

The changing risk composition hypothesis (Ritter, 1984), which is based on the asymmetric information theory, states that the degree of underpricing is correlated with firm's ex ante uncertainty. The more uncertain the market is about the true value of the issuing firm, the higher the discount the company must offer to uninformed investors to submit their bids. Therefore, underpricing activity should be increased with the ex ante uncertainty surrounding an issue. The overreaction hypothesis is derived from behavior theory, and states that investors often violate rational choices when making decisions. According to DHS (Daniel, Hirshleifer, and Subrahmanyam, 1998), initial overreaction and self-attribution bias would drive the price above the rational expected value. Further information will gradually induce the price back toward the fundamental value. Based on

the changing risk composition hypothesis and overreaction hypothesis, the high initial returns for Internet firms could be due to their high future uncertainty, investor's overreaction, or both.

The Pioneer work on Internet IPOs is Bartov et al (2002), in which the authors show how Internet-related firms were initially priced with a small sample of 98 Internet firms. The contribution of their article is to investigate whether there exists valuation differences between Internet and Non-Internet firms in the initial prospectus price, final offer price, and first trading day price. Unlike the standard IPO research, their work focused on studying offer prices instead of initial returns. Unlike Bartov (2002), who studied the association between pricing of Internet IPOs and a set of financial variables, this article uses pre-IPO performance variables as an uncertainty proxy to explain the higher initial returns for Internet firms based on the changing risk composition hypothesis. Thus the argument in this article is that Internet-related firms face higher future uncertainty than non-Internet firms, and lead to higher initial returns compared to non-Internet related firms. Moreover, this study not only focuses on the initial return period, but also investigates IPOs' short run and long run aftermarket performances. The combination of investing firms' performances in the initial day, 6 month, and 36 month after initial offerings gives a broader and unique view of valuing Internet stocks than Bartov and other researcher' work.

Ljungqvist and Wilhelm (2001) report that ownership structure and inside selling behavior can partially explain the astronomical initial return for 1999-2000. They find that insider ownership stakes have declined from 1996 to 2000, and 1999 and 2000 witnessed a sharp decline in both the frequency and magnitude of secondary sales of

existing shares by pre-IPO owners. The authors argued that these changes in ownership structure and selling behavior should undermine the incentives to bargain over the offer price, thus contribute to the high initial returns for 1999 and 2000. However, in their article, the question as to why in the same period (1999 and 2000) Internet-related firms earned over 40% more initial return than non-Internet related firms is still unanswered. Unlike Ljungqvist and Wilhelm's study (2001), which is focused on the principal-agent perspective, this article is based on asymmetric information and behavior theory. Actually, this paper finds that Internet firms exhibit lower float ratio (measured as share offered divided by total shares outstanding) than non-Internet firms, from which it can be inferred that insider ownership is higher for Internet firms than for non-Internet firms, thus the insider ownership can not explain high initial returns for internet firms.

Jaggia and Thosar (2004) find evidence to support DHS' overreaction framework by investigating high-tech IPOs medium-term aftermarket performance. The authors proposed an overreaction explanation for IPOs based on the overreaction framework. When given a favorable signal, investors' overconfidence pushes the stock price above its rational expected level at time 1. If investors observe that public signals are consistent with their initial assessment, self-attribution bias will drive the price even higher, and further away from the rational level at time 2. The arrival of later public information gradually induces the price back to the fundamental value at time 3. According to this overreaction framework, Jaggia and Thosar (2004) propose that overreacted IPOs will exhibit positive momentum in the short run. However, Jaggia and Thosar (2004) only test the DHS overreaction hypothesis in the short run (6 months after IPO) in a sample of 301 high-tech IPOs, and find that momentum variables are important to explain firm's

short run performance, which is consistent with an overreaction prediction. Unlike Jaggia and Thosar's (2004) work, this article tests the overreaction hypothesis in initial return period, short run (6-month), and long run (36-month) aftermarket performances using broader pre-IPO operating performances as proxies for firms' fundamentals. The sample includes not only Internet firms, but also Non-Internet firms with the aim of showing the divergent patterns of Internet and non-Internet firms in the initial return and after offering periods.

Based on the proposed changing risk composition and overreaction hypothesis, empirical tests are conducted in these three stages: first trading day, short-term, and long run performances. If the changing risk composition hypothesis is appropriate to explain high initial return for Internet firms, Internet firms should face higher future uncertainties than non-Internet firms, and proxies for uncertainty variables could explain firms' initial returns. If overreaction behavior for Internet firms exists in the pre-offering and initial trading day, one would observe that Internet firms exhibit high initial return, which cannot be explained by their fundamentals. Moreover, according to DHL's theory, one would expect that Internet firms exhibit a short-run positive price momentum and the long-run price reversal pattern. Thus the logic behind investigating IPO's long-run performance in this article is to test the proposed overreaction explanation of the extremely high initial underpricing of Internet firms in the Internet bubble period. The most common explanation of IPO's initial underpricing is based on the asymmetric information theory, such as the risk composition hypothesis. However, few articles really test the overreaction hypothesis, even though researchers like to mention that the long-run underperformance could be due to investors' initial overreaction. It is also believed

that Internet IPOs can be employed as a good means of testing investors' overreaction, since Cooper et al. (2003) preliminarily find that investors react positively to firms changing their names to "dot com."

Variables like years existing before IPO, offer size, pre-IPO operating performances, and sales growth rate are chosen as the proxies to measure firms' ex-ante uncertainty. The results are consistent with the changing risk composition hypothesis. Among all the uncertainty measures, sales growth rate and age of the firm before IPO are the most powerful variables to explain initial returns. Sales growth rate is positively related to initial return, whereas age before IPO is negatively related. Debt per share, debt to assets, and size are significant predictors for initial returns, however the direction of these relationships are not as hypothesized.

Preliminary results from this study are also consistent with the overreaction hypothesis in several respects. First, it is demonstrated that as an industrial class, Internet firms have a tendency to experience upward price revision when compared to non-Internet firms. 274 out of 376 Internet firms and 184 out of 368 non-Internet firms experienced upward price revision, while 69 Internet firms and 125 Non-Internet firms experienced downward price revision. Based on book building theory, price revision should be higher for offers where there is a strong demand. Moreover, A firm's price revision can be explained by an Internet dummy variable that is highly significant (0.01 level) with a coefficient more than 0.14. Second, the Internet dummy variable is significantly and positively related to initial returns after controlling for uncertainties, with coefficient of more than 0.30. OLS regression with initial return as the dependent variable shows that pre-IPO performances are not significant predictors of firms' initial

returns for Internet firms, while investors value pre-IPO debt per share, sales growth rate, and age before IPO for non-Internet firms. Third, Internet firms had a clear pattern of positive price momentum and long-run price reversal compared to non-Internet firms. The 6 and 36-month buy and hold returns are 17.34% and -53.68% for Internet firms and 5.41% and -1.56% for non-Internet firms. The regression results show that Internet firms earned 24% higher 6-month buy and hold returns than non-Internet firms when controlling firm's risk and initial returns. Fundamental variables like sales per share and sales to total assets before IPO, which cannot explain initial returns and short-term returns, can explain firms' long-run buy and hold returns with significantly positive coefficients. Internet firms earned significantly negative three year buy-and-hold index adjusted returns after controlling for change of operating performances, size, and market-to-book ratio.

Regarding underwriter's self-selection, the results show that prestigious underwriters tend to select larger offer size and better pre-IPO performing firms. Sales per share and offer size are significant criteria of underwriters' self-selection. For prestigious underwriters, non-Internet firms chosen have better pre-IPO performance than Internet firms that were chosen. Overall, the results do not support the hypothesis that prestigious underwriters do not consider Internet firms' performance when undertaking them.

The rest of this paper is organized as follows: Section 2 is a review of the literature; section 3 describes the sampling method and data resources; section 4 reports the analysis of the determinant of price revision and underpricing; section 5 studies the

sample firms' long-run market performance, and section 6 shows the evidence of underwriter's self selection.

2. Literature Review

2.0 Why do firms go public?

Before studying the IPO market, it is helpful to answer a fundamental question: why do firms go public? It is commonly understood that firms go public to raise equity capital and to create a public market in which the founders and other shareholders can convert their wealth into cash at some future date. Life cycle theories and market-timing theories have been developed to explain the rationale of firm management to go public.

According to the Life Cycle theory, a firm will be privately owned at first, but if it grows sufficiently large, there will be an impetus to go public (Chemmanur and Fulghieri 1999). Public trading has costs and benefits. In addition to the initial underpricing, going public implies considerable direct costs: underwriting fees, registration fees etc. Then there are recurring expenses such as fees on auditing, certification, and dissemination of accounting information. Since many of these expenses do not increase proportionally with the size of IPO, they weigh relatively more heavily on small companies. Ritter (1987) has estimated that in the United States, the fixed costs equal approximately \$250,000 and the variable costs are about 7 percent of the gross proceeds of the IPO. From the view of transaction costs, it is suggested that the likelihood of an IPO should be positively correlated with company size. Moreover, Public trading can definitely add value to firms, as it may inspire more faith in the firm from other investors, customers, creditors, and suppliers. In addition, public trading may also confer a first-mover advantage if the firm is the first in its industry to go public (Ritter and Welch 2002).

Besides these advantages, there is the possibility of overcoming borrowing constraints, which allows access to financial resources other than banks or venture capital. This is probably the most cited benefit of going public. According to Pagano et al (1998), the opportunity to tap public market for funds should be particularly appealing for companies with large current and future investments, high leverage, and high growth. Besides this, if the initial owners want to raise money from dispersed investors, listing on an organized exchange provides better liquidity than an informal search for buyers. Pagano et al (1998) found evidence from firms in Italy that the likelihood of an IPO increases with the size of the company.

It is well known that firms postpone their equity issues if they know they are currently undervalued and have an incentive to go public if they recognize that other companies in their industry are overvalued. To the extent that a bear market places too low a value on the firm, IPOs will be delayed until a bull market offers a more favorable pricing. In Pagano's (1998) paper, the authors measure the buoyancy of the relevant market by the median market-to book ratio of public companies in the same industry, and empirically they found that the likelihood of an IPO is increasing in the industry's market to book ratio.

Ritter and Welch (2002) propose that there would be more IPOs after a period of high initial returns because underwriters encourage more firms to go public when public valuations turn out to be higher than expected, and because underwriters discourage firms from filing when the public valuations turn out to be lower than expected. Lowry and Schwert (2002) find that both IPO volumes and average initial returns are highly autocorrelated. Their data show a strong pattern of negative correlations between current

initial returns and past numbers of IPOs along with strong positive correlations between current initial returns and future numbers of IPOs. It is suggested that companies time their IPOs in response to the size of recent initial returns.

Schultz and Zaman (2001) found unfavorable evidence for the market-timing theory. The authors try to find evidence regarding why 321 Internet firms rush to go public during January 1999 through March 2000 with an average first day return of 91%. Interestingly, most these companies had little if any revenue, and only 28 of the 321 were profitable in the previous quarter. Two explanations are investigated in this article; the first is that managers hurry to take their companies public because the market is irrationally overpriced. The second argues that the prices of these stocks are reasonable given the tremendous growth and enormous potential of the Internet. Based on the second explanation, companies rush to grab market share in an industry in which economies of scale ensure that only a few firms will survive in each niche. The results of the Schultz and Zaman (2001) study show that there is only weak evidence to support the argument that Internet IPOs are attempts to sell overpriced stocks.

2.1 Theories and evidence on IPO's underpricing

The IPO market has attracted so much attention because companies on average underprice their shares when going public (Ritter 1984, Loughran and Ritter 1995). This implies on the one hand that investors make profits if they purchase stocks at offer price (when they are underpriced), and on the other hand, issuing firms substantially lose potential proceeds due to a lower offer price. Several theories have developed to explain

the phenomenon of IPO's underpricing. They are Asymmetric information – the winner's curse, overreaction, underpricing as a signal of firm's quality, book-building theory, change issue objective function, avoid litigation, and the marketing roles of IPO.

2.1.1 Asymmetric Information: the winner's curse

The best-known asymmetric information model of initial underpricing is Rock's (1986) "winner's curse." Rock assumes that both the issuing firms and its underwriting bank are completely uninformed about the true value of the shares offered. However, some investors (not all) are perfectly informed (referred to as "informed investors"). Informed investors bid only for attractively priced IPOs, whereas the uninformed investors bid indiscriminately. This imposes a "winner's curse" on uninformed investors: in unattractive offerings, they receive all the shares they bid for which informed investors would not bid; in attractive shares, they face competition for shares from informed investors. For uninformed investors, the average profits from underpriced shares would offset the losses from overpriced shares. In extreme cases, uninformed investors may receive 100 percent overpriced offerings and no shares of underpriced offerings, which results in negative returns. If uninformed investors expect this result, they may withdraw from the market and only the informed investors stay. Rock assumes that the primary market is dependent upon the continued participation of uninformed investors, which means informed demand is insufficient to account for all the shares offered even in attractive offerings. Since the market needs the participation of uninformed investors, deliberate underpricing offerings is undertaken to help the uninformed investors to break even. This does not remove the allocation bias against the uninformed. They will still be

crowded out by informed investors in most under-priced offerings, but they will no longer absorb losses on average.

Ritter (1984) further developed and tested the implications of Rock's model, namely by suggesting a positive relationship between the degree of underpricing and ex ante uncertainty. He argues that the more uncertain the market is about the true value of the issue firm, the higher the discount the company must offer to the uninformed investors to submit the bids. If high-risk offerings represent an unusually large fraction of initial public offerings in some periods, these periods should have unusually high average initial returns and is called hot issue market. Two variables are used as proxies for ex ante uncertainty; 1) the annual sales of the issuing firm prior to the official listing, and 2) the volatility of its first 20-day stock returns after initial listed measured as the standard deviation of returns. Even though this study shows a positive relationship between the degree of risk and underpricing, there are still very high initial returns for nature resource companies during the hot issuing market after controlling for their risks. Thus, he concludes that the changing risk composition cannot explain the unusually high average initial returns during the hot issue period.

Researchers have also extended the study of IPO underpricing to specific industries such as the close-end funds and REITs. For example, Weiss (1990) and Peavy (1991) report that new issues of close-end funds average a zero return on their first day of trading and are associated with a 10% negative abnormal return in the subsequent 100 trading days. This lack of initial underpricing is consistent with the winner's curse explanation of underpricing because there is little uncertainty about the value of a close-end fund. Ling and Ryngaert (1997) find evidence that equity REIT IPOs in the 1990s

have been under-priced on average by 3.6%, and have moderately outperformed seasoned equity REITs in the 100 trading days after issuance. REIT IPO underpricing is attributed to greater valuation uncertainty and a higher degree of institutional involvement. Initial returns are negatively related to the underwriter's reputation – a commonly acknowledged proxy for uncertainty - and positively related to the initial level of institutional share ownership. Evidence from this study is consistent with the winner's curse hypothesis of underpricing.

2.1.2 Overreaction

Test of overreaction can only be achieved by combining the underpricing of an IPO and its long run under-performance. According to this behavioral explanation, there are fads in the IPO market, with investors initially being over-optimistic about the prospects of newly listed companies and bidding up initial trading prices beyond fair value. In the long-run, the firm's performance should reflect its fundamental values, which leads to the negative long-run abnormal returns. Ritter (1991) finds that the issue firms during 1975- 84 substantially underperformed a sample of matching firms from first trading day till their 3-year anniversaries. He concludes that investors are periodically overoptimistic about the earnings potential of young growth companies. Mikkelsen et al (1997) show that long-run share price performance is related to a change in operating performance. When operating performance fails to sustain pre-offering level, shares price fall.

2.1.3 Underpricing as a signal of firm's quality

Unlike the winner's curse, which assumes some investors have better information about the issue firm, theory of underpricing as a signal assumes companies have better information about the present value and the risk of their future cash flows than do investors. Based on this asymmetric information, underpricing may become a means of convincing potential buyers of the high value of the firm. Several studies tested the signaling theory concerning the relation between initial underpricing and later equity offering. Issue firms deliberately under-price their IPOs to signal the true value and to achieve a better price for a subsequent equity offering. If firms do underprice to signal investors favorably for later equity offerings, one would expect reissuing companies to have experienced great underpricing. However, evidence on this is mixed. For example, Welch (1989) and Jegadeesh et al (1993) test the signaling hypotheses empirically by assessing the likelihood of a Seasoned equity offering as a function of the IPO underpricing. They find a small impact of underpricing for the likelihood of SEOs. Clearly, signaling models would be of little practical importance if companies did not follow a multiple-stage sale policy of an initial offering followed by subsequent equity offerings or inside sales.

2.1.4 Book Building Theory

Book Building is a method for underwriters to decide the final offer price according to the expressed demand by investors. Book Building consists of three main steps. The first step is that the investment bank determines which investors will be invited to participate. In most cases, small retail investors are not included in book building efforts. In the second stage, invited investors are required to submit indications

of demand. At the final stage of book building, the final price and share allocation are determined according to submitted demand and shares supply. If there is a strong demand, the underwriter will set a higher offer price. But if potential investors know that showing a willingness to pay a high price will result in higher offer price, these investors must be offered something in return. To induce investors to reveal true intent regarding share purchases at a high price, underwriters must offer them some combination of more IPO allocations and underpricing opportunities when they indicate a willingness to purchase shares at a high price. Hanley (1993) empirically tested the bookbuilding theory, and found that when underwriters revise the share price upward from their original estimation in the preliminary prospectus, underpricing tends to be greater.

2.1.5 Changing issuer objective function

Loughran and Ritter (2002) argue that the changing issuer objective function can explain the increase in underpricing during the bubble period. The changing issuer objective function asserts that, holding constant the level of managerial ownership and other characteristics, issuing firms become more willing to leave money on the table. Issuers have put less weight on IPO proceeds and more weight on the proceeds from future sales and side payments.

The authors proposed two explanations; the first is the analyst coverage hypothesis, the second is the corruption hypothesis for the willingness of underpricing. The analyst coverage hypothesis is related to the increased importance of analyst coverage. As issuers placed more emphasis on hiring a lead underwriter with a highly ranked analyst to cover the firm, they became less concerned about avoiding underwriters

with a reputation for excessive underpricing. According to the corruption hypothesis, co-operating decision-makers receive side payments. Beginning in the 1990s, underwriters began to allocate hot IPOs to personal accounts, and to the venture capitalist and the executives of issuing firms. This activity may encourage issue firms to choose a lead underwriter with a reputation for severe underpricing rather than avoid choosing it.

2.1.6 Legal liability hypothesis

The basic idea of legal liability hypothesis is that companies knowingly sell their stock at a discount to insure against future lawsuits from shareholders disappointed with the performance of their shares. Shareholders can sue the issuers on the grounds that material facts were misstated or omitted from an IPO prospectus. Tinic (1988) argue that intentional underpricing may act as insurance against such securities litigation. He assume that the more overpriced an issue, the more likely is a future lawsuit.

2.1.7 The marketing role of IPOs

Demers and Lewellen (2003) explore the potential marketing benefits of going public and of IPO underpricing. They use web traffic as a direct measurement of product market performance for Internet firms. Underpricing is expected to be a marketing tool; specifically, it is seen as a way to attract media attention and create valuable publicity. These authors find that post-IPO growth in web traffic is positively associated with initial returns. In order to investigate whether there are marketing benefits associated with going public that extend beyond the hot market for consumer-oriented Internet IPOs, they extend their analysis to a larger sample of Internet companies and to a random sample of

non-Internet IPOs. For both samples, the post-IPO marketing benefits, which are measured as media exposure, are positively associated with initial returns.

2.2 Evidence of IPO's long-run Underperformance

Another area that attracts the interest of academics in recent years is the post-IPO long-run performance. Efficient market proponents would argue that once an IPO is issued, the stock is just like other stock and thus the aftermarket stock price should appropriately reflect its fundamental value. Therefore, risk adjusted post-IPO stock price performance should not be predictable.

The pioneering work in this field is Ritter (1991). In his study, the author finds that issuing firms during 1975-84 substantially underperformed a sample of matching firms from the closing price on the first day of public trading to their three-year-anniversaries. The average holding period return for the sample IPOs is 34.47%, whereas a control sample matched by industry and market value produced an average total return of 61.86% over the same 3 year holding period. The worst performing companies were young companies and those going public in heavy volume years. Three explanations are proposed: bad luck, risk mis-measurement, and over-optimism. The evidence presented is consistent with the notion that many firms go public near the peak of industry-specific fads.

Tech, Welch, and Wong (1998) attribute some of the poor post-IPO performance to "optimistic" accounting early in the life of the firm. It is not surprising that firms are eager to look good when they conduct their IPOs, and that the investors has difficulties in

finding hidden warning signals. According to these authors, the cause of poor long run market performance is due to earning management as earnings reported in excess of cash flows by taking positive accruals are tested. They provide evidence that issuers with unusually high accruals in the IPO year experience poor stock return performance in the three-year after. IPO issuers in the most aggressive categorization of earning management experienced a 20 percent three-year after market return lower than issues in the most modest earning management categorization. This suggests that at least a part of the poor long-run performance is due to a market that is optimistic and unable to see tough times ahead.

Yi (2001) investigates pre-offering earnings and long-run performance of IPOs. This study finds that IPO firms as a whole underperformed a market index and control firms over a 3-year period after initial issue, which is consistent with Ritter (1991)'s result. Moreover, firms with positive pre-offering earnings perform better than firms with negative earnings. Among all the firms, only the firms going public with negative earnings have a statistically significant negative abnormal mean return. Yi (2001) is also consistent with the over-optimistic hypothesis, that investors may have been too optimistic about future prospects of IPO firms, especially those with negative earnings.

In Jain and Kini's (1994) study, a significant decline in operating performance subsequent to the IPO is found. Operating performance included operating return on asset, operating cash flow to total assets, sales, and asset turnover. The authors conclude that the decline in post-issue operating performance is inconsistent with the fact that IPO firms are initially priced at high price-earning multiples. IPO firms that start with high market to book ratio and price to earning ratios experience a decline in these measures

after IPO. Overall, the evidence suggests that investors appear to value firms going public based on the expectation that earnings growth will continue, when in actuality, they are not even sustained. Ritter (2002) conducted a review of relevant literature, in which he mentioned that there is no reliable relationship between short-run underpricing and long-run performance. These results are sensitive to whether penny stock IPOs are included.

2.3 Evidence on underwriter's reputation

Literature on the relationship between an underwriter's reputation and the IPO's underpricing is interesting. Beatty and Welch (1996), Loughran and Ritter (2002), and others have documented that a negative relationship between underwriter prestige and underpricing existed in the 1980s, but reversed in the 1990s. In the 1980s, prestigious underwriters were associated with less underpricing, and investors did not demand a large underpricing because of the great reputation capital that is committed. However, the greater underpricing associated with prestigious underwriters in the 1990s and Internet bubble period is inconsistent with the hypothesis that underwriters attempt to maximize issue proceeds and that reputation is an important determinant of the money on the table. Loughran and Ritter (2002)'s results show that over time, especially in the Internet bubble period, prestigious underwriters relaxed their underwriting standards and took public an increasing number of very young and unproved companies.

2.4 Value IPOs

Most of the literatures regarding IPOs suggest that pricing an IPO is based on the comparison of its operational and financial performance to other public owned companies in the same or similar industry. The firm and its underwriters make pricing decisions based on an analysis of market price ratios, with adjustments for firm-specific differences, and determine a minimum and maximum offer price. This method is called the comparable firm approach. This approach works best when a highly comparable group is available. Unlike the comparable firm approach, the discounted cash flow method asserts that asset price is based on its future cash flow. In many situations, it is difficult to estimate future cash flows and appropriate discount rate. Most IPO firms in the U.S. are young companies – especially in the Internet bubble period – and it is difficult to value these firms according to traditional discounted cash flow analysis. By contrast, the use of accounting numbers and firm multiples are widely recommended (Kim and Ritter 1999).

In Kim and Ritter's (1999) article, accounting information and comparable firm multiples are used to value IPOs. Their sample includes 190 domestic operating IPOs from 1992 to 1993 which must have positive earnings per share and book value per share. Comparable firms are chosen with same 4 digit SIC code. These authors find that valuing IPOs on the basis of the price-to-earnings, price-to-sales, enterprise value-to sales, and enterprise value to operating cash flow ratios of comparables firms have only modest predictive ability without further adjustments. This is largely due to the wide variation of these ratios for young firms within an industry. The difficulties in valuing young firms could also explain the large offer price adjustment before IPO and high initial return for Internet firms.

2.5 Literatures related to Internet IPOs

Internet related IPOs have begun to catch research interests within the past few years, especially after the tumultuous year, 1999 and 2000, which experienced a spurious amount of Internet related firms going public, and associated with extremely high initial returns. Most articles study how Internet-related firms were initially priced (Bartov et al, 2002, Hand 2001). Researchers tried to find whether these stocks were rationally priced compared to non-Internet related stocks. In these two articles, stock pricing is measured from two perspectives: accounting performance and web traffic.

Bartov et al. (2002) empirically investigated valuation of Internet firms at various stages of the IPO from mid point of pre-IPO price range, offer price, and first day closing price. Their analyses involve three types of explanatory variables. The first is a set of financial variables; earnings, cash flows, sales, and book values. The second is a set of non-financial variables; relative offer size and a measure capturing the relative position of the final offer price relative to its initial price range. The third is primarily a set of control variables which are important in explaining IPO valuations like underwriter rank, R&D expenditures and so on.

Their sample covers the 42-month period from January 1996 to June 1999. The initial sample included 233 Internet firms, however after screening according to a series of criteria, only 98 firms are left in the sample. In order to compare Internet firms with non-Internet firms, 98 non-Internet firms were chosen according to their IPO date and size. In their study, significant differences between the valuation of Internet firms and

non-Internet firms were found, especially at the initial IPO pricing stage and at the time of IPO. Specifically, the valuation of non-Internet firms generally follows 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 is a departure from conventional wisdom, with earnings not being priced while negative cash flows are priced. When the dependent variables are changed from either offer price or first trading day closing price to initial return, earnings and cash flows lose their explanatory power. Specifically, the difference between offer price and first trading day closing price is insignificant related to any of the financial variables for either sample, except for annual sales growth which indicates that growing firms receive a more positive reaction from stock market.

Lingqvist and Wilhelm (2002) investigated IPO pricing from the year 1996 to 2000. The results show that ownership structure and inside selling behavior can account for IPO underpricing because they reduce key decision-makers' incentives to control underpricing. In 1996, pre-IPO insider ownership stakes averaged 63%, but by 2000 the ratio had declined to 51%. CEO stakes declined even more dramatically, from 22.8% to 11.5%. Similarly, equity stakes held by venture capitals and investment banks, and those held by other corporations declined sharply over this period. Besides these, secondary sales of existing shares by all categories of pre-IPO owners and especially CEOs have declined sharply. On contrast, shares allocated to families and friends increased dramatically from 25% in 1996 to 76% in 1999 and to 91% in 2000. From the view of standard principal-agent theories, underpricing is significantly lower when insider ownership stakes are larger and when insiders sell more shares at the offer price.

Empirical results support this prediction and find an association between IPO pricing in the dot-com bubble and changes in ownership structure and insider selling behavior. When controlling for above ownership structure and inside selling behavior, dummy variable coefficients associated with high-tech and Internet firms decline by more than 60%. It should mention that the coefficients for Internet dummy variables are significant and positive in their regressions, which reflects that Internet firms earned super initial returns even after controlling ownership structures and inside selling behaviors.

Schultz and Zaman (2001) examine the motives for Internet firms. There are two commonly offered explanations for the propensity of Internet firms to go public. The first argument is that Internet firms are trying to grab market shares in an industry with large economics of scale. The second argument is that Internet firms are rushing to go public when Internet stocks are irrationally high. Results from this research provide only weak evidence that Internet firms go public to sell overpriced stock. The authors find that managers do not sell as many of their personal shares, and that insiders sell fewer of their own shares in Internet IPOs than do insiders associated with other IPOs. This is consistent with the idea that insiders believe that Internet stocks are fairly priced. Besides the main findings, evidence is also presented that Internet firms go public at an earlier stage in their life than other companies because the mean of earnings to post issue market capitalization are negative for Internet firms and positive for other IPOs.

Cooper et. al (2001) document a striking positive stock price reaction to the announcements of corporate name changes to Internet-related dotcom names. The sample in their study consists of 95 very small firms that change their names to include “.com” or “Internet.” An average abnormal return of 80% is found for ten days surrounding the

announcement. The authors call this phenomenon “mania”, which is often related to certain glamour industries with both an enormous growth potential and uncertainty. Consequently, investors were extremely eager to buy shares of any firms that are involved in these industries. These results challenge the rational pricing hypothesis and lend more support to irrational investor behavior model.

Hand (2001) argues that if cross-sectional variation in the equity market values of Internet and non-Internet stocks can be consistently explained by similar factors, it is unlikely that the pricing of Internet stocks has been entirely irrational. The author divides Internet firms into two groups: with material web traffic and without material web traffic. The two types of non-Internet firms chosen include a random sample of public traded non-Internet firms and a sample of non-Internet firms that went public at the same time as Internet firms. Two time periods are estimated: March 2000 which is the peak of Internet firms going public and December 2000. Equity market value is measured as the closing price multiplied the number of shares outstanding at the offer date. The results show that equity markets value Internet firms with immaterial web traffic, with the analysts’ forecasts of earnings in 2001 and the long term rate of growth in earnings. This is not the case for firms with intensive web traffic. Beyond earnings, web traffic is positively priced. However, there is no evidence that the degree of public float and short interest, which are two proxies for supply and demand forces, are value-relevant to Internet firms. Overall, the author argues that there are enough similarities in the cross-sectional pricing of Internet and Non-Internet firms, and it is unlikely that the pricing of Internet stocks during 2000 was entirely irrational.

3 DATA AND METHODOLOGY

3.1 valuation uncertainty, overreaction, and underwriter's reputation

A large volume of IPO literature examines the first day return on IPOs and the explanations assume there exists information asymmetry in initial public offering market. Based on this explanation, underpricing is a compensation for uninformed investors. The higher the uncertainty surrounding an offering, the higher the degree of information asymmetry for uninformed investors, and thus results in higher degree underpricing. The changing risk composition hypothesis (Ritter, 1984) states the correlation between underpricing and firm's ex ante uncertainty. The more uncertain the market is about the true value of the issuing firm, the higher the discount the company must offer to uninformed investors to submit the bids, therefore, underpricing should increase in the ex ante uncertainty surrounding an issue. Internet firms usually have smaller firm size, less profitable pre-IPO operating performance, fewer years in existence before going public, and unstable earnings compared to non-Internet firms. Based on the changing risk composition theory, it is argued that the high initial return of Internet firms is derived from their high future uncertainties.

Hypothesis 1: Internet-related firms face higher future uncertainty than non-Internet firms, and thus lead to higher initial returns compared to non-Internet related firms.

According to the overreaction hypothesis, investors are likely to be overoptimistic with certain firms, such as those with potential earning growth or firms in a specific industry. Cooper et al. (2002) find a striking positive stock price reaction to the announcement of corporate name changes that included Internet-related dotcom names. So, based on Cooper's finding, this study presents a hypothesis that the high initial return for Internet firms is also a dotcom phenomenon. The overreaction to Internet firms could begin in the pre-offering period, which is shown by underwriter's upward price revision before setting the final offer price. Moreover, if investors were simply overoptimistic with Internet firms on the first trading day, then one would expect to find that initial returns for Internet firms are not related to their fundamentals. This overreaction could be an artifact of a particular industry: the Internet. Thus, there was the tendency for everybody to try to find another Microsoft. Unlike Internet firms, non-Internet firms are still priced rationally, so we would expect their initial returns to reflect their fundamentals. Basically, overreaction hypothesis is based on behavioral explanation; investors are optimistic to Internet firms and bidding initial trading price beyond fair value. Thus, in the first trading day, high initial return is anticipated.

Hypothesis 2: Investors are optimistic to Internet-related IPOs, and overreact to them. Investors have crowded the market for Internet issues, which lead to higher upward price revisions for Internet firms than for Non-Internet firms. Moreover, due to investors' overreaction, pre-IPO fundamental variables are not relevant explanatory variables to initial returns for Internet related firms

Empirical studies related to IPOs' long run performance have not reached consensus regarding whether IPO firms underperform their benchmarks. Several researchers find that IPO firms experience long run underperformance compared to benchmark firms and the most frequently cited studies are "The long run performance of initial public offerings" by Ritter (1991) and "the New Issue Puzzle" by Loughran and Ritter (1995). However, Brov and Gompers (1997) argue that venture-backed IPOs do not significantly underperform, only the smallest nonventure-backed firms underperform compared to several benchmarks. Recently, Gompers and Lerner (2003) studied the 5-year performance after initial public offerings with 3,661 IPOs from 1935 to 1972. Gompers and Lerner find that the underperformance disappears when using cumulative abnormal returns instead of buy-and-hold abnormal returns. From a calendar-time analysis, IPO firms perform as same as the market. Ritter and Welch (2002) also argue that many of phenomena found in the IPO literature depend on the time period, thus it is necessary to explain the causes of such phenomena in their specific period. Internet firms experienced super high initial underpricing in the Internet bubble period, and if behavioral explanations like overreaction is true, then the long-run performance of Internet IPOs should follow a certain pattern that can be predicted by behavior theories. Thus, the rationale for investigating IPO's long-run performance in this article is to test the proposed overreaction explanation to the extremely high initial underpricing of Internet firms in the Internet bubble period. It is also believed that Internet IPOs can be employed as a good means of testing investors' overreaction, since Cooper et al (2003) find that investors reacted positively to firms changing their names to "dot com."

Empirical findings to support behavioral theory that individuals often violate Bayes' rule and rational choices are numerous. For example, DeBondt and Thaler (1995) demonstrate that buying past losers and selling past winners is a profitable trading strategy. Fama (1992) also shows that firm size and market to book ratio are powerful predictors of a firm's return while market Beta does not seem to explain the results. Lakonishok, Shleifer, and Vishny (1994) show that "value strategy" earns significantly positive abnormal returns. Findings of market anomalies in the IPO field are also fruitful, such as IPO underpricing and long run underperformance. Jaggia and Thosar (2004) propose that the overheated high-tech IPO environment of late 1990s is an ideal testing period for behavioral theories. In their study, DHS overreaction framework (Daniel, Hirshleifer, and Subrahmanyam 1998) is tested and they find that overreaction continued in the short run with a sample of 301 high tech companies issued from January 1, 1998 to October 30, 1999.

According to DHS' overreaction framework, investors are overconfident and overreact to private signals. In addition, self-attribution bias makes overreaction continue in the short run, and finally, the long-run price reversal is expected due to further release of public information. Jaggia and Thosar (2004) propose an overreaction explanation for IPOs based on the DHS framework. When given a favorable signal, investors' overconfidence pushes the stock price above its rational expected level at time 1. If investors observe that public signals are consistent with their initial assessment, self-attribution bias will drive the price even higher, and further away from the rational level at time 2. The arrival of later public information gradually induces the price back to the fundamental value at time 3. According to this overreaction proposal, overreacted IPOs

will exhibit positive momentum in the short run and a price reversal in the long run. Jaggia and Thosar (2004) only test the DHS overreaction hypothesis in the short run (6 months after IPO) in a sample of 301 high-tech IPOs, and find that momentum variables are important to explain firm's short run performance, which is consistent with overreaction prediction. If investors do overreact to Internet-related firms in the initial return period, positive price momentum in the short run and a price reversal in the long run for Internet firms would be expected after controlling for other factors, such as changes of operating performance, size, and market to book ratio.

Hypothesis 3: In the short run, due to investors' overreaction, Internet firms would exhibit a positive price momentum; however, in the long-run, Internet-related firms cannot sustain abnormally high returns, especially for those firms which experienced spuriously high initial returns. Price reversal is expected and the market performance in the long run for Internet firms is positively related to their pre-IPO performances.

In the Internet bubble period, do prestigious underwriters relaxed their underwriting standards and took public an increasing number of very young and unprofitable companies? If this is the case, it should be found that pre-IPO operating performance are positively related underwriters ranking for non-Internet firms, but this relation does not hold for Internet firms.

Hypothesis 4: With respect to underwriter's self selection, high reputation underwriters pick up non-Internet firms with better pre-IPO operating performance, but they tend not to consider pre-IPO operating performance for Internet firms.

3.2 Sample Selection and Data Sources

The sample is comprised of 744 initial public offerings from January 1, 1999 to December 31, 2000. The reason the sample is restricted to these specific time period is the spurious amount of Internet IPOs within these two years (table one). The total number of Internet firms is 313 for 1999 and 164 for 2000. In this period, the ratio of Internet firms to total offerings is much higher than the ratios for other years. This timeframe is commonly referred to as the Internet Bubble period (Loughran and Ritter, 2002). The sample firms are restricted in the year 1999 and 2000 since it is a good time period to test overreaction hypothesis.

[Insert Table 1 here]

Sample firms are identified, and data collected from Edgar-online for firms priced between January 1 1999 and January 1 2001. Based on this time limitation, 1117 firms were selected. Several criteria are set to clean the final sample: (1) the offering is not an ADR, which resulted in the exclusion of 145 firms, (2) Shares must be traded in NYSE, AMEX, and NASDAQ, which lessened the sample by another 88 firms, (3) the company is included in the CRSP daily database, which excluded another 13 firms, (4) the offering is not a financial company and involves common stock only, 81 close end funds, REITs, unit offerings, and other types of financial companies are excluded, (5) the IPO must

have complete data (including offer price, date, amount, and shares offered), which excludes 14 more firms, (6) a offer must have an offer price of \$5 or more, lessening the sample by 3, (7) the IPO is not combined with warrants or rights, which excludes 10 firms, (8) the offer can be found in COMPUSTAT, excluding 16 more firms. After refining the sample by these criteria, 744 firms are included in the final sample (3 firms have other missing data, see table 2).

[Insert Table 2 here]

Offering data like offer price, offer date, number of share offered, and name of the underwriters are collected from Edgar-online. Internet companies are also identified via Edgar-online, as indicated by the Edgar-online “Internet –related” classification. This is necessary because SIC codes for Internet firms vary widely. It is almost impossible to identify Internet stocks from SIC listings because they carry numerous two-digit SIC codes (Schultz and Zaman 2001). For example, the SIC code for Yahoo is 73, Amazon.com is 59, and Priceline.com is 47, each of which is shared with non-Internet firms. In our sample, most Internet firms have 73,59,48, 36, and 35 as the first two digital of SIC code. The final sample includes 376 Internet firms and 368 non-Internet firms.

The closing price on offer date, shares outstanding, and 24-month daily returns are gathered from CRSP database. Firm CUSIP numbers are obtained from CRSP, and the same firms are identified in COMPUSTAT using the CUSIP number obtained from CRSP. Previous year performance data are collected from COMPUSTAT, which includes total assets, sales, net income, total debt, and cash flow from operations. Firms’ total sales before offering was also made available through Edgar-online. For example, several consecutive annual sales or quarterly sales can be found from a firms’ prospectus.

These sales figures are the basis for calculating sales growth rate. Underwriter's ranking is collected from Jay Ritter's personal web site. Firms' founded year is obtained from Business & Company Resource Center database.

3.3 Description of variables

3.3.1 Offering variables

Offering variables include offer price, offer date, offer amount, change in offer range, change in offer price, price revision, offering size, float, years of existing before IPO, and Internet dummy. The offer price is normally set one day before the actual trading day. In other words, the trading date is one day after the pricing day. For example, Priceline.com is priced at \$16 on March 29 1999 (pricing date), and began trading on NASDAQ on March 30 1999 (IPO trading date). Underwriters assign an estimated offer price range before setting the final offer price. The mid point of the offer range is commonly used in academic research. For example, if the offer range for Priceline.com is \$12 to \$14, then the mid point of offer range is \$13.

The change in offer range is measured as the ratio of price difference between the midpoint of initial offer range and final offer range to midpoint of initial offer range. For example, the firm Manufactures Services LTD set its offer price range at \$17 to \$19 on April 28 2000. On Jun 1 2000, the company decided to decrease the offer range to \$15 to \$17. The initial mid point of offer range is \$18 $((19-17)/2)$ and the final midpoint of offer range is \$16 $((17-15)/2)$. In this case, change in offer range can be calculated as $(16-18)/18=-.11$. If a company never announced an increase or decrease its offer price range,

its change in offer range should be zero, which means that the firm had estimated the share demand properly at the first place. Change in offer range is an important measurement according to book building theory because the final share price and share allocation are determined by share demands expressed by investors, thus underwriters would like to adjust the offer price range with expressed demand.

Change in offer price measures the position of final offer price relative to the mid point of final price range. It is calculated as $(\text{offer price} - \text{mid point of final offer price range}) / \text{mid point of final offer price range}$. For example, Price line .com set its offer price on \$16. Before this, its final price range is from \$12 to \$14, which indicates the midpoint of final price range is \$13. Then the Change in offer price should be $0.2308 (16-13/13)$. Like the variable change in offer range, it is also a market indicator of share demand.

Price revision measures the ratio of price difference between offer price and midpoint of initial offer price range to mid point of initial offer price range. It includes two price adjustments, change in offer range and change in offer price. In other words, price revision can also be calculated as: $(1 + \text{change in offer range}) * (\text{change in offer price}) - 1$.

In this research, offering size is measured as the amount of shares outstanding multiplied by the offer price. It is well known that firm's size can partly explain its daily return (Fama and French 1992). Small size firms would earn higher returns than large firms.

Another important variable is Float. Float represents the amount of shares issued in the IPO as a percentage of total shares outstanding. High float can be viewed as a high supply of shares, and thus stock should be priced low, or be less under-priced (Bartov et

al. 2002). Moreover, Schultzen 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 insiders are less likely to sell shares to catch the benefit of overpricing. From the view of agency cost, low float, which means high insider ownership, represents less conflict of interest between managers and shareholders.

Age (years existing before IPO) is calculated as number of years between IPO year and founded year. The months in the founded year and IPO year are neglected. For example, ACLARA BIOSCIENCES INC went public on March 21 2000 and its founded year is in 1995, then 5 years is its years existing before IPO.

In addition, an Internet dummy variable was included. If an offer is Internet related, then the variable is equal to 1, or 0 if the offer is not related to the Internet. Bartov (2002) states that valuation of Internet stocks is difficult because not only do Internet firms invest highly in intangible assets, but also attempt to transform the way in which business is transacted. In addition, the vast majority of Internet companies are young growth firms with little or even negative earnings. These characters of Internet firms further contribute to the substantial uncertainty that is associated with the valuation of Internet stocks. One of focuses of this study is to understand whether investors rationally value firms in the new (Internet) industry, or the irrational so-called “dotcom” fad exists.

3.3.2 Firms pre-offering operating performance variables

All firms' pre-offering operating performance is relative to year -1 , which is the year prior to the IPO. Total sales is COMPUSTAT data item 12. Net income is

COMPUSTAT data item 18, which represents the income of a company after all expenses, including special items, income taxes, and minority interest. Operating cash flow is calculated as income after all expenses plus depreciation and amortization (COMPUSTAT: IB+DP). Total debt is the sum of total long term debt plus debt in current liabilities (COMPUSTAT: DLTT + DLC). Total asset, which is COMPUSTAT item 6, represents current asset plus net property and equipment plus other non-current assets like intangible asset.

The operating performance variables are categorized into three groups: the first is operating performance on total asset (including sales on asset, net income on asset, cash flow on asset, and total debt on asset); The second is operating performance on shares outstanding (including sales per share, net income per share, cash flow per share, and total debt per share); The last one is sales growth rate measured as the change of sales between year -1 and year -2 divided by sales in year -2 .

3.3.3 Initial returns and long-run returns

Returns are calculated for two intervals: the initial return period (normally 1 day) and the after market period which is defined as the 36 months after the IPO, exclusive of the initial return period. The initial return is defined as the percentage difference between first day closing price and the offering price. The first day close pricing is listed on the CRSP daily return tape.

$$\text{Initial return} = (\text{close price} - \text{offer price}) / \text{offer price}$$

Three years after market performance is used because the sample is from 1999 to 2000, and the CRSP daily return tape for 2004 is not available. The initial return date is defined as month 0, and the aftermarket period includes the following 24 months. Each month is defined as successive 21-trading-day periods relative to the IPO date. In other words, month 1 consists of event days 2-22, month 2 consists event days 23-43, etc. For IPOs that are delisted before their 2 years anniversary, the aftermarket period is truncated on the last trading day.

Similar as returns calculated by Ritter (1991), daily benchmark-adjusted return is obtained as the daily raw return minus the daily bench mark return. The daily benchmark returns are the value-weighted NYSE NASDAQ, and AMEX index return (CRSP index return 100080).

The benchmark-adjusted return for stock i in day d is defined as:

$$AR_{id} = r_{id} - r_{md}$$

Each firm time period t buy and hold and cumulative return are defined as:

$$BHR_{it} = \prod (1 + r_{id}) - \prod (1 + r_{md}) \quad d=1 \text{ to } t$$

$$CAR_{it} = \sum AR_{id} \quad d=1 \text{ to } t$$

The average buy and hold and cumulative returns are:

$$BHR = 1/n \sum (BHR_{it}) \quad (i=1 \text{ to } n)$$

$$CAR = 1/n \sum (CAR_{it}) \quad (i=1 \text{ to } n)$$

3.3.4 Underwriter's ranking

The rankings of underwriter's reputation are from Jay Ritter's IPO data sources. This data is based on the May 1999 Goldman Sachs prospectus which lists over 120

underwriters. When a firm goes public, the underwriting section lists all the investment banking firms that are part of the underwriting syndicate. More prestigious underwriters are listed higher in the underwriting section, in brackets, with the underwriters in higher brackets underwriting more shares. Managing and co-managing underwriters are assigned a ranking of 9, and other underwriters given a ranking based on the bracket they are in. If an underwriter is not in Goldman Sachs prospectus, it is assigned a ranking 1 or 2 if they were penny stock underwriters that had been subject to enforcement actions by the SEC during 1995-1999. All other remaining underwriter's rankings are determined by an independent and disinterested investment banking expert. In order to distinguish with Carter and Manaster, Dark, and Singh's ranking, Ritter's ranking are integers followed by a 0.1. Therefore, ranking in this system ranges from 1.1 to 9.1. In this study, underwriter's ranking is also grouped to three categories: most prestigious underwriters, which rank 9.1; prestigious underwriters ranking 8.1; and not prestigious underwriters with any ranking less than 8.1.

3.4 Description of the sample firms

Table 3 shows the descriptive offer statistics of the sample IPOs. It is noted that Internet firms and non-Internet firms are almost evenly distributed in the year 1999 and 2000. There are 376 Internet related and 368 non-Internet related firms in the two years. A comparison of these two groups shows that Internet firms have significantly smaller numbers with respect to shares offered, shares outstanding, issue size, issue amount, and float rate. Interestingly, the float rate for Internet firms is .2328 and .3160 for Non-

Internet firms, which is consistent with the findings by Schultzen and Zaman (2001). These authors find that Internet firms have relatively high insider ownership, therefore low float rate, which they argue should be a positive signal to investors because it indicates that insiders are less likely to sell shares to bail out.

[Insert Table 3 here]

Internet firms have a larger change in offer range and change in offer price than non-Internet firms. For example, change in offer range and change in offer price are .1405 and .0756 for Internet firms, but they are only .0325 and .0194 for non-Internet firms, implies that Internet shares were more popular. These numbers are positive for both groups, indicating that share demand had been underestimated for both Internet related and non-Internet related firms. As evidenced by initial returns, Internet firms' underpricing is much more pronounced than non-Internet firms (with .8858 and .4473 respectively), and investors are anxious to acquire these shares even though prices are adjusted upward before the IPO.

The variable underwriter's rank does not show significant difference between Internet and non-Internet firms. Both underwriters' rankings are high (over 8.0). The evidence is inconsistent with the argument of "the competitive devaluation of underwriting standards" because it is commonly assumed that prestigious underwriters refused to undertake young and unproved companies, which was true in the 1980s and earlier (Loughran and Ritter 2002).

4. Pre-IPO operating performance, price revision, and underpricing

4.1 Pre-IPO operating performance and ex ante uncertainty.

According to the changing risk composition hypothesis, the greater the ex ante uncertainty about an issue, the greater the required compensation to investors for becoming informed. In other words, high risk issues are expected to be underpriced more than other issues. The risk here, however, is not systematic beta-type risk, but “the uncertainty uninformed investors have regarding the after market price.” (Ritter, 1984) While this measure of risk cannot be directly observable, in this study, several proxies based upon pre-IPO operating performance and offering characteristics will be used.

Internet IPOs are anticipated as high risk offerings compared to non-Internet offerings because they are young, less established (low pre-IPO operating performance), and unstable regarding sales. For small firms, with little or no operating history and small or even negative earnings, it is reasonable to expect a great deal of uncertainty with respect to the appropriate price per share. Uncertainty forces issuers to underprice these offerings substantially. Non-Internet firms, with large earnings and long pre-IPO operating history, are presumably easier to value, and one would expect that on average, less money would be left on the table to compensate investors.

Table 4 shows differences in the issuing firm’s age before IPO and absolute operating performances between Internet and Non-Internet groups. It is noted that Internet firms have less years existing before IPO (5.45) than that for non-Internet firms (13.14), which confirms the assertion that most Internet firms are very young firms. The

results also show that Internet firms were smaller in size, with much less sales, earnings, cash flows, and total assets. Moreover, panel B of Table 4 reports the number of firms that have negative earnings and cash flows from operation before IPO. Of the sample, 338 out of 376 Internet firms and 235 out of 368 non-Internet firms have negative pre-IPO earnings. These results preliminarily support the assertion that Internet firms, as a group, have highly uncertain futures.

[Insert Table 4 here]

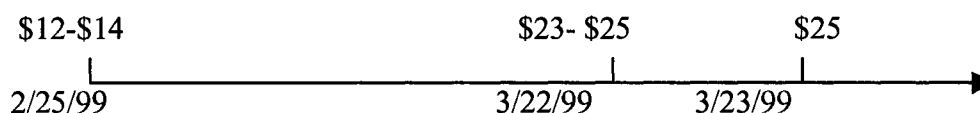
Table 5 shows issuing firms' operating performance scaled by total assets and shares outstanding. The mean of income to assets, cash flow to assets, income to shares outstanding, and cash flow to shares outstanding are all negative for both Internet and Non-Internet firms. Earnings per share are -.4628 and -.1683 for the two groups respectively, and they are similar to Bartov et al (2002) results, which have earnings per share -0.66 for Internet firms and -0.14 for Non-Internet firms between January 1996 to June 1999 (n = 98 IPOs). Unlike net income and cash flow measures, there are no significant differences for debt measures between Internet firm and non-Internet firms. Sales growth rate is significantly higher for Internet firms (5.3911) than for Non-Internet firms (3.1050), which clearly demonstrates that Internet firms have unstable sales – or high future uncertainty. Overall, the results show that Internet firms are young, with worse pre-IPO performance, but higher sales growth rate than Non-Internet firms. Results in Tables 4 and 5 are consistent with the proposed hypothesis that Internet firms face greater uncertainty than non-Internet firms.

[Insert Table 5 here]

4.2 Evidence on pre-IPO operating performance and price revision

Examination of IPO' price revision is done in two stages. In the first stage, the variable change in offer range is calculated as (midpoint of final offer range – midpoint of initial offer range)/ midpoint of initial offer range. In the second stage, the change of offer price is measured by subtracting the midpoint of final offer range from the IPO offer price, and dividing by the midpoint of final price range. The relation of the three prices, mid point of initial offer price range, mid point of final offer price range, and final offer price are illustrated in the time line below using ABOUT.COM as an example.

Figure 1: Issuing time line of the firm ABOUT.COM



On 2/25/99 the company set its initial price range \$12 to \$14, and on 3/22/99 it increased the range to \$23 to \$25. Finally, on 3/23/99 it set its offer price on \$25. In the first stage, the change in offer range = $(24-13)/13 = .8461$. In the second stage, the change in offer price = $(25-24)/24 = .0417$. The total price revision = $(25-13)/13 = .9231$

Table 6 shows the descriptive statistics of change in offer range, change in offer price, and total price revision between Internet firms and Non-Internet firms. These variables are used to create a matrix of firms according to zero-centered levels (e.g., <0 , $=0$, and >0) with regard to each variable. According to book building theory, underwriters adjust the offer price range and the final offer price according to revealed

information by investors. Because firms with higher future uncertainty benefit more from investors' truthful revelation of share demand, thus high price revisions are expected for firms with high ex ante uncertainty. It is also argued that investors are crowded in Internet firms and lead to larger upward price revision for Internet firms than for non-Internet firms. The results in Table 6 show that price revisions are not distributed proportionally among Internet and Non-Internet firms. Internet firms tend to experience price upward revision, while non-Internet firms seem to exhibit price revision tendencies that are more equally distributed between upward and downward revisions. The upward price adjustment measured as change in offer range, change in offer price, and price revision are .3779, .1340, and .3829 for Internet firms, which are larger than non-Internet firms at .3014, .1325, and .2590. Initial returns are positively related to price revision. Upward price revision comes with high initial return (1.1400 and .7963) and downward price revision comes with low initial return (.1150 and .0795) for both Internet and non-Internet firms. In other words, the highest initial return firms are more likely experienced upward price revision, and the lowest initial returns firms are more likely experienced downward price revision. Moreover, the overall initial returns for Internet firms are larger than initial returns for Non-Internet firms among each price adjustment group. These results are consistent with the overreaction hypothesis, which states that investors are very optimistic to Internet offerings, thus lift up their offer prices.

[Insert Table 6 here]

The relationship between pre-IPO performance and price revision is unclear (results are reported in Table 7). For Non-Internet firms, zero price revision firms show the best performance in sales to total assets, while upward price revision firms

experienced the highest income and cash flow to total assets. Non-Internet firms that experienced upward price revision have the lowest debt to total assets (.3004). Growth rate in sales is important to the valuation of IPOs, but the results show that only non-Internet firms with the greatest growth rate (4.1956) experienced upward price revision. There does not exist a clear pattern for price revision of Internet firms regarding their sales growth rate. No price revision firms experienced almost same sales growth rate as upward price revision firms.

[Insert Table 7 here]

Yi (2001) finds that only firms going public with negative earnings had statistically significant negative abnormal returns over a 3-year period after going public. Therefore, the author suggests that investors may have been too optimistic about future prospects of the IPO firms, especially those that had negative earnings. If investors just overreact to negative earning firms, then it is expected the both Internet and Non-Internet firms with negative earnings would have similar price revisions and initial returns. Table 8 shows the results of price revision and initial returns between positive and negative pre-IPO earning and cash flow groups. It is expected that negative earning firms would have greater upward price revision and initial returns because investors are likely to be overoptimistic about negative earning firms. The results in table 8 are consistent with this expectation that firms with negative net income and cash flow per share before IPO experience larger price revisions and initial returns. However, Table 8 also shows that Internet firms always experience higher price revision and initial returns than those of Non-Internet firms, therefore, the hypothesis that investors overreact to Internet firms is supported.

[Insert Table 8 here]

4.3 Analysis of firm's initial underpricing

Table 9 gives the results of firms' initial returns on their pre-IPO operating performance by quintile. It is expected that the worst performed firms should have highest initial returns. However, based on the results in Table 8, there does not exist strong evidence to show the relation between pre-IPO operating performance and initial returns. The only clear results are the most under-priced firms are those with greatest annual sales growth rate, whose initial return are 1.087 and .955 for Internet and Non-Internet firms. Compared to these, the initial return in the lowest sales growth group are .637 and .271 respectively. The least under-priced non-Internet firms are those that have the highest pre-IPO performance such as sales to assets (.236), cash flow per share (.274), or income per share (.338). For Internet firms, the highest income per share and cash flow per share quintiles have the lowest initial return: .658 and .541. These results are consistent with proposed hypothesis that the greater the fundamental uncertainty about a stock issue, the greater the required compensation to investors for becoming informed, in other words, higher underpricing.

[Insert Table 9 here]

It is interesting to see the differences in pre-IPO operating performance between "extra hot" IPOs and "extra cold" IPOs. In consistent with previous study (Tech, Welch, and Wong 1998), extra-cold IPOs are offers with initial return equal or less than zero; Cold IPOs are offers with initial return great than zero but equal or less than 10%; Hot

IPOs are offers with initial return great than 10% but less or equal 60%; and extra-hot IPOs are offers with initial return more than 60%. Table 10 represents the results of pre-IPO performance along the four “hot-cold” typology categories. It is very interesting to note that Internet and Non-Internet firms show divergent to be valued in growth rate. For example, extra-cold and extra-hot Internet firms have growth rate .34891 and 6.2257, while extra-cold and extra-hot non-Internet firms have growth rate 1.8512 and 5.5920. The pattern for non-Internet firms is clear, initial returns are positively related sales growth rate. Based on evidence here, changing risk composition hypothesis can explain initial return for non-Internet firms well because growth rate is a good proxy for future uncertainty.

[Insert Table 10 here]

4.4 Regression results

The correlations among Pre-IPO performances ratios are represented in table 11. As we assumed, most measures are highly correlated, like earnings per share and cash flow per share. In this study, only significantly uncorrelated measures, such as sales to asset and debt to asset, are included in a single regression.

[Insert Table 11 here]

4.4.1 OLS regression with price revision as the dependent variable

As stated before, price revision is measured as the ratio of price difference between the offer price and the mid point of the initial price range to the midpoint of

initial price range. Price revision is assumed to reflect information acquired from informed investors. Thus, it can be concluded that firms with higher future uncertainty benefit more from investors' truthful revelation of share demand, thus have high price revisions. However, it should be mentioned that firms are more likely to withdraw in response to negative news and increase offer price in responds to positive news, and that only firms that have actual offerings are included in this sample. That is, there is a self selection bias.

Model 1:

$$PV_i = \alpha_i + \beta_{ij} UNCER_{ij} + \gamma_{ij} CV_{ij} + \kappa_i DUMMY_i + \varepsilon_i$$

PV: price revision

UNCER: uncertainty variables; including pre-IPO operating performance measures, firm size, and firm age.

CV: control variables; including underwriter's ranking and float.

DUMMY: Internet dummy variables.

According to proposed hypothesis, Internet firms have higher future uncertainty than Non-Internet firms, and as a result, have higher price revisions. Therefore, it is expected β_{ij} is significantly correlated with price revisions. Among these uncertainty variables, sales growth rate, debt to assets, and debt per share should have positive signs, whereas firm size, age and other performance measures should have negative signs. Base on overreaction hypothesis, investors overreact to Internet firms, and κ_i should be significant and positive.

Table 12 shows 6 regression results with price revision as the dependant variables. Debt to asset and debt per share have significantly negative coefficients (-0.0442 and -0.0083), and their signs are inconsistent with the argument that high debt to assets or debt per share firms are higher future uncertainty firms, and should have higher price revisions. The coefficients of cash flow per share (-0.0191) and sales growth rate (0.0576) are significant and consistent with the expectation, which states that high cash flow per share or low growth rate firms have less future uncertainties. The most powerful explanatory variable is age. It is significantly negative in all regressions, and confirms the statement that young firms are riskier and uncertain. The coefficient of firm's size is positive, which is also inconsistent with "uncertainty" argument because small size is demonstrably associated with high uncertainty. It is also interesting to note that firms underwritten by more prestigious underwriters have experienced less price revision which is inconsistent with the result in Ljungqvist and Wilhelm' (2001) study (sample period is from 1996 to 2000). In their study, firms underwritten by more prestigious underwriters have a tendency toward greater price revision. Their interpretation is that more prestigious underwriters are chosen by venture-backed or older firms, those filing larger offers, and companies with greater valuation uncertainty. Float is also significantly positive in every regression. As stated before, float represents the amount of shares issued in the IPO as a percentage of total shares outstanding, and thus high float can be view as the high supply of shares. The results in Table 12 reveal that high float firms have experienced larger price revision than low float firms, which counters the argument that insiders should bargain for more aggressive positive revision when their stakes are larger.

In Table 12, the dummy variable INTERNET is significant in each regression after controlling for firms' uncertainty. The coefficient is around .15, and means that every Internet firm has experienced an average upward price revision of 15%. This result supports the hypothesis that investors tend to be more optimistic about Internet firms, even in the book-building period.

[Insert Table 12 here]

4.4.2 Regression results with Initial Return as the Dependent Variable

Model 2:

$$INIRET = \alpha_i + \beta_{ij} UNCER_{ij} + \gamma_{ij} CV_{ij} + \kappa_i DUMMY_i + \varepsilon_i$$

INIRET: initial returns

UNCER: uncertainty variables; including pre-IPO operating performance measures, firm size, and firm age.

CV: control variables; including underwriter's ranking and float.

DUMMY: Internet dummy variables.

Based on the results in Table 13, regarding pre-IPO performance, only debt to assets, debt per share, and growth rate are significant predictors of initial returns. Similar as the pre-session analysis, the negative sign of debt to assets and debt per share are not expected. But from the behavior explanation, investors might crowd out these firms because high debt to asset and high debt per share are indicators of greater financial risk. Unlike debt to asset or debt per share, growth rate is an important measure for firm's

stable future earnings. According to changing risk composition hypothesis, underwriters need to compensate uninformed investors in value high uncertainty firms, thus the coefficient of growth rate should be positive. It should mention that irrational investors are likely to extrapolate firm's growth and expect a high future growth rate. Both arguments expect growth rate has a positive coefficient on initial return. The results are consistent with the proposed hypothesis since the coefficient for growth rate is 0.2075, and significant at .05 level.

Underwriters' rank was insignificant with underpricing as a dependent variable, which is consistent with Ljungqvist and Wilhelm (2001)' finding. The Internet dummy variable is still significant in all regressions. The smallest coefficient for Internet dummy is .3168, which reflect the fact that Internet firms earn average over 30% initial returns after controlling for firm's specific uncertainties. This finding is highly consistent with overreaction hypothesis.

[Insert Table 13 here]

In order to test the overreaction hypothesis further, the sample is split between Internet firms and non-Internet firms, and comparative analysis is conducted, with initial return as the dependent variable. Each sub-sample contains over 300 firms, with the expected result that fundamentals will not be associated with initial returns for Internet firms. This is reasonable, because investment in Internet firms is hypothesized to be irrational. Conversely, non-Internet firms should see a strong association between fundamentals and initial returns, since investors are hypothesized to behave rationally.

The results in Table 14 support the overreaction hypothesis. No pre-IPO performance measures except sales growth rate are significant for Internet firms. Sales

growth rate is marginally significant with a coefficient .1389. Moreover, Age also lost its explanatory power. Unlike Internet firms, results in Table 15 represent that debt to assets, debt per share, and growth rate are significant at .01 level with initial return as the dependent variable for Non-Internet firms. Another uncertainty variable, age, is highly significant as expected. The only commonly significant variables are size and price revision for both Internet and Non-Internet firms. Price revision alone can explain over 42% and 38% underpricing for both Internet and Non-Internet firms. Its coefficients are 1.7807 (Table 14, regression 7) for Internet firms and 1.4922 (Table 15 regression 7) for Non-Internet firms.

[Insert table 14 and Table 15 here]

Overall, the results for price revision and initial return are consistent with the changing risk composition and overreaction hypotheses. Among all the uncertainty measures, sales growth rate and age are most powerful and have effects on both price revisions and initial returns. The higher the sales growth rate, or the smaller the age before IPO, the higher degree of price revisions and initial returns are. Cash flow per share is only useful to explain price revisions, not initial returns. Debt per share, debt to assets, and size are significant variables, but their signs are not as expected. Internet dummy variables are positively significant in both price revisions and initial returns after controlling firms' uncertainties. Moreover, fundamental variables like debt to assets and debt per share cannot explain initial returns for Internet firms at all, and the overreaction hypothesis is preliminary supported.

5. Firm's long-run market performance

5.1 Overreaction and firm's after market performance

Empirical studies related to IPOs' long run performance have not reached consensus regarding whether IPO firms underperform their benchmarks. Several researchers found that IPO firms experienced long run underperformance compared to benchmark firms and the most frequently cited studies are "The long run performance of initial public offerings" by Ritter (1991) and " the New Issue Puzzle" by Loughran and Ritter (1995). However, Brov and Gompers (1997) argue that venture-backed IPOs do not significantly underperform, only the smallest nonventure-backed firms underperform compared to several benchmarks. Recently, Gompers and Lerner (2003) studied the 5-year performance after initial public offerings with 3661 IPOs from 1935 to 1972. Gompers and Lerner find that the underperformance disappears when using cumulative abnormal returns instead of buy-and-hold abnormal returns. From a calendar-time analysis, IPO firms perform as same as the market. Ritter and Welch (2002) also argue that many of phenomena found in the IPO literature depend on the time period, thus it is necessary to explain the causes of such phenomena in their specific period. Internet firms experienced super high initial underpricing in the Internet bubble period, and if behavioral explanations like overreaction is true, then the long-run performance of Internet IPOs should follow a certain pattern that can be predicted by behavior theories. Thus the rationale for investigating IPO's long-run performance in this article is to test the proposed overreaction explanation to the extremely high initial underpricing of

Internet firms in the Internet bubble period. The most common explanation of IPO's initial underpricing is based on the asymmetric information theory, such as the risk composition hypothesis. However, few articles really test the overreaction hypothesis, even though researchers like to mention that the long-run underperformance could be due to investors' initial overreaction. It is also believed that Internet IPOs can be employed as a good means of testing investors' overreaction, since Cooper et al (2003) have preliminarily found that investors reacted positively to firms changing their names to "dot com."

Empirical findings to support behavioral theory that individuals often violate Bayes' rule and rational choices are numerous. For example, DeBondt and Thaler (1995) demonstrate that buying past losers and selling past winners is a profitable trading strategy. Fama (1992) also shows that firm size and market to book ratio are powerful predictors of a firm's return while market Beta does not seem to explain the results. Lakonishok, Shleifer, and Vishny (1994) show that "value strategy" earns significantly positive abnormal returns. Findings of market anomalies in the IPO field are also fruitful, such as IPO underpricing and long run underperformance. Jaggia and Thosar (2004) proposed that the overheated high-tech IPO environment of late 1990s is an ideal testing period for behavioral theories. In their study, DHS overreaction framework (Daniel, Hirshleifer, and Subrahmanyam 1998) is tested and they find that overreaction continued in the short run with a sample of 301 high tech companies issued from January 1, 1998 to October 30, 1999.

According to DHL' overreaction framework, investors are overconfident and overreact to private signals. In addition, self –attribution bias makes overreaction

continue in the short run, and finally, the long-run price reversal is expected due to further release of public information. Jaggia and Thosar (2004) proposed an overreaction explanation for IPOs based on the DHL framework. When given a favorable signal, investors' overconfidence pushes the stock price above its rational expected level at time 1. If investors observe that public signals are consistent with their initial assessment, self-attribution bias will drive the price even higher, and further away from the rational level at time 2. The arrival of later public information gradually induces the price back to the fundamental value at time 3. According to this overreaction proposal, overreacted IPOs will exhibit positive momentum in the short run and a price reversal in the long run. Jaggia and Thosar (2004) only test the DHS overreaction hypothesis in the short run (6 months after IPO) in a sample of 301 high-tech IPOs, and found that momentum variables are important to explain firm's short run performance, which is consistent with overreaction prediction. Unlike Jaggia and Thosar's (2004) work, this article tests both short run (6-month) and long run (36-month) aftermarket performances using a more broad pre-IPO operating performances as proxies for firms' fundamentals. The sample included not only Internet firms, but also Non-Internet firms with the aim of testing the overreaction hypothesis as a way to explain the huge initial return differences between Internet and Non-Internet IPOs. If investors do overreact to Internet-related firms in the initial return period, positive price momentum in the short run and a price reversal in the long run for Internet firms would be expected after controlling for other factors, such as changes of operating performance, size, and market to book ratio.

5.2 Empirical results

All sample firms' buy-and-hold or cumulative index-adjusted returns are calculated in the 36-month period after offerings. The results are shown in Table 16, in which it can be seen that Internet firms and non-Internet firms exhibit significantly different buy-and-hold returns at month 4 and month 5. For example, at month 5, the buy-and-hold return for Internet firms is .3541, which is significantly higher than that of Non-Internet firms, which is only .1325. However, beginning at month 11, Internet firms show significantly lower buy-and-hold returns than non-Internet firms. By the end of the 36th month after initial public offerings, the buy-and-hold return for Internet firms is -.5368, and -.0156 for Non-Internet firms. Figure 1 clearly shows the performance pattern for both types of firms. It is preliminary evidence that Internet firms exhibit positive price momentum in the short run and price reversal in the long run.

[Insert Table 16, Figure 1 and 2 here]

It is interesting to know whether firms' long run market performances are related to their pre-IPO performances, or in other words, whether pre-IPO fundamental values affect firms' long run performances. In order to answer this question, 3-year buy-and-hold index adjusted returns are categorized by firms' pre-IPO performance quartiles, which is shown in Table 17. There appears to be a strong pattern for Non-Internet firms that the best pre-IPO performed firms had the highest 3 years buy-and-hold returns than other firms. For example, non-Internet firms with the highest sales to total assets, net income to total assets, cash flow to total assets, sales per share, earnings per share, and cash flow per share earned the highest 3- year buy-and-hold returns. For Internet firms, the 3 -year buy-and-hold returns were all negative for every pre-IPO operating

performance quartiles. These returns are slightly higher in the highest sales per share, earnings per share, and cash flow per share categories.

[Insert Table 17 here]

Table 18 shows the results of 6-month and 3-year buy-and-hold returns among four initial return groups. In the 6-month period, the hot and extra-hot Internet firms earned much higher returns (.3142 and .1808) than Non-Internet firms (.1569 and -.1482). However, in the 3- year after market period, it is very clear that Internet firms earned lower returns than Non-Internet firms in every category. For both Internet and non-Internet firms, extra-cold IPOs had the highest returns. These return data preliminarily show that Internet firms had fair short-run but poor long-run performances compared to Non-Internet firms.

[Insert Table 18 here]

As Fama and French (1992) found that size and market-to-book ratio can significantly explain a firm's long run performances, in this article, sample firms' 3-year buy-and-hold returns sorted by size and market-to-book ratio are then examined. Consistent with previous studies, market value of equity is obtained by multiplying stock price (Item 24 in Compustat) and common shares outstanding (Item 25). Book value of equity is calculated as the common total equity (Item 60) plus deferred taxes and investment tax credit (Item 35). IPO firms are divided into four size groups according to market value at the end of 24 months. The biggest quintile include firms with size over 1000 million, and the smallest quintile include firms with size less than 100 million. Firms are also divided into five market-to-book ratio quintiles according to their market-to-book ratio at the end of 24 month after IPO. All negative market-to-book ratio firms

are categorized in the “Negative” group, and the positive market-to-book ratio firms are then divided into four groups with the fourth group having the largest market-to-book ratio and the first group having the smallest market-to-book ratio.

Table 19 represents the distribution of sample firms by size quintiles and market-to-book ratio quintiles. From Panel A, 40 percent firms are located in the smallest size quintile, while only 13.7 percent firms are in the largest size quintile. Concerning market-to-book ratio, 16.71 percent firms are smallest in size and smallest in positive market-to-book ratio. Only 5.75 percent firms fall into the largest in size and market-to-book ratio group. Panel B and Panel C list the corresponding size and market-to book ratio among the 20 size and market-to-book ratio categories. Table 20 shows the 36-month buy-and-hold return by size, market-to-book ratio, and both size and market to book ratio categorizes. In panel A, 36-month return for Internet firms do not exhibit a pattern with size, while for Non-Internet firms, it shows the largest firms have the highest buy-and-hold return, which is .5951. When controlling for market to book ratio, the highest market to book ratio Internet firms have a slightly higher return, -.4741, but it is still less than return for Non-Internet firms, which is .1756 (Panel B). When controlling for both size and market-to-book ratio, it appears that almost all Internet firms have smaller returns than Non-Internet firms in the same size and market to book ratio category. The results in table 20 imply that the most powerful variables, size and market to book ratio, cannot explain the significant return difference between Internet firms and Non-Internet firms.

[Insert Table 19 and 20 here]

Since Jain and Kini (1994) find a significant decline in operating performance subsequent to the initial public offerings, it is necessary to examine the change of operating performance for the sample firms, and to understand how the negative 36-month buy-and-hold return can be explained by decline of operating performance. Table 21 represents the actual operating performance data in the issuing year and 3 years following. Internet firms experienced a steady growth in sales, with a total of 273.38 million in the issuing year, and reaching 468.67 million by the end of the third year after IPO. Non-Internet firms had higher sales than Internet firms in the issuing year and the year following, but lower sales in the second and the third year. All firms' earnings to total assets, earnings per share, cash flow per share, and cash flow to total assets ratios are negative, and never showed positive in the 3 years period. By the end of third year after IPO, the operating performance of Internet and Non-Internet firms are very close to each other. Since the results do not show that there is a clear decline of firm's operating performance, the overreaction hypothesis is preliminarily supported. The very negative 3-year buy-and-hold return for Internet firms is possibly attributable to market price correction instead of decline of operation performance.

[Insert Table 21 here]

5.3 Regression results

OLS regressions were run for testing the short-term (6 month) momentum and long-run (36-month) price reversals with short term and long term buy-and-hold index adjusted return as dependent variables respectively. Table 22 represents 6 regression results for testing short-term momentum, in which the dependent variables are 1 month to

6 month buy-and-hold returns. The independent variables include initial return (which are represented by Cold, Hot, and Extra-hot dummy variables), Internet dummy variables, Pre-IPO fundamental variables like age, earnings per share, firm size, and control variables like underwriter's ranking. A positive momentum for Internet firms is found in the 4th, 5th, and 6th month buy and hold periods as evidenced by the fact that the Internet Dummy variables are significantly positive in those regressions. For example, when 6-month buy-and-hold return is dependent variable, the coefficient for Internet dummy variable is .2388, which means average Internet firms earned 24% higher 6-month buy-and-hold returns than Non-Internet firms when controlling for firm's risk and initial returns. Hot IPOs, which have initial return between 10 percent and 60 percent, also exhibit a positive momentum and earned significantly higher short-term returns than other firms. Fundamental variables like Age before IPO and earnings per share before IPO are irrelevant to firms' short-term returns, which is consistent with Jaggia and Thosar's finding that fundamental variables have at best weak explanatory power for short-term returns. One interesting finding is that underwriter's ranking is significantly related to firms' after market performance, which may indicate that prestigious underwriters support their issues after initial issuing.

[Insert Table 22 here]

According to the overreaction hypothesis, with an increase in public information, stock prices would eventually fall and a price reversal pattern would be exhibited. Table 23 represents four regression results with 3-year buy-and-hold return as the dependent variables. The independent variables include pre-IPO fundamental variables, such as earning per share, sales to total asset, sales per share, and age before IPO; initial return

variables which include 3 dummy variables; control variables, such as underwriter's ranking, firm size and market to book ratio at the end of second year after IPO; Internet dummy variable; and the change of operating performance variables, such as a series of change of earnings per share variables. The i^{th} year change of earning per share is calculated as the difference of earning per share between i^{th} year and one year before, then dividing by earnings per share the year before. The results in Table 23 are consistent with the overreaction hypothesis in two respects: firstly, all the Internet dummy variables are significantly negative, with coefficients bigger than 30%. In other words, after 36 month from initial public offerings, Internet firms earned 30% less buy-and-hold returns than Non-Internet firms. Thus price reversal pattern for Internet firms are established. Secondly, fundamental variables, like sales per share and sales to total assets, which cannot explain initial returns and short- term buy-and-hold returns, can explain firms' long-run buy-and-hold returns with significantly positive coefficients. The higher the sales per share or sales to total assets before IPO, the better the long-run after market performances tend to be. In order to test whether change of operating performance can predict firms' long-run performance, change of earnings per share in the first, second, and third year after IPO are included as the independent variables. The results show that an increase of earnings per share in the first year and third year contribute significantly to firm's long-run performance. Unlike market to book ratio, firm size is relevant to explain long run performances. Among the three initial return dummy variables, extra hot IPOs have the worst returns since the coefficients are all significantly negative. Underwriter's rankings are not significant any more as they are in the short-term period.

[Insert Table 23 here]

6. Evidence on underwriter's self selection for offerings

Ritter (2002) proposes that in the Internet bubble period, prestigious underwriters loose their issuing standards and undertook a large amount of very young and small firms. Since most Internet firms are every young and small, it is expected that prestigious underwriters did not strictly select Internet firms according to their pre-IPO performances, but for Non-Internet firms, the selection criteria are still higher for prestigious underwriters than for non-prestigious underwriters. Based on this argument, the proposed hypothesis is that pre-IPO operating performances are positively related to underwriter's reputation for non-Internet firms, but this relation does not hold for Internet firms.

Underwriter's rankings are from Jay Ritter's personal database and are divided into nine categories, with 9.1 representing the most prestigious underwriters and 1.1 represent the lease prestigious underwriters. Table 24 shows the descriptive statistics among underwriters with different reputations. It is clear that the most prestigious underwriters were responsible for 59.87% percent market, while underwriters in the other eight categories, which is referred as non-prestigious underwriters, were responsible for only 40.13% market. Overall, prestigious underwriters set higher offer prices and made larger offer amounts than less prestigious underwriters. Concerning initial returns, firms undertaken by prestigious underwriters experienced higher initial returns for both Internet and Non-Internet firms than firms undertaken by non-prestigious underwriters.

[Insert Table 24 here]

Table 25 shows the results of underwriters' self-selection according to pre-IPO performance between prestigious and un-prestigious underwriters. For the total firms (Panel A), prestigious underwriters pick firms having significantly high income to total assets, cash flow to total assets, sales per share, sales growth rate, and low debt to total assets. These results are consistent with the concept that prestigious underwriters pick up better-performing firms than non-prestigious underwriters do. Panel B and Panel C are the results for Internet firms and Non-Internet firms respectively. It is interesting to note that there exists a divergence in underwriter's self-selection tastes for Internet firms and Non-Internet firms. Prestigious underwriters were apparently more concerned with firms sales to total assets, debt to total assets, and sales growth rate regarding Internet firms, while they consider cash flow to total assets, cash flow per share, sales per share, and debt per share for non-Internet firms. The only commonality between Internet and Non-Internet firms is that prestigious underwriters tend to select large firms. Firms undertaken by prestigious underwriters are large in size compared to those undertaken by non-prestigious underwriters. Moreover, the mean size for Internet and non-Internet firms undertaken by prestigious underwriters is significantly different, which is 658.22 million for Internet firms, and 1054.93 million for non-Internet firms. The overall results from Table 25 show that prestigious underwriters appeared to pick up big and better performing firms, and the non-Internet firms they selected have better pre-IPO performance than Internet firms they selected. Therefore, the results do not support the hypothesis that prestigious underwriters are unconcerned about Internet firms' performance when undertaking them.

[Insert Table 25 here]

Table 26 represents the Probit regression results with the underwriter's reputation as the dependent variables. If the underwriter is prestigious with a ranking 9.1, the dependent variable equals 1, otherwise, it equals 0. Three regressions were run with different pre-IPO performance variables in each regression. Among the pre-IPO operating performance variables, sales per share and cash flow per share are significantly positive, with coefficients of 0.0542 and 0.1997 respectively. The logarithmic size is significantly positive in every regression, with coefficients exceeding .70. These are strong indications that prestigious underwriters tend to choose firms with higher sales per share and larger size than non-prestigious underwriters do. When comparing their coefficients, size contributes the most prominently to the explanation of dependent variables. The Internet dummy variable is not significant, and provides evidence that prestigious underwriters do not treat Internet firms differently when making underwriter decisions. Overall, prestigious underwriters consider the pre-IPO operating performance for both Internet firms and Non-Internet firms, even though overall Internet firms are smaller in size and less profitable compared to Non-Internet firms.

[Insert Table 26 here]

7. Conclusion

Internet related firms experienced an extremely high degree of underpricing in the year 1999 and 2000; 40 percent more than underpricing of Non-Internet firms. Two explanations for this phenomenon are examined in this paper: the changing risk composition hypothesis and overreaction hypothesis. Changing risk composition, which is based on asymmetric information theory, states that the degree of price revision and underpricing is correlated with firm's ex ante uncertainty. Variables like years existing before IPO, offer size, pre-IPO operating performance, and sales growth rate are chosen as the proxies to measure firms' ex-ante uncertainty. The overreaction hypothesis is derived from behavior theory, and states that investors often violate rational choice when making decisions. According to DHS theory (Daniel, Hirshleifer, and Subrahmanyam, 1998), initial overreaction and self-attribution bias would drive the price above the rational expected value. Further information will gradually induce the price back toward fundamental value. Based on the overreaction hypothesis, the extremely high initial returns that are unexplained by fundamentals, the medium-term momentum, and the long-run price reversal are expected for Internet firms. Empirical tests are thus conducted in these three stages: first trading day, medium-term, and long-run performances.

The results are consistent with both hypotheses, and the high initial returns for Internet firms are explainable by investors' over-reaction and the firm's high uncertainty. Among all the uncertainty measures, sales growth rate and age of the firm before IPO are the most powerful. Pre-IPO performances are not significant predictors of firms' initial returns for Internet firms, while investors value pre-IPO debt per share, sales growth rate,

and age before IPO for non-Internet firms. Internet firms exhibit strong medium-term positive momentum and long-term price reversal after controlling for the change of operating performance, firm size, and market to book ratio. Internet firms earned 23% higher returns in the medium-term and 30% lower return in the long run than Non-Internet firms. Long-term performances are significantly explained by pre-IPO fundamentals like sales per share.

When concerning underwriter's self-selection, the results show that prestigious underwriters do like to select big and better-performing firms. Sales per share and offer size are significant criteria for prestigious underwriters. For prestigious underwriters, non-Internet firms they picked have better pre-IPO performance than Internet firms they picked. Overall, the results do not support the hypothesis that prestigious underwriters do not care about Internet firms' performance when undertaking them.

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Figure 1

3-year buy and hold index adjusted returns between Internet and non-Internet firms

The initial return date is defined as month 0, and the aftermarket period includes the following 36 months. Each month is defined as successive 22-trading-day periods relative to the IPO date. In other words, month 1 consists of event days 1-22, month 2 consists event days 23-44, etc. For IPOs that are delisted before their 3 years anniversary, the aftermarket period is truncated on the last trading day. The daily benchmark returns are the value-weighted NYSE NASDAQ, and AMEX index return (CRSP index return 100080).

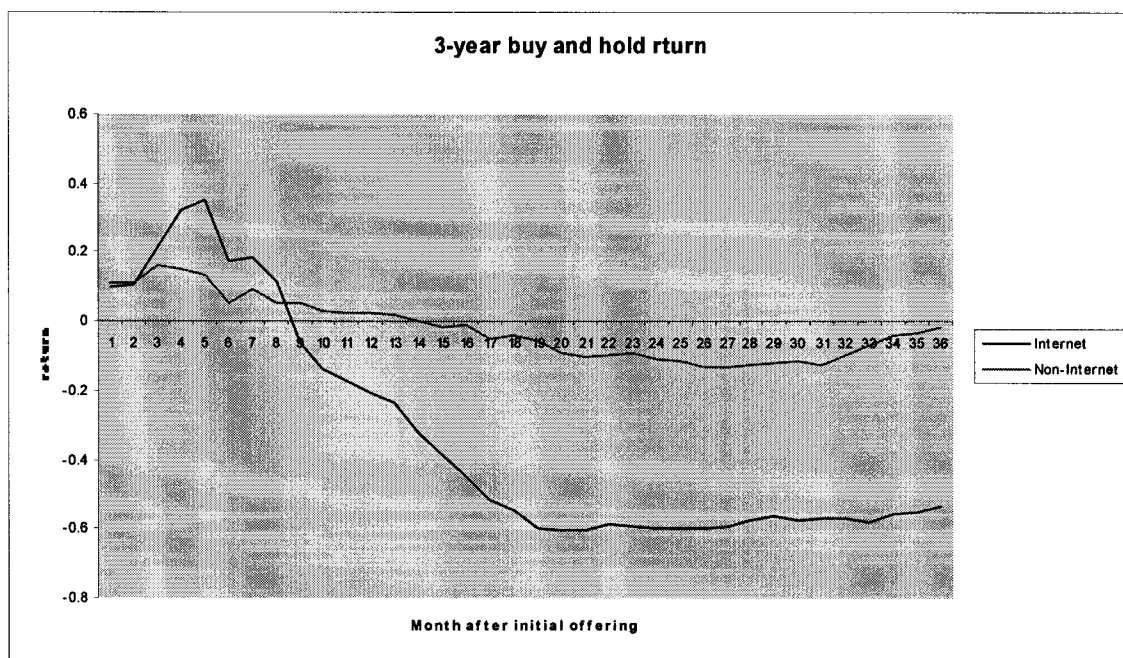


Figure 2

3-year Cumulative index adjusted returns between Internet and non-Internet firms

The initial return date is defined as month 0, and the aftermarket period includes the following 36 months. Each month is defined as successive 22-trading-day periods relative to the IPO date. In other words, month 1 consists of event days 1-22, month 2 consists event days 23-44, etc. For IPOs that are delisted before their 3 years anniversary, the aftermarket period is truncated on the last trading day. The daily benchmark returns are the value-weighted NYSE NASDAQ, and AMEX index return (CRSP index return 100080).

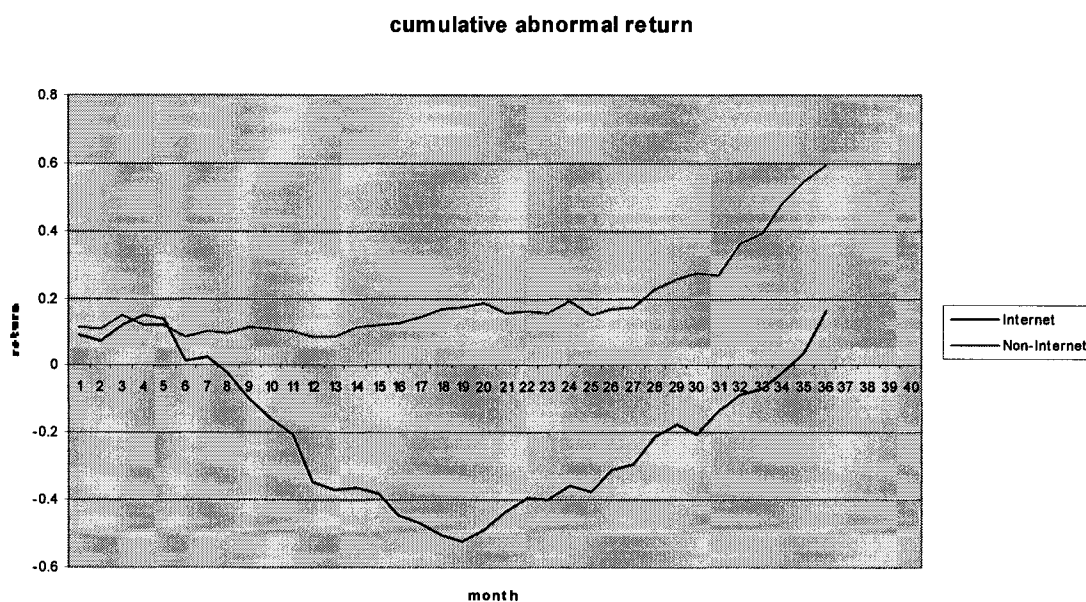


Table 1**The ratio of Internet-related IPOs to total Issues between 1996 to 2002**

Data are from edgar-online.com. The total issues do not include those that are not public traded. Ratio of Internet related is calculated as number of Internet related to total issues.

Year	Total	Internet related	Ratio of Internet related (%)
1996	313	17	5.43
1997	659	30	4.55
1998	471	43	9.13
1999	609	313	51.40
2000	508	164	32.28
2001	149	4	2.68
2002	134	13	9.7

Table 2**Sample Selection Criteria**

The IPO firms are identified from edgar-online.com.

Criteria	Number of firms	Total left
Total public issues	1117	
Country of origin which outside the USA	145	972
Issues from OTCBB, SWX, VANCOUV, MA	88	884
Not be found in CRSP (no Permno number)	13	871
Financial companies (including Unit offering, REIT, close-end fund)	81	790
Companies whose offer price is not be found	9	781
Companies with offer prices below \$5	3	778
Companies with missing shares offering data	5	773
Companies issued with warrant or right	10	763
Companies mislabeled as an IPO	1	762
Companies that can not be located in COMPUSTAT according to their CUSIP	16	746
Companies that only have the first trading return data in CRSP	2	744

Table 3
Descriptive Characters of Issue firms

Table values are mean measures for 744 IPOs in the year 1999 and 2000. 376 firms are Internet related and 368 are Non-Internet related. Offer data are from edgar-online, and first trading day close price data are from CRSP daily return tape. All firm operating performance data are relative year -1, which is one year before firm's IPO, and they are collected from COMPUSTAT. Float represents the amount of shares offered in the IPO as a percentage of total shares outstanding. Change in offer range is calculated as the ratio of price difference between mid point of final offer range and initial offer range to midpoint of initial offer range. Change in offer price is calculated as the ratio of price difference between offer price and final mid point of offer range to final mid point of offer range. The initial return is defined as the percentage difference between first day closing price and the offering price. The rankings of underwriter's reputation are from Jay Ritter's IPO data sources. Offering size is measured as the amount of shares outstanding multiplied by the offer price.

	Total (n= 744)	Internet-related (n= 376)	Non-Internet related (n=368)	Difference (t-value)
Issue amount (million \$)	128.4765	82.5029	175.4495	-4.14**
Size (Million \$)	629.3004	506.0491	755.2310	-2.44*
Share offered	8170089	6224533	10000000	-3.56**
Share outstanding	36715370	32622.75	40896.96	-2.03*
Float rate	.2740	.2328	.3160	-5.14**
Midpoint of final offer range (\$)	13.8945	13.5678	14.2284	-1.67
Change in offer range	.0871	.1405	.0325	5.98**
Change in offer price	.0478	.0756	.0194	5.65**
Price revision	.1509	.2382	.0616	7.09**
Underwriter's rank	8.2796	8.3213	8.2361	.785
Offer price (\$)	14.7243	14.8059	14.6409	.357
First-day close price (\$)	27.0741	31.0610	23.0005	4.22**
Initial return	.6689	.8858	.4473	6.76**

* Significant at .05

** Significant at .001

Table 4
Mean of issue firms characteristics regarding ex ante uncertainty

Table values are mean measures for 744 IPOs in the year 1999 and 2000. 376 firms are Internet related and 368 are Non-Internet related. Offer data are from edgar-online, and first trading day close price data are from CRSP daily return tape. All firm operating performance data are relative year -1, which is one year before firm's IPO, and they are collected from COMPUSTAT.

Panel A				
	Total (n= 744)	Internet-related (n= 376)	Non-Internet related (n=368)	Difference (t-value)
Age (years existing before IPO)	9.4808	5.4478	13.1437	-6.34**
Size (million \$)	629.3004	506.0491	755.2310	-2.44*
Sales (million \$)	218.8492	20.8462	421.7079	-3.27**
Earnings (million \$)	-6.0570	-14.1500	2.2120	-2.62**
Cash Flow (million \$)	5.7668	-11.9000	23.7305	-3.48**
Total Asset (million \$)	361.8679	42.1208	688.5661	-2.61**
Total Debt (million \$)	89.2030	12.2419	168.4835	-4.65**
Panel B				
	(Number of firms)			
	Total (n= 744)	Internet-related (n= 376)	Non-Internet related (n=368)	
earnings<=0	573	338 (89.89%)	235 (63.86%)	
Earnings>0	171	38 (10.11%)	133 (36.14%)	
Cash flow<=0	513	315 (83.78%)	198 (53.8%)	
Cash flow>0	207	48 (12.77%)	159 (43.21%)	

** Significant at .01 level

* Significant at .05 level

Table 5
Descriptive Characters of Issue firm's pre-IPO financial performance

Table values are mean pre-IPO operating measures for 744 IPOs in the year 1999 and 2000. 376 firms are Internet related and 368 are Non-Internet related. All firm's operating performance data are relative to year -1, which is one year before firm's IPO, and are collected from COMPUSTAT. Sales growth rate are measured as $[\text{sales}(-1) - \text{sales}(-2)] / \text{sales}(-2)$.

	Total (n= 744)	Internet-related (n= 376)	Non-Internet related (n=368)	Difference (t-value)
A: Scaled by total asset				
Sales/asset	1.1517	1.0305	1.2759	.588
Income/asset	-.6739	-.9871	-.3538	-5.161**
Cash flow/asset	-.6199	-.8964	-.3386	-4.655**
Debt/asset	.3365	.3310	.3421	-.253
B: Scaled by share outstanding				
Sales per share	3.4781	.8865	6.1332	-5.503**
Income per share	-.3171	-.4628	-.1683	-3.370**
Cash flow per share	-.1064	-.3893	.1813	-5.517**
Debt per share	1.8298	.4808	3.2194	-6.211**
C: Growth rate				
Sales growth rate	4.2480	5.3911	3.1050	3.41**

** Significant at .01 level

* Significant at .05 level

Table 6
Description of issue firm's price revision

The sample covers 744 IPOs in the years 1999 and 2000. 376 firms are Internet related and 368 are Non-Internet related. Offer data are from Edgar-online, and first trading day closing price data are from CRSP daily return tape. Change in offer range is calculated as the ratio of price difference between mid point of final offer range and initial offer range to mid point of initial offer range. Change in offer price is calculated as the ratio of price difference between offer price and final mid point of offer range to final mid point offer range. The initial return is defined as the percentage difference between first day closing price and the offering price. The rankings of underwriter's reputation are from Jay Ritter's IPO data sources. Total price revision is calculated as the ratio of price difference between final offer price and mid point of initial offer price range.

			Number of firms		Mean value		Initial return	
			Internet	Non Internet	Internet	Non Internet	Internet	Non Internet
Change midpoint offer	<0		36	50	-.2441	-.2067	.1343	.1624
	=0		177	244	0	0	.4612	.3076
	>0		163	74	.3779	.3014	1.5128	1.1004
Change in offer price	<0		62	117	-.1334	-.1464	.1076	.0508
	=0		40	67	0	0	.4276	.2036
	>0		273	183	.1340	.1325	1.1324	.7920
Total Price revision	<0		69	125	-.2257	-.2004	.1150	.0795
	=0		32	58	0	0	.3944	.1394
	>0		274	184	.3829	.2590	1.1400	.7963

Table 7
Price revision and Pre-IPO performance

The sample covers 744 IPOs offered in the years 1999 and 2000. 376 firms are Internet related and 368 are Non-Internet related. Offer data are from Edgar-online, and first trading day closing price data are from the CRSP daily return tape. Issue firms' price revision is investigated in two stages. The first stage, the change of offer price range between the mid point of initial price range and final price range is measured. The second stage is to investigate the price change between the final offer price and the final midpoint of price offer range. Change in offer range is calculated as the ratio of the change offer range to the initial mid point of offer range. Change in offer price calculated as the ratio of price difference between offer price and final mid point of offer range. Total price revision is calculated as the ratio of price difference between final offer price and mid point of initial price range. All operating performance data are at the period of one year before IPO.

		Price revision		
		< 0	= 0	>0
Sales/assets	I	1.3038	.8862	.9768
	II	.8992	3.7372	.7600
Income/assets	I	-1.0501	-1.4423	-.9218
	II	-.3821	-.3463	-.3390
Cash flow/assets	I	-.9282	-1.3781	-.8339
	II	-.3324	-.5044	-.2942
Debt/assets	I	.3605	.7018	.2815
	II	.3940	.3683	.3004
Sales per share	I	.7674	.2002	.9870
	II	6.8481	8.7748	4.8416
Income per share	I	-.4033	-.4288	-.4838
	II	-.2049	-.3602	-.0845
Cash flow per share	I	-.3284	-.3951	-.4062
	II	.2336	-.0666	.2216
Debt per share	I	.2763	.1653	.5709
	II	4.4371	3.3818	2.3548
Sales growth rate	I	3.9068	5.7663	5.7152
	II	2.2495	1.6797	4.1956

I-Internet firms
 II-Non-Internet firms

Table 8
Price revision and initial return among positive and negative operating performance groups

All firms' operating performance data are relative to year -1, which is one year before firm's IPO, and are collected from COMPUSTAT. Total price revision is calculated as the ratio of price difference between final offer price and mid point of initial price range to mid point of initial price range. The initial return is defined as the percentage difference between first day closing price and the offering price. The rankings of underwriter's reputation are from Jay Ritter's IPO data sources.

Financial Performance	Price revision		Initial return	
	Internet	Non-Internet	Internet	Non-Internet
Net income Per Share >= 0	.1758	.0447	.8087	.3702
Net income Per Share < 0	.2451	.0711	.8944	.4909
Cash Flow Per Share>=0	.1921	.0368	.8484	.3324
Cash Flow Per Share <0	.2456	.0855	.8792	.5500

Table 9
Initial return on pre-IPO operating performance quintile

All firms' operating performance data are relative year -1, which is one year before firm's IPO, and are collected from COMPUSTAT. Operating performance measures are categorized to 5 quintiles. The first represents the lowest performance group and the fifth represents the highest performance group. Initial return is defined as the percentage difference between first day closing price and the offering price.

	Sales/asset		Income/asset		Cash		Debt/asset		Sales per share		Income per		Cash flow per		Debt per share		Growth	
	quintile		quintile		Flow/asset		quintile		quintile		share quintile		share quintile		quintile		quintile	
	I	II	I	II	I	II	I	II	I	II	I	II	I	II	I	II	I	II
1	.970	.541	.815	.535	.773	.549	.947	.495	.894	.573	.909	.382	.954	.493	.984	.484	.637	.271
2	.765	.501	1.026	.663	1.117	.706	1.058	.572	.938	.752	.986	.593	.957	.583	.999	.712	.665	.381
3	1.029	.492	.804	.605	.797	.603	.851	.607	.897	.581	.872	.541	.871	.676	.822	.586	.780	.384
4	.709	.473	.928	.236	.804	.243	.872	.397	.888	.501	.855	.483	.780	.469	.842	.554	.925	.563
5	.920	.236	.830	.408	.861	.389	.618	.251	.588	.180	.658	.338	.541	.274	.470	.191	1.087	.955

I = Internet firms

II = Non-Internet firms

Table 10
Pre-IPO performance among four initial return groups

The sample covers 744 IPOs offered in the years 1999 and 2000. 376 firms are Internet related and 368 are Non-Internet related. Firms' operating performance data are relative to year -1, which is one year before firm's IPO, and are collected from COMPUSTAT. Initial return is defined as the percentage difference between first day closing price and the offering price. Extra-cold IPOs are offers with initial return equal or less than zero; Cold IPOs are offers with initial return more than zero but equal or less than 10%; Hot IPOs are offers with initial return great than 10% but less or equal 60%; and extra-hot IPOs are offers with initial return more than 60%.

	Sales/asset		Income/asset		Cash Flow/asset		Debt/asset		Growth rate	
	Internet	Non-	Internet	Non-	Internet	Non	Internet	Non	Internet	Non
Extra-cold	1.358	.9638	-1.0091	-.2986	-.9664	-.2422	.6142	.4066	3.4891	1.8512
Cold	1.4893	2.9138	-1.2319	-.2448	-1.1913	-.3551	.6734	.3149	6.1374	2.5214
Hot	1.0564	.6254	-.9195	-.3922	-.7398	-.3508	.2566	.3912	4.8422	2.5478
Extra-hot	.8333	.6828	-.9806	-.4294	-.9223	-.3820	.2292	.2343	6.2257	5.5920
Continued on Table 10:										
	Sales per share		Earnings per share		Cash flow per share		Debt per share			
	Internet	Non	Internet	Non	Internet	Non	Internet	Non		
Extra-cold	.6853	11.9296	-.4788	-.5100	-.4001	.1301	.7236	5.1440		
Cold	.6376	6.4640	-.4466	-.1696	-.3893	.2777	.3402	4.4955		
Hot	1.3711	5.9436	-.5076	.0432	-.3906	.3511	.8959	3.3205		
Extra-hot	.6945	1.6220	-.4329	-.2315	-.3851	-.1272	.1720	.4449		

Table 11
Correlation Matrix between pre-IPO financial performances

All firm operating performance data are relative to year -1, which is one year before firm's IPO, and are collected from COMPUSTAT.

	Sales/assets	Total debt/ assets	Sales per share	Earnings per share	Cash flow per share	Debt per share	Sales growth rate
Sales/assets	1	.039	.020	.029	.067	-.025	-.046
Total debt/ assets	.039	1	.009	-.057	-.023	.167**	-.061
Sales per share	.020	.009	1	.159**	.561**	.505**	-.089*
Earnings per share	.029	-.057	.159**	1	.843**	-.085*	-0.95*
Cash flow per share	.067	-.023	.561**	.843**	1	.311**	-.112**
Debt per share	-.025	.167**	.505**	-.085*	.311**	1	-.015
Sales growth rate	-.046	-.061	-.089*	-.095*	-.112**	-.049	1

** Correlation is significant at the 0.01 level (2-tailed).

* Correlation is significant at the 0.05 level (2-tailed).

Table 12
Ordinary Least Squares Regression Results with price revision as the Dependent Variable

Table values are mean measures for 744 IPOs in the year 1999 and 2000. 376 firms are Internet related and 368 are Non-Internet related. Offer data are from Edgar-online, and first trading day close price data are from the CRSP daily return tape. All firm operating performance data are relative to year -1, which is one year before firm's IPO, and are collected from COMPUSTAT. Dependent variable price revision is calculated as the ratio of price difference between offer price and mid point of initial price range to mid point of initial price range. Float represents the amount of shares sold in the IPO as a percentage of total shares outstanding. The rankings of underwriter's reputation are from Jay Ritter's IPO data sources. Offering size is measured as the amount of share outstanding multiplying the offer price.

Sales_asset: sales to total asset before IPO.

Income_asset: Income to total asset before IPO.

CF_asset: Cash Flow to total asset before IPO.

Debt_asset: debt to total asset before IPO.

Sales_ps: Total sales divided by total share outstanding at IPO.

EPS: total net income divided by total share outstanding at IPO.

CF_ps: cash flow divided by total share outstanding at IPO.

Debt_ps: Debt divided by total share outstanding at IPO.

Growth: sales growth rate before IPO.

Age: years existing before IPO.

Continued	1	2	3	4	5	6
Intercept	-0.06394 (-6.28)**	-0.6790 (-6.92)**	-0.6454 (-6.72)**	-0.7403 (-7.11)**	-0.7064 (-7.45)**	-0.5993 (-5.87)**
Sales_asset	0.0051 (0.55)					
Debt_asset	-0.0442 (-1.75)*					
Sales_PS		-0.0019 (-1.56)				
EPS			-0.0037 (-0.29)			
CF_PS				-0.0191 (-1.70)*		
Debt_PS					-0.0083 (-3.20)**	
Log(Growth)						0.0576 (3.59)**
Log (size)	0.1579 (9.23)**	0.1629 (9.38)**	0.1575 (9.22)**	0.1737 (9.65)**	0.1717 (9.80)**	0.1465 (8.12)**
Age	-0.0030 (-3.46)**	-0.0026 (-2.90)**	-0.0029 (-3.30)**	-0.0027 (-2.99)**	-0.0026 (-2.98)**	-0.0025 (-2.84)**
Rank	-0.0245 (-2.17)**	-0.0250 (-2.25)**	-0.0247 (-2.21)**	-0.0269 (-2.33)**	-0.0237 (-2.13)**	-0.0271 (-2.27)**
Float	0.1460 (2.00)*	0.1783 (2.30)*	0.1341 (1.87)*	0.2161 (2.71)**	0.2840 (3.29)**	0.1309 (1.84)
Internet	0.1758 (7.39)**	0.1531 (5.71)**	0.1570 (5.84)**	0.1552 (5.72)**	0.1505 (5.61)**	0.1349 (4.68)**
Adjust R-square	0.2094	0.2092	0.2055	0.2189	0.2189	0.2175

**Significant at .05

*Significant at .1

Table 13**Ordinary Least Squares Regression Results with Initial Return as the Dependent Variable**

Initial return: (first day close price-offer price)/ offer price. Sales_asset: sales to total asset before IPO. Income_asset: Income to total asset before IPO. CF_asset: Cash Flow to total asset before IPO. Debt_asset: debt to total asset before IPO. Sales_ps: Total sales divided by total share outstanding at IPO. EPS: total net income divided by total share outstanding at IPO. CF_ps: cash flow divided by total share outstanding at IPO.

	1	2	3	4	5	6
Intercept	-1.0457 (-3.79)**	-1.1750 (-4.42)**	-1.0878 (-4.18)**	-1.1076 (-3.96)**	-1.3417 (-4.84)**	-0.9513 (-3.35)**
Sales_asset	0.0081 (0.32)					
Debt_asset	-0.1213 (-1.77)*					
Sales_PS		-0.0044 (-1.36)				
EPS			0.0047 (0.14)			
CF_PS				-0.0282 (-0.93)		
Debt_PS					-0.0187 (-2.66)**	
Log(Growth)						0.2075 (4.64)**
Log(size)	0.2404 (5.22)**	0.2545 (5.44)**	0.2404 (5.23)**	0.2497 (5.20)**	0.2719 (5.77)**	0.2057 (4.14)**
Age	-0.0059 (-2.50)**	-0.0051 (-2.09)**	-0.0061 (-2.54)**	-0.0055 (-2.24)**	-0.0050 (-2.14)**	-0.0037 (-1.53)
Rank	0.0392 (1.28)	0.0395 (1.31)	0.0414 (1.37)	0.0337 (1.08)	0.0430 (1.42)	0.0292 (0.88)
Float	-0.2715 (-1.37)	-0.1833 (-0.87)	-0.2949 (-1.52)	-0.1967 (-0.92)	0.0288 (0.12)	-0.2651 (-1.34)
Internet	0.3642 (4.97)**	0.3600 (4.93)**	0.3678 (5.04)**	0.3526 (4.82)**	0.3528 (4.84)**	0.2861 (3.56)**
Adjusted R-square	0.1688	0.1678	0.1651	0.1597	0.1752	0.1791

Table 14**Ordinary Least Squares Regression Results with Initial Return as the Dependent Variable For Internet Firms**

Initial return: (first day close price-offer price)/ offer price. Sales_asset: sales to total asset before IPO. Income_asset: Income to total asset before IPO. CF_asset: Cash Flow to total asset before IPO. Debt_asset: debt to total asset before IPO. Sales_ps: Total sales divided by total share outstanding at IPO. EPS: total net income divided by total share outstanding at IPO. CF_ps: cash flow divided by total share outstanding at IPO. Debt_ps: Debt divided by total share outstanding at IPO. Growth: sales growth rate before IPO. Age: years existing before IPO.

	1	2	3	4	5	6	7
Intercept	-2.5303 (-4.38)**	-2.4263 (-4.38)**	-2.4099 (-4.33)	-2.2288 (-3.87)**	-2.5603 (-4.58)**	-2.4391 (-3.82)**	0.4636 (9.72)**
Sales_asset	0.0414 (1.25)						
Debt_asset	-0.0618 (-0.61)						
Sales_PS		-0.0058 (-0.39)					
EPS			-0.0113 (-0.08)				
CF_PS				-0.1547 (-1.08)			
Debt_PS					-0.0373 (-1.57)		
Log(Growth)						0.1389 (1.75)*	
Log(size)	0.4710 (5.19)**	0.4632 (5.10)**	0.4642 (5.07)**	0.4263 (4.65)**	0.4805 (5.28)**	0.4431 (4.05)**	
Age	-0.0096 (-0.81)	-0.0064 (-0.52)	-0.075 (-0.63)	-0.0063 (-0.52)	-0.0057 (-0.48)	-0.0049 (-0.37)	
Rank	0.0830 (1.55)	0.0760 (1.47)	0.0738 (1.43)	0.0725 (1.34)	0.0761 (1.48)	0.0758 (1.30)	
Float	0.1378 (0.31)	0.1855 (0.42)	-0.1556 (0.34)	0.1068 (0.25)	0.3661 (0.81)	0.1351 (0.30)	
Revision							1.7807 (16.56)**
Adjusted R-square	0.1619	0.1597	0.1593	0.1443	0.1663	0.1558	0.4224

Table 15**Ordinary Least Squares Regression Results with Initial Return as the Dependent Variable For Non-Internet firms**

Initial return: (first day close price-offer price)/ offer price. Sales_asset: sales to total asset before IPO. Income_asset: Income to total asset before IPO. CF_asset: Cash Flow to total asset before IPO. Debt_asset: debt to total asset before IPO. Sales_ps: Total sales divided by total share outstanding at IPO. EPS: total net income divided by total share outstanding at IPO. CF_ps: cash flow divided by total share outstanding at IPO.

	1	2	3	4	5	6	7
Intercept	-0.1472 (-0.53)	-0.3900 (-1.49)	-0.2985 (-1.17)	-0.3525 (-1.25)	-0.5269 (-1.91)*	-0.1892 (-0.70)	0.3564 (11.74)**
Sales_asset	0.0438 (-0.95)						
Debt_asset	-0.1611 (-1.82)*						
Sales_PS		-0.0030 (-1.08)					
EPS			0.0172 (0.57)				
CF_PS				-0.0052 (-0.19)			
Debt_PS					-0.0141 (-2.21)**		
Log(Growth)						0.2264 (4.38)**	
Log(size)	0.1343 (2.81)**	0.1624 (3.36)**	0.1455 (3.09)**	0.1609 (3.16)**	0.1759 (3.64)**	0.1463 (3.00)**	
Age	-0.0044 (-2.20)**	-0.0044 (-2.13)**	-0.0052 (-2.56)**	-0.0049 (-2.35)**	-0.0043 (-2.18)**	-0.0031 (-1.55)	
Rank	0.0127 (0.38)	0.0096 (0.29)	0.0140 (0.42)	0.0082 (0.24)	0.0123 (0.37)	-0.0121 (-0.34)	
Float	-0.3594 (-1.89)*	0.2562 (-1.24)	-0.3693 (-1.98)**	-0.3333 (-1.50)	-0.0645 (-0.27)	-0.2604 (-1.38)	
Revision							1.4922 (14.96)**
Adjusted R-square	0.1020	0.0956	0.0918	0.0941	0.1060	0.1384	0.3783

Table 16
Descriptive of 36- month post-IPO returns

Aftermarket period includes the following 36 months after initial trading day. Each month is defined as successive 22-trading-day periods relative to the IPO date. In other words, month 1 consists of event days 1-22, month 2 consists event days 23-44, etc. For IPOs that are delisted before their 3 years anniversary, the aftermarket period is truncated on the last trading day, and the buy-and –hold return ends with CRSP's last listing. The daily benchmark returns are the value-weighted NYSE NASDAQ, and AMEX index return (CRSP index return 100080).

	Buy-and-hold index adjusted returns				Cumulative index adjusted returns			
	Total	Internet-related	Non-Internet related	difference (t-value)	Total	Internet-related	Non-Internet related	Difference (t-value)
Month 1	.1027	.0965	.1090	-.380	.1030	.0935	.1127	-.672
Month2	.1072	.1032	.1113	-.176	.0930	.0760	.1102	-.866
Month3	.1874	.2117	.1628	.723	.1334	.1185	.1486	-.621
Month4	.2383	.3262	.1493	2.010*	.1361	.1521	.1199	.572
Month 5	.2441	.3541	.1325	2.143*	.1296	.1357	.1233	.202
Month6	.1140	.1734	.0541	1.229	.0481	.0128	.0836	-1.090
Month7	.1386	.1854	.0916	.907	.0649	.0281	.1019	-1.069
Month 8	.0827	.1139	.0516	.582	.0372	-.0211	.0955	-1.622
Month9	-.0025	-.0602	.0547	-1.200	.0090	-.0985	.1156	-2.877**
Month10	-.0521	-.1352	.0308	-1.815	-.0248	-.1565	.1066	-3.436**
Month11	-.0711	-.1695	.0266	-1.987*	-.0478	-.2019	.1051	-3.902**
Month12	-.0899	-.2067	.0243	-2.178*	-.1290	-.3472	.0843	-5.113**
Month13	-.1063	-.2378	.0208	-2.375*	-.1398	-.3705	.0830	-5.241**
Month 14	-.1576	-.3229	.0006	-3.126**	-.1202	-.3645	.1137	-5.604**
Month15	-.1949	-.3867	-.0148	-3.648**	-.1213	-.3810	.1227	-5.864**
Month16	-.2210	-.4493	-.0112	-4.372**	-.1475	-.4452	.1261	-6.462**
Month 17	-.2722	-.5166	-.0501	-5.499**	-.1506	-.4729	.1426	-6.902**

Continue on Table 16

	Buy-and-hold returns				Cumulative returns			
	Total	Internet-related	Non-Internet related	difference (t-value)	Total	Internet-related	Non-Internet related	Difference (t-value)
Month18	-.2815	-.5477	-.0412	-6.058**	-.1513	-.5045	.1674	-7.534**
Month19	-.3110	-.5964	-.0552	-6.914**	-.1567	-.5245	.1729	-7.638**
Month 20	-.3288	-.6035	-.0890	-8.638**	-.1288	-.4860	.1832	-7.381**
Month21	-.3360	-.6058	-.1042	-8.976**	-.1169	-.4343	.1559	-6.417**
Month22	-.3207	-.5856	-.0974	-8.638**	-.0933	-.3929	.1591	-5.775**
Month23	-.3205	-.5927	-.0905	-8.301**	-.0975	-.3980	.1564	-5.744**
Month24	-.3349	-.5976	-.1082	-8.357**	-.0603	-.3581	.1909	-5.778**
Month 25	-.3325	-.5977	-.1119	-8.171**	-.0866	-.3747	.1476	-5.405**
Month26	-.3445	-.5990	-.1328	-8.354**	-.0481	-.3105	.1652	-4.824**
Month27	-.3398	-.5914	-.1343	-8.104**	-.0319	-.2932	.1766	-4.714**
Month28	-.3274	-.5780	-.1240	-7.752**	.0353	-.2101	.2297	-4.335**
Month29	-.3175	-.5625	-.1217	-7.194**	.0677	-.1722	.2548	-4.155**
Month 30	-.3193	-.5770	-.1151	-7.716**	.0678	-.2017	.2762	-4.517**
Month31	-.3188	-.5710	-.1232	-7.579**	.0939	-.1339	.2664	-3.788**
Month32	-.3028	-.5713	-.0947	-7.279**	.1695	-.0860	.3627	-4.239**
Month33	-.2942	-.5811	-.0696	-7.226**	.1913	-.0713	.3918	-4.285**
Month34	-.2684	-.5609	-.0378	-7.053**	.2620	-.0237	.4817	-4.664**
Month 35	-.2612	-.5512	-.0348	-7.053**	.3238	.0409	.5431	-4.579**
Month36	-.2466	-.5368	-.0156	-7.128**	.3999	.1599	.5910	-3.797**

Table 17
Post-IPO Buy-and-hold returns Categorized by Pre-IPO Performance groups

The sample covers 744 IPOs in the year 1999 and 2000. 376 firms are Internet related and 368 are Non-Internet related. Aftermarket period includes the following 36 months. Each month is defined as successive 22-trading-day periods relative to the IPO date. Pre-IPO performances are relative to the year -1, which is one year before the IPO.

Financial Performance quartiles (P)	Sample size		3-year buy-and-hold returns	
	Internet	Non-Internet	Internet	Non-Internet
Panel A: P= Sales/Total Assets				
0 - 0.15	73	68	-.5432	-.3380
0.15 - 0.55	66	73	-.5850	.0054
0.55 - 1.34	58	86	-.5026	-.0576
1.34 -150	67	78	-.5051	.2580
Panel B: P= Net income /Total Assets				
-.25 ~ -.76	82	47	-.5940	-.3101
-.76 ~ -.36	80	59	-.5720	-.2879
-.36 ~ -.01	63	75	-.4544	-.2573
-.01~ 10	39	125	-.4785	.3095
Panel C: P= Cash Flow /Total Assets				
-.25 ~ -.71	81	47	-.5759	-.3768
-.71~ -.32	77	59	-.5804	-.2229
-.32 ~ .02	60	70	-.4374	-.2958
.02 ~ 1.14	36	122	-.4624	.3538
Panel D: P= debt /Total Assets				
0 ~.02	73	67	-.4884	-.0890
.02 ~ .14	83	59	-.5490	.0794
.14 ~ .42	62	88	-.5700	.0145
.42 ~ .6.96	46	90	-.5662	-.0703
Panel E: P= Sales per share				
0 ~ .1	81	64	-.5578	-.3826
.1 ~ .46	81	49	-.5499	-.2706
.46 ~ 1.71	71	70	-.5791	-.1646
1.73 ~ 226.58	31	122	-.3427	.3226
Panel F: P= earnings per share				
-13.42 ~ -.56	70	67	-.5554	-.2569
-.55 ~ -.28	71	61	-.5397	-.1896
-.28 ~ -.02	79	58	-.5473	-.3403
-.02 ~ 15.91	44	120	-.4924	.3181

Continue on Table 17

Financial Performance quartiles (P)	Sample size		3-year buy-and-hold returns	
	Internet	Non-Internet	Internet	Non-Internet
Panel G: Cash flow per share				
	Internet	Non-Internet	Internet	Non-Internet
-.47 ~ -.22	74	55	-.5240	-.2011
-.22 ~ .05	76	58	-.5681	-.3970
.05 ~ 26.08	33	124	-.3520	.3905
Panel H: P= Debt per share				
0 ~ .01	78	65	-.4918	-.0661
.01 ~ .1	84	55	-.6083	-.3851
.1 ~ .49	76	69	-.4984	.0327
.49 ~ 83.34	26	115	-.5640	.1304
Panel I: P= Sales growth rate				
-.9 - 1.34	30	102	-.3824	.0972
1.34 - 1.9	56	75	-.5195	.0453
1.9 - 3.65	63	51	-.5249	-.3302
3.66 - 446.5	79	37	-.5985	-.0353

Table 18

After-IPO Buy-and-hold returns Categorized by initial Returns

Aftermarket period includes the following 36 months after initial public offerings. Each month is defined as successive 22-trading-day periods relative to the IPO date. For IPOs that are delisted before the 3 year anniversary, the aftermarket period is truncated on the last trading day, and the buy-and –hold return ends with CRSP's last listing. Initial return is defined as the percentage difference between first day closing price and the offering price. Extra-cold IPOs are offers with initial return equal or less than zero; Cold IPOs are offers with initial return more than zero but equal or less than 10%; Hot IPOs are offers with initial return great than 10% but less or equal 60%; and extra-hot IPOs are offers with initial return more than 60%.

	6- month			3-year		
	Total	Internet	Non-Internet	Total	Internet	Non-Internet
Extra-cold	-.2121	.0991	.1465	-.0461	-.3792	.1583
Cold	-.0415	-.1842	.0186	-.1608	-.4616	-.0773
Hot	-.0308	.3142	.1569	-.0994	-.5074	.0905
Extra-hot	-.0884	.1808	-.1482	-.4750	-.5944	-.2679

Table 19
Distribution of IPO firms according to their size and Market-to-Book ratio at the end of the second year

Market value of equity is obtained by multiplying stock price (Item 24 in Compustat) and common shares outstanding (Item 25). Book value of equity is calculated as the common total equity (Item 60) plus deferred taxes and investment tax credit (Item 35). IPO firms are divided into 4 size groups according to their market value at the end of 24 month. The biggest quintile contains firms with size over 1000 million, and the smallest quintile with size less than 100 million. All negative market-to-book ratio firms are categorized as "Negative" group, and the positive market-to-book ratio firms are then divided into 4 groups with the forth group having the largest market-to-book ratio.

Panel A: Distribution of IPOs (%)						
Size Quintile	Market-to-book Quintile					Total
	Negative	1	2	3	4	
smallest	2.74	16.71	12.6	4.11	3.84	40
2	0.82	3.56	7.67	12.33	9.59	33.97
3	0.27	1.64	1.92	3.29	5.21	12.33
Biggest	N/A	0.55	2.47	4.93	5.75	13.7
Total	3.83	22.46	24.66	24.66	24.39	100%

Panel B: Size by Portfolio (million)					
Size Quintile	Market-to-book Quintile				
	Negative	1	2	3	4
smallest	12.3412	27.9506	53.3127	51.0281	53.3499
2	261.4304	193.1067	221.3970	250.4731	290.6026
3	608.7758	736.3256	675.6808	714.7270	756.9842
Biggest	N/A	3167.0945	2605.7844	2871.7230	5535.5331

Panel C: Market to book ratio by Portfolio					
Size Quintile	Market-to-book Quintile				
	Negative	1	2	3	4
smallest	-1.6004	.5407	1.2163	2.3633	31.6897
2	-9.4576	.6944	1.2794	2.4372	6.7149
3	-11.5465	.5854	1.3296	2.5908	8.7550
Biggest	N/A	.7977	1.1890	2.4875	8.5168

Table 20

36 month buy and hold return categorized by size and market to book ratio portfolios

Each month is defined as successive 22-trading-day periods relative to the IPO date. For IPOs that are delisted before the 3 year anniversary, the aftermarket period is truncated on the last trading day, and the buy-and –hold return ends with CRSP’s last listing. IPO firms are divided into 4 size groups according to their market value at the end of 24 month. The biggest quintile contains firms with size over 1000 million, and the smallest quintile with size less than 100 million. All negative market-to-book ratio firms are categorized as “Negative” group, and the positive market-to-book ratio firms are then divided into 4 groups with the forth group having the largest market-to-book ratio.

Panel A: 36-Month buy-and-hold index adjusted return by size portfolios				
Size	1 smallest	2	3	4
Internet	-.5577	-.5369	-.5252	-.5416
Non-Internet	-.0901	-.2111	-.0491	.5951

Panel B: 36-month buy-and-hold index adjusted return by Market-to-book ratio portfolios					
Market-to-book	negative	1	2	3	4 biggest
Internet	-.6492	-.5571	-.5740	-.5555	-.4741
Non-Internet	-.2682	-.2815	.1364	-.0991	.1756

Pane C: 36-month buy-and-hold index adjusted return by size and market-to-book portfolios					
Market-to-book	Size	1 smallest	2	3	4 biggest
Negative	Internet	-.6540	-.6253	N/A	N/A
	Non-Internet	-.2553	-.0591	-.7510	N/A
1	Internet	-.5705	-.4975	-.5993	N/A
	Non-Internet	-.3081	-.4379	-.2423	.6068
2	Internet	-.5913	-.5478	-.5440	-.5962
	Non-Internet	.4648	-.4426	-.2410	.4827
3	Internet	-.2267	-.6267	-.6812	-.5949
	Non-Internet	-.2667	-.2096	.2882	.0482
4	Internet	-.6233	-.3933	-.4586	-.4828
	Non-Internet	-.3323	-.0260	-.1299	1.2394

Table 21
Change of operating performances in the 3-year period after initial public offerings

Table values are mean and percentage changes of operating performance in the issue year and 3 years followed. All firm's operating performance data are collected from COMPUSTAT.

		Issuing year	1	2	3
Sales growth	Internet firms	273.38	342.84	392.45	468.67
	Changes		25.41%	14.47%	19.42%
	non-Internet firms	314.05	448.82	387.40	438.54
	Changes		42.91%	-13.68%	13.20%
Earnings to assets	Internet firms	-.3811	-.5365	-.8027	-.4274
	Changes		-40.78%	-49.62%	46.75%
	non-Internet firms	-.2775	-.3383	-.4381	-.3308
	Changes		-21.91%	-29.5%	24.495
Earnings per share	Internet firms	-30.14	-24.36	-13.92	-2.14
	Changes		19.18%	42.86%	84.63%
	non-Internet firms	-2.45	-2.68	-1.74	-1.99
	Changes		-9.39%	35.07%	-14.37%
Cash Flow to total assets	Internet firms	-.3214	-.4333	-.6494	-.3229
	Changes		-34.82%	-49.87%	50.28%
	non-Internet firms	-.2351	-.2704	-.3488	-.2490
	Changes		-15.01%	-28.99%	28.61%
Cash flow per share	Internet firms	-28.75	-21.48	-10.83	-1.44
	Changes		25.29%	49.58%	86.70%
	non-Internet firms	-1.90	-1.88	-1.06	-1.29
	Changes		1.05%	43.62%	-21.7%
Debt to total assets	Internet firms	12.15	11.30	13.17	15.04
	Changes		7%	16.55%	14.20%
	non-Internet firms	15.78	12.92	13.81	15.35
	Changes		-18.12%	6.89%	11.15%

Table 22
Regression results for medium-term momentum with 1-6 month buy and hold index adjusted returns as dependent variable

Each month is defined as successive 22-trading-day periods relative to the IPO date. For IPOs that are delisted before the 3 year anniversary, the aftermarket period is truncated on the last trading day, and the buy-and -hold return ends with CRSP's last listing. Initial return is defined as the percentage difference between first day closing price and the offering price. Extra-cold IPOs are offers with initial return equal or less than zero; Cold IPOs are offers with initial return more than zero but equal or less than 10%; Hot IPOs are offers with initial return great than 10% but less or equal 60%; and extra-hot IPOs are offers with initial return more than 60%. Age is the existing years before IPO. Offer size is measured as the offer price times shares outstanding at the initial reading day. EPS is earning s per share one year before the IPO year and is obtained from COMPUSTAT. Underwriter's ranking if from Jay Ritter's personal web.

	Constant	Cold Dummy	Hot Dummy	Ex-hot Dummy	Internet Dummy	Age	Log(offer size)	EPS	Rank	Adjust R ²
1-month	0.0079 (0.06)	0.0578 (0.83)	0.1886 (3.50)**	0.1303 (2.42)*	-0.0032 (-0.08)	-0.0013 (-0.99)	-0.0704 (-3.10)**	0.0146 (0.80)	0.0519 (3.27)**	0.0344
2-months	-0.1632 (-0.96)	0.0783 (0.86)	0.2485 (3.50)**	0.1034 (1.46)	0.0102 (0.20)	-0.0017 (-1.04)	-0.0897 (-3.00)**	0.0153 (0.63)	0.0847 (4.06)**	0.0415
3-months	-0.2398 (-0.96)	0.086 (0.64)	0.2307 (2.20)*	0.0763 (0.73)	0.0838 (1.10)	-0.0036 (-1.45)	-0.0907 (-2.05)	0.0263 (0.73)	0.1037 (3.36)**	0.0219
4-months	-0.1316 (-0.40)	0.0579 (0.32)	0.2813 (2.01)*	0.0754 (0.54)	0.2676 (2.65)**	-0.0043 (-1.32)	-0.1094 (-1.86)*	0.0445 (0.93)	0.0994 (2.42)*	0.0229
5-months	-0.1367 (-0.34)	0.0094 (0.04)	0.3315 (1.95)*	0.0251 (0.15)	0.3446 (2.82)**	-0.0038 (-0.97)	-0.1561 (-2.19)*	0.0533 (0.93)	0.1308 (2.63)**	0.0260
6-months	-0.0927 (-0.09)	-0.0154 (-0.08)	0.2816 (1.83)	-0.0192 (-0.12)	0.2388 (2.16)*	-0.0018 (-0.51)	-0.1101 (-1.71)	0.0227 (0.44)	0.0831 (1.85)	0.0128

**Significant at .01

*Significant at .05

Table 23
OLS Regression Results with 3- Year Buy-and-hold returns as Dependant Variable

Aftermarket period includes the following 36 months after initial public offerings. Each month is defined as successive 22-trading-day periods relative to the IPO date. Extra-cold IPOs are offers with initial return equal or less than zero; Cold IPOs are offers with initial return more than zero but equal or less than 10%; Hot IPOs are offers with initial return great than 10% but less or equal 60%; and extra-hot IPOs are offers with initial return more than 60%. Age is the existing years before IPO. EPS is earning s per share one year before the IPO year and is obtained from COMPUSTAT. Underwriter's ranking is obtained from Jay Ritter's personal data source. Market value of equity is obtained by multiplying stock price and common shares outstanding. Book value of equity is calculated as the common total equity plus deferred taxes and investment tax credit.

	1		2		3		4	
C	-0.1464	(-0.51)	-0.4884	(-1.59)	-0.1907	(-0.66)	-0.2356	(-0.79)
Cash Flow per share							0.0229	(0.92)
EPS					-0.0023	(-0.07)		
Sales to total assets			0.1142	(2.61)***				
Sales per share	0.0059	(2.36)**						
LOG(market value)	0.0494	(1.96)**	0.0580	(2.30)**	0.0517	(2.04)**	0.0467	(1.80)*
LOG(market to book ratio)	0.0557	(1.32)	0.0502	(1.19)	0.0516	(1.21)	0.0555	(1.27)
Rank	-0.0200	(-0.67)	0.0071	(0.23)	-0.0146	(-0.49)	-0.0038	(-0.12)
Age	0.0029	(0.84)	0.0049	(1.54)	0.0068	(2.01)**	0.0051	(1.44)
Cold dummy	-0.1897	(-1.24)	-0.2103	(-1.37)	-0.2039	(-1.33)	-0.2055	(-1.28)
Hot dummy	-0.1008	(-0.87)	-0.1128	(-0.98)	-0.1164	(-0.99)	-0.1300	(-1.10)
Ex-hot dummy	-0.3298	(-2.81)***	-0.3480	(-2.99)***	-0.3536	(-2.98)***	-0.3618	(-3.01)***
Internet dummy	-0.3251	(-3.92)***	-0.3393	(-4.11)***	-0.3377	(-4.05)***	-0.3293	(-3.86)***
Change of EPS-first year	0.0110	(2.25)**	0.0124	(2.54)***	0.0107	(2.17)**	0.0113	(2.27)**
Change of EPS-second year	0.0055	(0.83)	0.0073	(1.09)	0.0062	(0.92)	0.0061	(0.90)
Change of EPS-third year	0.0128	(1.84)*	0.0135	(1.95)**	0.0123	(1.76)*	0.0120	(1.71)*
R-Square	0.1971		0.2005		0.1805		0.1769	

*** Significant at 1% level;

** Significant at 5% level;

* Significant at 10% level;

Table 24
Descriptive characters among underwriter's ranking group

The rankings of underwriter's reputation are from Jay Ritter's IPO data sources. Ranking with 9.1 represents the most prestigious underwriters while 1.1 represents the underwriters with the least reputation. Initial return is defined as the percentage difference between first day closing price and the offering price. Offering size is measured as the amount of shares outstanding multiplied by the offer price.

Underwriter's ranking		9.1	8.1	7.1	6.1	5.1	4.1	3.1	2.1	1.1
Internet	Percentage of firms undertaken	30.07%	14.15%	1.9%	1.5%	1.36%	0.95%	0.68%	0.27%	0.14%
	Offer price	15.93	13.86	12.82	11.5	12.8	10.07	8.4	8	8
	Offer amount	99.87	66.02	50.08	48.71	44.5	26.1	16.24	5.67	8
	Initial return	1.0987	0.6926	0.4162	0.251	0.3603	0.7041	0.1329	0.0619	0.1719
Non-Internet	Percentage of firms undertaken	29.8%	11.02%	2.31%	2.18%	0.95%	0.68%	1.5%	0.41%	0.14%
	Offer price	16.42	13.62	12.79	10.24	10	10	8.14	26.6	7
	Offer amount	236.37	73.67	51.89	47.64	28.51	28.12	10.68	7.83	14
	Initial return	0.5173	0.4562	0.3337	0.4482	0.1111	0.1456	0.0238	0.0889	0.0625
Total	Percentage of firms undertaken	59.87%	25.17%	4.21%	3.68%	2.31%	1.63%	2.18%	0.68%	0.28%

Table 25
Pre-IPO Financial performances among prestigious and un-prestigious underwriters

Prestigious underwrites have a ranking 9.1 and unprestigious underwriters have a ranking 8.1 or below. All financial performances data are obtained from COMPUSTAT and related to year -1, which is one year before IPO. Offer size is measured as the amount of shares outstanding multiplied by the offer price

Panel A: Total Firms										
ranking	Offer size	sales/assets	income/assets	Cash flow/assets	debt/assets	sales per share	earning per share	Cash flow per share	debt per share	growth
prestigious	855.67	0.7484	-0.5564	-0.5041	0.2982	4.1689	-0.3326	-0.0469	2.5436	5.0598
unprestigious	267.02	1.7496	-0.8699	-0.8163	0.398	1.6593	-0.2787	-0.2078	0.5863	3.1492
difference(t-value)	7.09**	-1.92	2.27*	2.37*	-1.99*	3.29**	-0.752	1.831	5.2**	3.18**
Panel B: Internet firms										
ranking	Size	sales/assets	income/assets	Cash flow/assets	debt/assets	sales per share	earning per share	Cash flow per share	debt per share	growth
prestigious	658.22	0.7235	-0.8096	-0.7545	0.2354	0.9971	-0.5024	-0.4157	0.6275	6.6615
unprestigious	281.55	1.468	-1.2486	-1.1085	0.4704	0.7106	-0.4096	-0.3554	0.2733	3.705
difference(t-value)	7.45**	-3.12**	1.86	1.52	-2.81**	0.72	-1.22	-0.91	1.47	3.18**
Panel C: Non-Internet-firms										
ranking	Size	sales/assets	income/assets	Cash flow/assets	debt/assets	sales per share	earning per share	Cash flow per share	debt per share	growth
prestigious	1054.93	0.7736	-0.3008	-0.2536	0.3615	7.3843	-0.1613	0.322	4.4772	3.5419
unprestigious	251.15	2.0572	-0.4564	-0.4959	0.3172	2.6954	-0.1357	-0.046	0.9355	2.518
difference(t-value)	5.09**	-1.21	1.23	2.31*	0.90	3.19**	-0.18	2.28*	5.09**	1.36

** Significant at 1% level;

* Significant at 5% level;

Table 26
Probit regression results for prestigious and un-prestigious underwriters

If the underwriter is prestigious with a ranking 9.1, the dependent variable equals to 1, otherwise, it equals to 0. Sales growth rate, debt to total assets, sales per share, and EPS are pre-IPO financial data. Age is the existing years before IPO. Offer size is measured as the offer price times shares outstanding at the initial trading day.

	1		2		3	
C	-4.5285	(-8.32)***	-4.0161	(-8.36)***	-4.1011	(-8.16)***
LOG(sales growth rate)	0.1084	(1.39)	0.0845	(1.11)	0.0977	(1.27)
Debt to total assets	-0.1194	(-0.87)				
Sales per share	0.0542	(3.55)***				
EPS			-0.0429	(-0.59)		
Cash Flow Per Share					0.1997	(2.19)**
AGE	-0.0025	(-0.48)	0.0036	(0.76)	0.0007	(0.13)
LOG(offer size)	0.8206	(8.93)***	0.7459	(8.91)***	0.7649	(8.73)***
Internet dummy	-0.0400	(-0.30)	-0.1435	(-1.11)	-0.0683	(-0.52)

*** Significant at 1% level;

** Significant at 5% level;

* Significant at 10% level;

Curriculum Vitae

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Ph.D. in Finance;

Xi'an University of Architecture and Technology, Xi'an, China 1997
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Instructor - Old Dominion University, Department of Finance Spring 2005
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Academic Assistant Fall 2004 and Spring 2005
-Old Dominion University, Student Support Services
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Research and Teaching Assistant - Old Dominion University 2001-2003
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Assistant Professor 1997-2000
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