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THE ROLE OF INVESTMENT BANKER REPUTATION IN INITIAL PUBLIC OFFERINGS: EVIDENCE FROM THE NASDAQ BUBBLE ERA

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A Thesis
In
the John Molson School of Business

Presented in Partial Fulfilment of the Requirements
for the Degree of Master of Science in Administration at
Concordia University
Montreal, Quebec, Canada

April 2002

Abstract

The Role of Investment Banker Reputation in Initial Public Offerings: Evidence from the NASDAQ Bubble Era

Yan Xie

The certification role of investment banks in the initial public offering (IPO) market has been well documented. Extant literature reports a negative relationship between the prestige of the investment banker and both the first-day price run-up (Carter and Manaster (1990) and long run performance of IPOs (Michaely and Shaw (1994)). However, the robustness of this relationship under different market conditions, particularly in times of greater uncertainty and increased market volatility, has not been tested. Using data on U.S. IPOs from 1996 to 2000, a "historical period" in the stock market, this paper addresses the following three research questions: (1) Do previous findings with respect to the relationship between investment banker prestige and performance of IPOs continue to hold in the "NASDAQ bubble" era? (2) Which issuer characteristics influence a prestigious investment banker's decision to underwrite an individual IPO in a hot issue market? (3) Does the choice of a reputable investment banker to underwrite the IPO help the issuing firm to reduce other costs, such as liquidity costs, associated with its IPO?

Contrary to previous findings, this study documents that after controlling for factors such as offering size and prevailing market conditions, IPOs (especially technology IPOs) underwritten by prestigious investment bankers are underpriced significantly more compared to IPOs underwritten by less prestigious investment bankers. This finding suggests that prestigious investment bankers did not avoid the

high-risk technology IPOs during the "NASDAQ bubble" period; thus, seriously bringing into question the certification role of the reputation of the investment banker vis-à-vis the risk of the issuing firm. While venture capitalist backed IPOs are underwritten by more prestigious investment bankers during this time period, there is no evidence that ownership by corporate and institutional investors is related to the prestige of the investment banker. Finally, the study documents that issuing firms that use the services of reputable investment bankers can significantly reduce other costs (such as liquidity costs measured using the length of the lock-up period as a proxy) of going public. This result is partially consistent with Courteau's (1995) optimal insider retention and retention commitment hypothesis.

Acknowledgements

I would like to thank my supervisor, Dr. Harjeet Bhabra, who took interest in my thesis from the very beginning and supported me throughout the various stages of my thesis. My appreciation also goes to Dr. Dogan Tirtiroglu, who helped me generating my research ideas and gave me valuable comments. I also would like to thank Dr. Thomas Walker for giving me suggestions and corrections when they were needed.

Finally, I would like to thank my friends and colleagues, who have supported and helped me to successfully complete this thesis.

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1. Introduction

The anomalies of underpricing and long-run underperformance of initial public offerings (IPOs) have attracted the attention of many researchers[1] over the past twenty years. Among them, a substantial body of literature focuses on the effects of underwriter (exchangeable with investment banker) reputation on the initial and long-run performance of IPOs. For example, Beatty and Ritter (1986), Carter and Manaster (1990), and Michaely and Shaw (1994) find that the underpricing of IPOs is negatively related to the reputation of the underwriter. They suggest that by using a more reputable underwriter, firms with less uncertainty about their aftermarket share price could reveal their low risk characteristics to investors, and thus reduce the magnitude of underpricing. A related body of work, represented by Beatty and Ritter (1986), Titman and Trueman (1986), and Booth and Smith (1986) suggest that the investment banker and other third parties, such as the auditor and the venture capitalist (VC), have the ability to certify that the offer price of the new issue reflects all available and relevant information about the issuer. They argue that the potential legal liabilities and damages to the reputation would force investment bankers to commit their best effort to investigate and reveal the true value of the IPO candidates to the public. Such an argument is also supported by Carter and Manaster (1990), who suggest that more prestigious underwriters would only market low risk IPOs in order to maintain their reputation.

Several other studies examine the long-term performance of IPO stocks either separately or jointly with IPO underpricing. For example, Loughran and Ritter (1995) find that during the period from 1970 to 1990, both IPO stocks and stocks with seasoned

[1] See Ibbotson (1975), Sindelar and Ritter (1988), Loughran and Ritter (1995).

equity offerings (SEOs) significantly underperformed relative to non-issuing firms during a five-year holding period even after adjusting for book-to-market effects. Michaely and Shaw (1994), on the other hand, find that IPOs underwritten by more prestigious underwriters outperform those underwritten by less prestigious underwriters over a two-year holding period. Consistent with the findings from Michaely and Shaw (1994), a more recent study by Carter, Dark, and Singh (1998), find that IPOs underwritten by more prestigious underwriters have significantly higher long-run market-adjusted returns.

In this paper, I propose and test three research questions using a data set of IPOs made during the historic "NASDAQ Bubble" era of 1996 to 2000. During this time, the NASDAQ index climbed from 1052 to 5048. A record number of firms went public during this hot issue market. I address the following issues:

First, does the negative relationship between the degree of underpricing and investment banker reputation, which is found to be significant in previous studies, still hold in an inflated stock market? As noted above, my IPO sample covers the period from 1996 to 2000, which was called the "High-Tech Bubble" or "NASDAQ Bubble" by the media. Driven by extraordinary high but volatile market returns, the degree of underpricing for IPOs during this period are noticeably different from those under so-called normal equity market conditions. For example, the 15 IPOs with the highest initial price run-up in history are recorded during this period. In addition, as Table 9 and Table 10 show, they are all underwritten by the top investment bankers on Wall Street. Did the prestigious investment bankers, such as Merrill Lynch and Goldman Sachs, adjust their risk tolerance to market risky technology IPOs compared to what they did before or was it just another "Hot Issue" market scenario similar to the hot natural resource IPOs in

1980[2]? I re-examine the impact of underwriter prestige on underpricing in this unusually "Hot Issue" market.

Secondly, I investigate how prestigious investment bankers identify the "right" IPO candidates in order to maintain their reputation in a "Hot Issue" market. Are there some common characteristics that distinguish IPOs underwritten by prestigious investment bankers from those underwritten by less prestigious investment bankers in the "Hot Issue" market? Previous empirical studies only show that IPOs underwritten by prestigious investment bankers experience less underpricing and have better long-term performance than IPOs underwritten by less prestigious investment bankers over a long period. A closely related study, covering the period from 1977 to 1988, is undertaken by Wolfe, Cooperman, and Ferris (1994). They find that, during their study period, prestigious investment bankers avoid underwriting small and risky IPOs, using the offering size and the standard deviation of excess returns during the first twenty days of trading as proxies for risk. Michaely and Shaw (1994) find that more prestigious investment bankers favor larger IPOs. Megginson and Weiss (1991) find that IPOs backed by venture capitalists are able to attract more prestigious investment bankers. Given these results, I re-examine if the relationship of underwriter reputation and the proxy variables for risk continue to hold in the "NASDAQ Bubble" era. In this study, in addition to offering size, I use the holdings of different groups of investors, such as venture capitalists, corporate and institutional investors to proxy for risk. Furthermore, I also investigate if the retention ratio of insider shares by different groups of investors is related to underwriter reputation.

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[2] See Ritter (1984).

The third question that I address relates to the costs of going public. By paying higher underwriting fees to use a more prestigious underwriter, can issuing firms save on other IPO related costs? The signaling hypothesis suggests that IPOs with high future prospects and low risk are able to distinguish themselves from low quality and high risk firms by using costly signals, such as retaining more insider shares, committing to longer lock-up period, and accepting a higher degree of underpricing, in order to convince the outsiders that their issues are less risky[3]. If the certification provided by an investment banker's prestige conveys enough credible information about the value of the IPO firm, could the signaling costs, such as underpricing, lock-up period, and level of retention, be reduced if a prestigious investment banker is appointed by a low risk firm?

The rest of this paper is organized as follows: in Section 2, the existing body of literature on IPO market anomalies and related studies on the reputation of investment bankers are discussed. In Section 3, the assumptions and hypotheses are developed and their testable implications are formulated. In Section 4, the data and methodology are described, while in Section 5, the results are discussed and possible explanations are presented. The findings from the study are summarized in Section 6 and the suggestions for future research are presented in Section 7.

[3] See Leland and Pyle (1977), Allen and Faulhaber (1989), Welch (1989), Grinblatt and Hwang (1989), and Courteau (1995) for detail.

2. Literature Review

2.1 IPO Underpricing

The IPO underpricing puzzle has been well documented by many researchers. Underpricing is defined as the percentage in the price of the stock from the offer price to the close of the first day of trading. Ibbotson (1975) was among the first to reveal the IPO underpricing phenomenon by documenting that the average IPO initial return of the first week was 11.4% over the period from 1960 to 1969. Ibbotson (1975) suggests that new issues may be underpriced in order to "leave a good taste in investors' mouths" to achieve higher price in the seasonal equity offerings. More recently, Carter, Dark, and Singh (1998) get an average market-adjusted initial return of 8.08% for all IPOs that went public during the period from 1979 to 1991.

Most of the theoretical studies on the underpricing topic are based on two major hypotheses: the signaling hypothesis and the winner's-curse hypothesis. I discuss each of them in more detail in the following sections.

2.1.1. The Signaling Models

The signaling hypothesis was first introduced in Leland and Pyle (1977). In their paper, Leland and Pyle argue that information asymmetries particularly exist in financial markets since sellers typically know their products or projects better than the buyers. If there is no information transfer, it is difficult for buyers to distinguish high quality products from low quality products, especially for financial products where quality is highly variable. As a result, buyers are only willing to pay a price equal to the value of an average quality product for any specific product class. In order to obtain a better

price, owners of high quality products or projects must act to reduce this information asymmetry. One such action that is suggested by Leland and Pyle is that sellers place a value on their own projects. The signaling model presented in their paper shows that an entrepreneur's willingness to invest in his own project can serve as a signal of project quality. Their model can be applied to the IPO market, where the portion of shares retained by the insider after the IPO can serve as a signal of the quality of the issuing firm. However, this signal is costly for the owner since it prevents the owner from holding a completely diversified portfolio and exposes the owner to firm-specific risk.

Hughes (1985) extends Leland and Pyle's (1977) signaling model to include disclosure as a second signal of firm value. Hughes suggests that one way to solve the information asymmetry is through a contingent contract between the investors and the issuer. Direct disclosure can serve as a contingent contract because investors price the new issue based on disclosed value, and the issuer would be penalized if the disclosed value proves to be lower than the disclosed value in the ex-IPO period. The costly penalty, such as a fine from the Securities and Exchange Commission (SEC), will induce the issuer to reveal the true value of the project.

Grinblatt and Hwang (1989) argue that the equilibrium signaling schedule is a function of both the project variance and the issuer's fractional holding. Therefore, Leland and Pyle's one signal model cannot solve the unknown variance problem. Grinblatt and Hwang's signaling model, therefore, considers the degree of underpricing as a second signal that can serve as a vehicle that conveys the variance information to the market. Their model yields three unique implications[4]: 1). Given the risk level of the

[4] There are eight implications presented in Grinblatt and Hwang's paper. Four of them are consistent with the Leland-Pyle model. One of them is consistent with Rock's (1986) model.

firm, the degree of underpricing is positively related to the insider's retention level; 2). Given the insider's retention level, the firm value is positively related to the degree of underpricing; and 3). Given the risk level of the firm, firm value is positively related to the degree of underpricing.

Close to the arguments from Grinblatt and Hwang (1989), Allen and Faulhaber (1989) also consider the degree of underpricing as a signal that conveys an issuer's prospects to its investors, especially for an issuer that is more likely to conduct SEOs in the future. Different from Grinblatt and Hwang's model, the signaling model from Allen and Faulhaber considers only the degree of underpricing and it assumes that investors continually update their valuation of the firm after the firm goes public. Their model predicts that firms that do not plan to issue seasonal equity should be less underpriced than those that plan to return to the market and issue seasonal equity sooner after the IPO.

Extending the signaling model of Leland and Pyle (1977), Courteau (1995) integrates the lock-up commitment on the part of insiders into the signaling model. Courteau suggests that the length of the lock-up period can be considered as a signaling mechanism that complements ownership retention. Since the cost is too high for low quality firms to imitate high quality firms, issuers would choose the retention level and the lock-up period that provides them with the highest level of expected utility. Courteau's model predicts that higher quality firms are likely to have higher levels of insider retention and commit to longer lockup periods in order to convince investors of their firm value compared to lower quality firms. In addition, Courteau suggests that longer lock-up periods may also be necessary for startup firms.

2.1.2. The Winner's-Curse Hypothesis

Rock (1986) argues that on average, issuers and underwriters underprice new issues in order to compensate uninformed investors for the risk of trading against informed investors. In Rock's model, individuals face an adverse selection problem when they bid for new issues. Since informed investors know the real value of the new issue, they will make their bid only when the issue is underpriced. If the issue were overpriced, only uninformed investors would submit their bids. As a result, uninformed investors will be allocated 100% of what they bid for if the issue is overpriced and a portion of what they bid for if the issue is underpriced. To keep the uninformed investors in the market, the expected return from their allocated shares must be non-negative. Therefore, on average, issuers and underwriters underprice their new issues.

Based on the theory from Rock's model, Carter and Manaster (1990) argue that investors will only acquire information for the most risky IPOs since underpricing for these firms is greater. Their model predicts that low risk IPOs would prefer to reveal their low risk characteristic to investors since low risk firms will attract fewer informed investors than high risk firms. By showing their low risk characteristic, low risk firms can demand a higher offer price for their shares, therefore, suffer less underpricing. One way how low risk firms could show their low risk characteristics is by appointing more reputable underwriters.

2.1.3. Empirical Findings for the Two Theories

Michaely and Shaw (1994) test for both the signaling models and the winner's-curse hypothesis by using a sample with 947 IPOs that went public during the period from 1984 to 1988. In their paper, Michaely and Shaw find no support for the signaling models of Allen and Faulhauber (1989), Welch (1989), and Grinblatt and Hwang (1989). They suggest that IPO underpricing does not act as a signal for the underlying IPO quality or as a good prediction for future dividends and earnings announcements. In addition, they find that firms with a higher degree of underpricing are less likely go to the re-issuing market, which is contrary to Allen and Faulhaber's (1989) prediction. They do not find the insider retention variable to be significantly related to underpricing even after controlling for variance. Michaley and Shaw use the unique feature of master limited partnerships (MLP[5]) to test Rock's winner's-curse hypothesis. They suggest that as MLPs are not attractive to the institutional investor, which acts as a proxy for informed investors, the information disadvantage of the uninformed investor in the regular corporate IPO market should be minimized in the MLP IPO market. They find that there is no significant underpricing in the MLP group compared to an average 4.5% underpricing for the matched non-MLP group even though the MLP group is not less risky than the non-MLP group. Michaley and Shaw conclude that when the winner's-curse problem does not exist, there is no need for the issuer to underprice the new issue.

[5] See Michaely and Shaw (1994) for a detailed description of the distinctive characteristics of MLPs.

2.2 *Third-party Certification Hypothesis*

As an extension of the signaling hypothesis and the winners'-curse hypothesis, researchers have also developed models to analyze how the presence of third parties help in reducing the information asymmetry problem between the issuer and the IPO investor. Titman and Trueman (1986) develop a model to show how the issuer communicates the inside information to investors by choosing auditors[6] with different quality levels. The basic result from their model is that issuers with favorable information are willing to pay more for the high quality auditor to reveal the favorable information to outside investors. However, issuers with less favorable information would not pay a high fee for hiring the high quality auditor since a high quality auditor would reveal the unfavorable information to the public to protect its reputation.

Beatty and Ritter (1986) create a model based on Rock's (1986) winner's-curse hypothesis to analyze the degree of underpricing and the reputation of the investment banker. Beatty and Ritter (1986) argue that the expected new issue underpricing is positively related to the aftermarket uncertainty of the new issue. They also argue that underwriters would not underprice the new issues too much or too little since by doing that they would face the potential loss of clients from the issuer or investor side respectively. Also based on Rock's model, Carter and Manaster (1990) develop a model to analyze the relationship between the price uncertainty of new issues and the reputation of the leading underwriters. Their model suggests that firms with less aftermarket price uncertainty would contract with prestigious underwriters and prestigious underwriters will only market low dispersion firms.

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[6] Titman and Trueman (1986) suggest that their model could also be applied to the choice of investment banker and other outsiders.

2.2.1. Empirical Findings for the Certification Hypothesis

By using a sample IPO data set from 1977 to 1982, Beatty and Ritter (1986) find evidence that the ex ante uncertainty about the offer price of an issuing firm is positive related to its expected underpricing. They also find evidence that investment bankers enforce the underpricing equilibrium even though the relation is noisy.

Carter and Manaster (1990) construct their own investment banker prestige ranking system based on the position of the investment bankers on tombstone announcements[7]. They use this unique ranking as a proxy for the reputation of investment bankers. They find that the price run-up, which is the difference between the offer price and the closing bid price two weeks after the IPO, and the deviation of price run-up were higher for IPOs handled by less prestigious underwriters. According to Carter and Manaster, the reputation variable provides more explanatory power than any other variable in the regressions. They interpret their findings as mutual demand from both the issuers' side and the underwriters' side. On one hand, low risk firms demand prestigious investment bankers to reveal their low risk characteristics. On the other hand, prestigious investment bankers only underwrite low risk IPOs in order to maintain their reputation.

Different from Carter and Manaster (1990), Michaely and Shaw (1994) use the market capitalization of the investment bankers as the proxy for the reputation and the first day price run-up as a proxy for underpricing. Consistent with the finding of Carter and Manaster (1990), Michaely and Shaw also find that the IPOs underwritten by prestigious investment bankers experience a smaller initial price run-up compared to their peer group. In addition, they form an initial return matrix that is categorized by size and

[7] See Carter and Manaster (1990) for details.

underwriters' prestige to perform a detailed comparison test. Their findings show three phenomena. First, the offering size is positively related to the reputation of the investment banker. Second, the initial price run-up is negatively related to the reputation of the investment banker. Third, the initial price run-up decreases as the offering size increases. However, they find that the relationship between size and price run-up only holds for the IPO group issued by the least reputable investment bankers. From that matrix, they also find that the negative relation between the price run-up and the prestige of the investment banker is not significant in the largest size IPO quintile. They explain this with the fact that distribution of larger issuers demands a bigger effort from underwiters; therefore, larger IPOs have to be underpriced more.

Using a sample of 1,192 IPOs from 1977 to 1988, Wolfe, Cooperman, and Ferris (1994) conduct an empirical study on the effect of offering characteristics and market conditions on the probability of a prestigious investment banker's decision to participate in an IPO. They find that in an environment with stable market conditions and less volatile interest rates, prestigious underwriters are more likely to participate in an IPO. In addition, they find that prestigious investment bankers are more likely to underwrite larger, less risky offerings. These findings are consistent with the hypotheses that suggest that market conditions and offering characteristics are important determinants of a prestigious underwriter's decision to underwrite an IPO.

As an extension to the third-party certification study for the IPO market, Megginson and Weiss (1991) conduct an empirical study to examine whether the certification provided by venture capitalists could substitute and complement the certification provided by prestigious auditors and investment bankers. By employing a

matched pairs methodology, they find that VC-backed IPOs experience less underpricing and pay lower underwriting fees. They suggest that the certification provided by venture capitalists could help to reduce the uncertainty involved in the IPO; hence, reduce the compensation paid to the auditor and the underwriter. They believe venture capitalists could share the certification function of the investment bankers and the auditors because venture capitalists must maintain their reputation in order to access the public capital markets and to attract entrepreneurial firms for investment in the future. In addition, they also find that VC-backed firms are able to attract more prestigious investment bankers and auditors.

A more recent empirical study that was conducted by Cai and Keasey (2000) examines the Dotcom IPOs on the NASDAQ during 1998 and 1999. They find that during their study period, Dotcom IPOs are underpriced by 50.36% on average[8]. They suggest that the empirical results from their study support Titman and Trueman's (1986) hypothesis that firm value is an increasing function of investment banker quality and Welch's (1989) signaling arguments that high quality firms underprice on IPO in order to obtain a higher price at a seasoned offering. They also argue that the asymmetric information explanations, which are suggested by Beatty and Ritter (1986), for IPO underpricing are not supported by their data.

[8] Underpricing here is calculated as the percentage difference between the offer prices and the market prices at the close of the first trading day.

2.3 The "Hot Issue" Market

Ritter (1984) studies the "Hot Issue" market of 1980. He finds that the average initial price run-up on unseasoned new issues from January 1980 to March 1981 was 48.4% compared to 16.3% during the rest of the 1977 to 1982 period. He suggests that i) the high average initial returns during the hot issue market of 1980 are associated with extremely high underpricing of natural resource issues and ii) excluding such a "Hot Issue" period, natural resource issues have the same relation between risk and expected return as non-natural resource issues. His finding cannot be completely explained by Rock's model, which suggests that the initial price run-up is only associated with the uncertainty of the IPOs' aftermarket price movement.

To explain this extraordinary phenomenon, Ritter creates three alternative hypotheses: i) the institutional lag hypothesis, which assumes that the underpricing is due to the market quickly rising after the offer price was set in an early stage in the process of going public; ii) the speculative bubble hypothesis, which assumes the high price run-up resulted from speculative excesses in the aftermarket; iii) the monopsony power hypothesis, which assumes that underwriters intended to underprice the natural resource issues for profits by allocating these issues only to their favored customers. The monopsony power hypothesis implies that the offer prices were set "too low" in relation to the valuations of other securities. He finds no evidence for either the institutional lag hypothesis or the speculative bubble hypothesis. However, his study suggests that during the hot issue market of 1980, underwriters were underpricing natural resource issues far more than they had to, which is consistent with the monopsony power hypothesis.

3. Hypotheses

In this section, the hypotheses for the three research questions are developed. The testable implications and the proxy variables associated with each hypothesis are also presented.

3.1. Certification Hypothesis

Researchers have conducted various theoretical and empirical studies on IPO underpricing based on the signaling and winner's-curse hypotheses. Empirical results are generally consistent with the winner's-curse hypothesis[9], though some studies find partial support for the signaling theories[10]. One variable that has been found to be consistently negatively related to the degree of underpricing is the reputation of investment bankers[11]. Titman and Trueman (1986) argue that the quality of the investment banker and the auditor can serve to certify the information provided by the issuer. This certification is valuable to the issuer since it helps in reducing the information asymmetry between the issuer and the outside investor. Titman and Trueman (1986) suggest that investment bankers' credibility in providing such certification services is different depending on their reputation. The first hypothesis tested in this study can, thus, be formally stated as follows:

Hypothesis 1: *Consistent with previous work, I hypothesize that IPOs underwritten by prestigious investment bankers will be less underpriced than IPOs underwritten by less prestigious investment bankers, during the "NASDAQ Bubble" era.*

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[9] See Michaely and Shaw (1994).
[10] See Jegadeesh, Weinstein, and Welch (1993).
[11] See Carter and Manaster (1990).

3.2. Risk Sharing Hypothesis

As an extension to Titman and Trueman's certification hypothesis, I argue that before an investment banker decides to risk its reputation in undertaking an IPO project, he should have assessed the risk and reward from the project. It is reasonable to assume that an investment banker will take an IPO project only if the reward-risk relationship is favorable. As Ritter (1984) points out, the measure of risk in the IPO process is not the systematic beta-type risk, but the uncertainty about the aftermarket price of the new issue. The reward, on the other hand, comes mainly from the underwriting fees and increased reputation capital if the issue is correctly priced. Then, "How does an investment banker identifies the risk level of an IPO candidate?" becomes an interesting question.

Carter and Manaster (1990) suggest that low risk firms demand prestigious investment bankers to reveal their low risk characteristics; and prestigious investment bankers only underwrite low risk IPOs in order to maintain their reputation. I argue that it is relatively easy for issuing firms to identify the prestige levels of the underwriters since the historical performance and the size of the investment bankers can be easily observed. However, it is far more difficult for investment bankers to assess the risk level of the IPO candidates since there is little financial and operating information available for the firms, especially for start-up firms, and the market demand for the new issues can also change significantly over short periods of time. One way the investment banker can obtain useful firm specific information is by communicating with insiders and *make themselves as insiders*[12]. Nonetheless, the information provided by insiders might not be true since insiders tend to provide only good information in exchanging for a higher offer price. Another way the investment banker can distinguish the risk level of an IPO

[12] See Booth and Smith (1986).

candidate is through analyzing the financial and operating information that is provided by the IPO candidate, as well as the changing market conditions on the specific industry. A related study by Wolfe, Cooperman, and Ferris (1994) uses the offering size and price volatility during the first twenty trading days as proxies for IPO risk, and the average return on the market, the standard deviation of returns on the market, the average of the two-year constant-maturity T-Note rate, and the standard deviation of changes in the two-year T-Note rate as proxies for market and interest rate conditions.

Different from Wolfe, Cooperman, and Ferris' (1994) methodology, I argue that an investment banker would consider the risk sharing and firm specific characteristics in assessing the risk level of an IPO candidate. I use the participation of third-party investors and their ownership as proxies for risk sharing characteristics. As third-party certification hypothesis suggests, the presence of third-party investors should signal positive future prospects of the issue, thus reducing the uncertainty about the aftermarket price. Therefore, the higher the number of third parties invested in the IPO candidate before it goes public, the less is the uncertainty of the underlying IPO candidate. Firm specific characteristics include those factors that might help investment bankers and investors evaluate the aftermarket price of the issuing firm and can be observed from an IPO company's financial statements or other publicly available sources.

Even though information on third parties and firm specific characteristics is available to all investment bankers, more prestigious investment bankers are likely to be more successful in choosing those IPOs that satisfy their requirements because of their higher reputation ranking. The second hypothesis tested is thus:

Hypothesis 2: *IPOs with a greater participation from third parties will be associated with more reputable investment bankers.*

3.2.1 Discussion of Risk Sharing Characteristics

Without the certification from third parties, the credibility of an entrepreneur's claim to the value of his/her firm is weak. Third-party certification will only occur if it is willing to invest its reputation, and/or its capital, and/or its management effort into the project. As a result, I argue that not only the investment banker and the auditor, but also third-party investors who provide funds and/or management efforts to the IPO candidate are able to provide such certification. They would like to provide such certification only if they are satisfied with the combination of return and risk of such projects. Because third-party investors normally take positions in the issuing firm before the firm approaches an investment banker for IPO services, the number of third-party investors and their percentage holdings in the controlling firm could serve as two proxies for the risk level they are willing to take in such an IPO project. By reading these two proxies, the investment banker and the auditor are able to find useful information for assessing the risk level of the issuing firm. I expect that the number of third-party investors and their percentage holdings in the controlling firm should be positively related to the proportion of risk they would be willing to share; therefore, the higher the number of third-party investors and their percentage holdings, the more attractive the issuing firm to prestigious investment bankers.

In this study, I consider venture capitalists, corporate investors, and institutional investors as three proxies for third-party investors.

a) The Venture Capitalist

Venture capitalists generally put their interest in on start-up and growth companies. Barry et al (1990) argue that venture capitalists often take significant equity positions in the companies and participate directly in the management, typically one or more serve on the company's board of directors. Like investment bankers, venture capitalists are also active in the IPO market. The presence of venture capitalists is expected to reduce the aftermarket uncertainty of the IPO candidate.

Because the presence of venture capitalists could reduce part of the costs that the investment banker must encounter to investigate and evaluate a newly IPO issuing firm, with other conditions being the same, the VC-backed IPO candidates should be more attractive to prestigious investment bankers. Megginson and Weiss (1991) find that the presence of venture capitalists helps the issuing firms to maximize the net proceeds from the IPO by reducing underpricing and direct costs. Specifically, they document that VC backing reduces the mean and median degree of IPO underpricing and that such backing significantly reduces the underwriting spread charged by the investment banker handling the issue. Their finding suggests that the financial capital, managerial and technical expertise, and enhanced access to other financial specialists make venture capitalists one of the best third-party certifiers for the quality of the IPO candidates. By comparing two size-matched sample groups, they claim that IPOs backed by venture capitalists are able to attract more prestigious auditors and underwriters than non-VC-backed IPOs.

During the "NASDAQ Bubble" period, the role of the venture capitalists in the IPO firms, especially high-tech IPO firms, should be more important than during other periods. Barry, Muscarella, Peavy, and Vetsuypens (1990) suggests that a venture-capital

provider often specializes in a particular industry and uses its industry contacts to help the company recruit key employees to assist in production, to line up suppliers, and to develop customer relations.

b) The Corporate Investor

There are few previous studies that pay attention to the certification and monitoring role of corporate investors. Corporate investors mainly invest in their suppliers, their customers, or other industries where they want to diversify their businesses. In some cases, two or more corporations may join to create a new firm and take it to the public. Unlike the venture capitalists, who consider the investment as their core business, corporate investors normally own businesses other than purely investing, and the majority of their investments focus on their main industry. To the investors and the investment bankers, the corporate investor provides certification for the IPO candidate even though the credibility is not as strong as that provided by the venture capitalists. A major reason is that the corporate investor is not as active as the venture capitalists in the IPO market. They might make one-time profits and leave the market since they build their reputations based on their core businesses but not on the performance of their investments in other firms. However, like venture capitalists, corporate investors also provide funds, managerial and technical expertise to help the new firm, and most of them take seats on the board of the new firm. Without careful assessment, corporate investors would not make their investments because these efforts are also costly to them. As a result, a presence of corporate investors is expected to reduce the project-related uncertainties and help the investment banker better evaluate the

prospects of the IPO candidate; therefore, such IPOs should attract more prestigious investment bankers.

c) The Institutional Investor

The participation of the institutional investors in the pre-IPO stage should be rare since the investment policies of most mutual funds and pension funds restrict them from investing in non-publicly traded securities due to the liquidity risk. However, if an IPO has institutional investors on board, it should be considered low risk as the institutional investors should be more conservative than the venture capitalists and corporate investors. Like the venture capitalists, the institutional investors maintain strong relationships with the investment bankers because the institutional investors are very active in the capital markets. With such connections, an IPO with a presence of institutional investors should attract more reputable investment bankers.

3.2.2 Discussion of Firm Specific Characteristics

a) The Offering Size

Wolfe, Cooperman, and Ferris (1994), use the offering size of the IPO as an important measure of the pricing risk of the underlying new issues. First, IPOs with large offering sizes can help underwriters to get attention from large institutional investors. In practice, large institutional investors, such as pension plans, insurance companies, and mutual funds, would avoid taking positions in a IPO company with a small amount of shares outstanding because the large amount of their investment will make them become significant shareholders, who, if they hold more than 5% of total shares outstanding, are

required to report their transactions to the SEC. In addition, IPOs with larger offering sizes are expected to have more shares outstanding and more liquidity than IPOs with smaller offering size in aftermarket trading. Less liquidity risk should further encourage investors, especially large institutional investors, to invest in large issues. Second, larger IPOs are generally issued by larger and better-established companies, which tend to have less operating and financing risk as well as more information available to the public. Therefore, underwriters can more easily and more accurately price a large issue compared to a small issue. Finally, as it is easy for the lead underwriter to ally itself with other investment bankers to form a syndication to market a large issue, the distribution risk and the risk from overpricing could be diversified.

Offering size is calculated as the product of the offer price and the number of shares to be issued. It is expected that more reputable investment bankers are more likely to associate with larger IPOs than those of less reputable investment bankers.

b) Tech IPOs versus non-Tech IPOs

In general, the valuation of tech IPOs is more complicated due to higher intangible assets and a rapid product cycles inherent in tech industries than the valuation of non-tech IPOs. This complication increases the uncertainty of the aftermarket prices of tech IPOs. Even in the long run, the value of intangible assets would be more volatile due to new products or patents being introduced by competitors than the value of tangible assets. Thus, holding all else the same, more reputable investment bankers are expected to avoid tech IPOs in a normal stock market environment.

Ritter (1984) finds that, during the hot issue market in 1980, underwriters underpriced natural resource issues far more than they had to. Because the underwriters could exercise their allocation options and give more underpriced shares to their favored customers, this incentive might change the risk tolerance level of the reputable investment bankers to attract more institutional investors. In Ritter's study, he did not find any evidence that such an incentive could convince prestigious investment bankers to underwrite small and risky natural resource IPOs. However, given larger offering tech IPOs that went public and the market valuation of tech stocks that is extremely high during my study period, I argue that the potential high underpricing of tech IPOs would be more than enough to compensate prestigious investment bankers for the risk of marketing tech IPOs. Therefore, more reputable investment bankers might prefer tech IPOs to non-tech IPOs during my study period than earlier periods because higher underwriting profits and lower overpricing risk are at stake.

3.2.3. External Market Condition Variables

Wolfe, Cooperman, and Ferris (1994) suggest that changing external conditions, such as market and interest rate volatilities, could influence the market valuation of new issues and create unanticipated price movements on, and/or after the offering date. As a result, the investment banker could bear a higher pricing risk if the market is volatile. They predict that prestigious investment bankers are most unlikely to participate in an IPO during such a volatile environment.

Following the methodology used by Wolfe et al, I include the following variables to proxy for external market conditions that could influence the investment bankers in deciding whether to participate in an IPO or not.

- Buy-and-hold return of the NASDAQ stock index for a period of one year preceding the offering.
- Standard deviation (proxy for market volatility) of the NASDAQ stock index six months preceding the offering.
- Number of IPOs during the six months prior to the offering to proxy for the market demand for new issues.
- Average underpricing of IPOs that went public in the six months prior to the current offering.

As suggested by Wolfe et al., I expect that prestigious investment bankers would most likely participate in a new issue market if the stock market is rising; however, it should be less likely that a prestigious investment banker would market a new issue if the market volatility is high. In addition, I predict that prestigious investment bankers will be more willing to participate in an IPO if the market demand for the new issue and the average underpricing are high during the time they decide whether to market an issue.

3.3. Issue Costs Hypothesis

As noted previously, Carter and Manaster (1990) and Michaely and Shaw (1994) find that underpricing is negatively related with the prestige of the underwriters. Carter and Manaster (1990) suggest that prestigious underwriters charge higher fees than the non-prestigious underwriters. However, prestigious underwriters are able to offer their low risk corporate clients relatively less underpricing. Titman and Trueman (1986) also suggest that firms with lower uncertainty of aftermarket prices would find it worthwhile to use more prestigious underwriters because prestigious underwriters can more precisely reveal the low risk characteristics of the issuing firms. In this paper, I argue that IPOs underwritten by prestigious underwriters are more likely to reduce IPO signaling costs than those underwritten by less prestigious underwriters.

The signaling hypothesis suggests that low risk and high quality firms are able to use costly signals to reveal the true value of the issues to the outside investors. However, their signals are not credible unless they hire more reputable investment bankers and auditors to certify their signals. I argue that even though the risk level and the quality of the new issue could be inferred by investors from both signals and the reputation of the underwriter, the reputation variable should dominate the signaling variables because of two reasons. First, the signal might not necessarily represent the prospects of insiders. Under continually changing market conditions, insiders might relatively change their holdings or the expected offer price, which could add noise to the signals. In contrast, investors are able to more easily infer the risk and quality of the new issue directly from the reputation of the underwriter as the historical performance of the investment banker is there to be tracked. Second, the reputation of the investment banker is backed by his years of outstanding performance. In contrast, some firms do not return to the market

after their IPO, which makes their signals less credible than those provided by the investment banker[13]. In addition, before the investment banker chooses to market a new issue, its experts spend time to acquire and analyze various firm and market specific information in order to value the firm[14]. Therefore, I expect that investors should rely more on the reputation of investment bankers to evaluate their IPO investment decisions instead of taking their time to analyze the noisy firm signals by themselves.

I argue that even though an issuer has to pay a higher underwriting charges for using a more reputable investment banker, it should be able to reduce the signaling costs related to the IPO. As long as the overall cost savings exceed the increased underwriting charges, most issuers would choose a more reputable underwriter provided that the underwriting firm is willing to market the issue. The investment bankers will impose various levels of direct and indirect costs to the IPO candidates with different risk levels. Their willingness to underwrite an IPO is conditional on whether the combination of underwriting return and protection of their reputation is greater than the potential risk of the specific underwriting contract.

As a result, I expect those IPOs that are underwritten by more reputable underwriters should be able to reduce their issuing costs except the underwriting fees. The proxies used in this paper for those signaling costs include insider retention, length of the lock-up period, and the degree of underpricing.

Hypothesis 3: *IPOs underwritten by more reputable investment bankers will be associated with lower signaling costs, such as underpricing, length of the lock-up period and retention by insiders.*

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[13] Beatty and Ritter (1986) argue that an issuing firm, which will go public only once, can not make a credible commitment by itself that the offer price is below the expected market price once it starts trading.
[14] Booth and Smith (1986) suggest that for the underwriter to be able to certify the price of a new issue, it must spend resources to become an insider.

3.3.1 Discussion of Signaling Costs

a) Insider Retention

Insiders include the key decision makers such as entrepreneur, venture capitalists, corporate investors, and institutional investors of the issuing firm. Information on insiders' holdings before and after the IPO can be found from the prospectus under the "Beneficial Shareholders Ownership" section. Insider retention level is the percentage of shares all insiders will retain after the firm goes public. If all insiders do not sell any shares in the IPO (no secondary share offering), the retention level is 100%. The retention level is calculated by dividing the post-IPO number of shares held by all insiders by their pre-IPO holdings.

Using the insider retention ratio to communicate important information of the IPOs to the outsider investors was first studied by Leland and Pyle (1977). Leland and Pyle suggest that a risk-averse entrepreneur could diversify his/her firm-specific risk by making an initial public offering of the firm's share. To convince the outsider investors of the high quality of his/her firm, the owner can send a signal to the market by retaining part of its equity and leave his/her investment portfolio less diversified. This signal is costly for insiders as it prevents the holding of a completely diversified portfolio and exposes the owner to firm-specific risk. As discussed above, insiders are able to replace all or part of this signaling cost by using the services of a more reputable underwriter. Therefore, IPOs underwritten by prestigious investment bankers are more likely to have insider selling and tend to have lower insider retention ratios.

b) Lock-up Period

The lock-up period is the period during which initial shareholders are prohibited from selling their shares in the secondary market starting from the IPO day. The Securities Act of 1933 contains several rules, such as Rule 144, Rule 144(K), and Rule 701, regarding the regulatory minimum holding periods under different circumstances. In practice, issuers generally voluntarily extend the holding period by signing a lock-up agreement with their underwriters. In a general lock-up agreement, the directors, officers and managerial employees of the IPO firm agree not to sell any of their shares, which are purchased prior to the IPO, for an extended period, over and above what the Securities Act required. However, the longer the lock-up period, the higher is the risk that an insider cannot sell his/her shares at the expected price, such as the IPO offer price. Thus, I expect insiders of IPOs underwritten by prestigious investment bankers to be able to reduce their liquidity costs by committing to a shorter lock-up period than IPOs underwritten by less prestigious investment bankers.

A typical lock-up agreement looks as follows.

LOCK-UP AGREEMENTS*

All of our officers and directors and substantially all of our stockholders have signed lock-up agreements under which they agreed not to transfer or dispose of, directly or indirectly, any shares of our common stock or any securities convertible into or exercisable or exchangeable for shares of our common stock, for a period of 180 days after the date of this prospectus. Transfers or dispositions can be made sooner: with the prior written consent of INVESTMENT BANKER; in the case of gifts or estate planning transfers where the donee signs a lock-up agreement; or in the case of distributions to stockholders or affiliates of the stockholders where the recipient signs a lock-up agreement.

* This sample lock-up agreement is copy from Edgar-online.com.

c) Underpricing

Grinblatt and Hwang (1989) and Allen and Faulhaber (1989) argue that underpricing is a credible signal that high quality firms use to distinguish their IPOs from low quality firms, because only high quality firms are able to recover the loss from underpricing by making subsequent equity offerings once a fair market price for the company's stock is established.

Allen and Faulhaber (1989) suggest that underpricing has three advantages over other methods of signaling the firm type. First, underpricing requires no monitoring because the investor is the direct beneficiary. Therefore, issuers with high uncertainty would prefer underpricing over any other information signals that require costly monitoring. Second, underpricing reduces the probability of, and damages in, lawsuits if subsequently the firm does not do well. Third, underpricing may generate publicity for the firm that is more valuable if the firm succeeds than if it fails.

On the other hand, underpricing is costly to the issuers. Underpricing means issuers have to sell their shares at a discount. Using a prestigious investment banker helps to certify the value of the issue. Low risk firms, therefore, are able to reduce the degree of underpricing, holding all else constant. However, for issues that the aftermarket price performance is highly uncertain, a prestigious investment banker will require more underpricing from the issuer in order to compensate for the higher potential risk of damaging their reputation if the issue ends up overpriced. However, if good information is gathered by underwriters from investors during the pre-issue period, the final offer price will be partially adjusted up to reflect the good information[15]. Hanley

[15] Offer price adjustment is the percentage difference between the final offer price and the middle price of initial offering range shows in the preliminary prospectus.

(1993) finds that underwriters prefer to reward investors for truthful revelation of reliable information by an increase in both share allocation and underpricing. Hanley (1993) also finds that larger underwriters are more likely to gather valuable information that affects the final offer price during the waiting period. In my study, I take the tech IPO as a proxy for the high risk IPO. I argue that when tech firms approach prestigious investment bankers, they might be asked to severely underprice their issues to compensate for the underwriting services from prestigious investment bankers. During the waiting period, as reliable information is revealed, issuers and investment bankers may agree to partially adjust the offer price upward. As prestigious investment bankers are more likely to gather valuable information, as Hanley (1993) suggests, I expect that IPOs, especially the tech IPOs, underwritten by prestigious investment bankers, are more likely to have their offer price adjusted upward than other IPOs.

The data and methodology employed to test the three hypotheses outlined in Section 3.1, 3.2 and 3.3 are discussed next in Section 4.

4. Data and Methodology

4.1. Data

In this study, the sample covers all initial public offerings (IPOs) issued from January 1, 1996 through December 31, 2000. The IPO firms are identified from IPODATA.com. From the same data source, I also collect the basic IPO information, such as offering information, financial information, and the use of proceeds. IPODATA.com is a fee based IPO data provider. It provides a HTML format data file for each IPO firm starting from 1994. Additional information such as lock-up period, insider holding, and underwriting information are acquired from EDGAR-ONLINE. By registering as a member, investors are allowed to obtain free electronic IPO prospectuses from EDGAR-ONLINE going back to 1994. However, a company was not mandated by the SEC to submit its prospectuses to EDGAR until 1996. In practice; however, I found that the earliest IPO prospectus available on May 1996. Due to the limitation of the data source, this paper only covers an IPO sample period from May 1996 to December 2000. In addition, for those regressions that involve market condition variables, I use the data starting from November 1996 due to the calculation of six months moving average of number of IPOs and underpricing. To make this sample comparable to previous studies, this final sample contains only firm commitment, non-spin-off, domestic, and non-bank common stock IPOs. The detailed sample screening process is summarized below and the descriptive statistics on selected variables for the 1,355 IPOs that went public between May 1996 and December 2000 is presented in Panel A of Table 1.

Sample Selection Criteria

Total number of IPOs in the raw sample.		2988
Less:	ADRs	172
Less:	Open End Fund	35
Less:	REITs	39
Less:	Bank IPOs (SIC 6000 – SIC 6099)	185
Less:	UNITs	142
Less:	Multi-classic IPOs*	328
Less:	Observations deleted because they do not have data on Edgar-online	693
Less:	Best-efforts IPOs	4
Less:	Observation that do not have data on CRSP	35
Final Sample:		1355

* Firms have more than one class of equity shares outstanding before the IPO.

Similar to Wolfe, Cooperman, and Ferris' (1994) model, this paper also controls for external market conditions. Proxies used in this paper for external market conditions are the average return of the NASDAQ stock index one year preceding the current offering, the standard deviation of the return of the NASDAQ stock six months preceding the current offer as a proxy for market volatility, the number of IPOs six months preceding the current offer, and average underpricing six months preceding the current offer. In order to generate the average number of IPOs and the average underpricing six months preceding the current offer, a moving average method is used and the first six months are involved in the calculation. As a result, for regressions in which I control for external market conditions, the sample only covers November 1996 to December 2000. The number of firms that went public during this period drops to 1,143.

4.1.1 Insider Ownership Information

The insider holding information is obtained from the section called "Principal and Selling Shareholders" from the prospectus. I take the number of shares held by all directors and executive officers as a proxy for insider ownership. Because venture capitalists, corporate investors, and financial institutions might also take seats on a company's board and actively participate in decision making processes, these three kinds of investors should also considered as insiders. As a result, the insider ownership in this study is further divided into three sub-groups: ownership of the venture capitalist, ownership of corporate investors, and ownership of institutional investors in the pre-IPO stage. The ownership of VCs, corporate investors, and institutional investors, is only recorded as insider ownership if they act as the directors and/or executive officers. Venture capitalists are identified if their names appear on the most active venture capitalists list posted by Megginson and Weiss (1991), or their names end with "Venture Capital", "Limited Partnership", or "L.P." Institutional investors are classified by the name ending with "Mutual Fund", "Insurance Company", or "Pension Plan". The rest of the non-individual investors are identified as corporate investors.

4.1.2 Identifying the Tech IPOs

Following the classification method introduced by Field and Hanka (2000), I identify the tech IPOs from my sample data set and assign a dummy of 1 to each tech IPO and 0 for a non-tech IPO. Field and Hanka (2000) define tech firms as those with the primary three digit SIC codes of:

357 – Computer hardware

367 – Electronic component, semiconductor

369 – Miscellaneous Electrical Machinery, Equipment & Supplies

382 – Instruments

384 – Medical Equipment

737 – Computer software

In addition to the above classifications, I introduce two more industries into the tech IPO category. These include:

366 – Communication equipment

481 – Communication services (Which including network service providers)

4.2 Methodology

4.2.1 Reputation Ranking of Investment Bankers

In order to analyze the different characteristics of IPOs underwritten by prestigious and less prestigious investment bankers, this sample is divided into two groups, the more reputable investment banker group and the less reputable investment banker group. Reputation of the investment banker is measured using the ranking list provided by Carter, Dark, and Singh (1998), which is an updated list based on the methodology developed by Carter and Manaster (1990).

The initial Carter-Manaster ranking is based on the tombstone announcements listed in the Investment Dealer's Digest from January 1979 to December 1983. The rankings are determined by examining the tombstone announcement, one at a time, and assigning an integer rank, zero to nine, for each underwriter in the announcement according to its position. As each new announcement is examined, any new underwriters are assigned ranks. If new ranks emerge between underwriters already assigned ranks,

any deposed underwriters move down the scale accordingly. The result is a measure of underwriter prestige on a scale from zero (least prestigious) to nine (most prestigious).

The latest update of the Carter-Manaster ranking was done by Carter, Dark, and Singh (1998). However, for the period from 1999 to 2000, there are new and merged investment banking firms that are not covered in the updated list. To solve this problem, I construct the following identification rules. For merged firms, each of them uses its Carter-Manaster ranking before the merger. After merging together, the new merged brokerage firm takes the higher of the two original ranking as its new ranking. For example, if investment banker *A* ranks 9 before it merged with investment banker *B*, which ranks 8, then the new firm would rank 9. For those investment bankers without ranking information in the ranking list, 1 is assigned to each of them. As suggested by Busaba, Benveniste, and Guo (2001), these firms are mostly small regional investment bankers with limited underwriting experience.

Finally, all IPOs are divided into two groups: the more reputable investment banker group contains those IPOs with investment bankers' reputation ranking equal to or higher than 7. The rest of firms in the sample data set are listed in the less reputable investment banker subgroup. A summary of the dispersion of each group is shown in Panel A of Table 2.

4.2.2 Linear Regression Model

Three general forms of multiple linear regressions are used to test the hypotheses. The dependent variable in all regressions is the reputation ranking of the investment banker. The first regression uses the degree of underpricing as the independent variable

to test if the negative relation between the underpricing and the prestige of the underwriter still held during the "NASDAQ Bubble" period. The size and industry factors as well as the presence of venture capitalist are controlled for in this regression.

Regression 1.

Rank = $\alpha + \beta_1 Underpricing + \beta_2 VCdum + \beta_3 Logsize + \beta_4 Tech + \varepsilon_i$

where

Underprice	=	Percentage price difference between the offer price and the closing price of the first trading date.
VCdum	=	Dummy variable. 1 for VC-backed IPOs, 0 for non-VC backed IPOs.
Logsize	=	logarithmic expected amount of offering.
Tech	=	Dummy variable. 1 for tech IPOs and 0 for non-tech IPOs.

Underprice is expected to be negatively related to the prestige of the underwriter. The sign of **VCdum** as well as the logarithmic offering size (**Logsize**) are also expected to be positive. In contrast, **Tech** is expected to be negatively related to the reputation ranking of the lead underwriter.

The second regression uses independent variables related to the actual number of venture capitalists, corporate and institutional investors and their percentage holdings prior to the IPO.

Regression 2.

$$\text{Rank} = \alpha + \beta_1 VC + \beta_2 VCPer + \beta_3 Corp + \beta_4 CorpPer + \beta_5 Inst + \beta_6 InstPer + \beta_7 Logsize + \beta_8 Tech + \beta_9 MarR + \beta_{10} MarV + \beta_{11} NoIPO + \beta_{12} AUprice + \varepsilon_i$$

where

VC	=	Number of venture capitalist invested in the firm before the IPO.
VCPer	=	Percentage of shares held by all venture capitalists, 0 for non-VC backed IPOs.
Corp	=	Number of corporate investors invested in the firm before its IPO.
CorpPer	=	Percentage of shares held by all corporate investors, 0 for IPOs without corporate investors.
Inst	=	Number of institutional investors invested in the firm before its IPO.
InstPer	=	Percentage of shares held by all institutional investors, 0 for IPOs without institutional investors.
MarR	=	The average return of NASDAQ stock index one year preceding the current offer.
MarV	=	The standard deviation of the return of the NASDAQ stock index six months preceding the current offer.
NoIPO	=	Number of IPOs six months preceding the current offer.
Auprice	=	Average underpricing six months preceding the current offer.

As discussed previously, insider ownership variables, which include **VC, VCPer, Corp, CorpPer, Inst, InstPer**, are expected to be positively related to the reputation ranking of the lead underwriter. For the market condition variables, I expect the sign of **MarR** and **NoIPO** to be positive and the sign of **MarV** and **Auprice** to be negative.

The third regression uses independent variables related to the percentage of shares retained by the different groups of investors.

Regression 3.

$$\text{Rank} = \alpha + \beta_1\text{Insideret} + \beta_2\text{VCret} + \beta_3\text{Corpret} + \beta_4\text{Instret} + \beta_5\text{Underprice} + \beta_6\text{Adjustup} + \beta_7\text{Lockup} + \beta_8\text{Logsize} + \beta_9\text{Tech} + \beta_{10}\text{MarR} + \beta_{11}\text{MarV} + \beta_{12}\text{NoIPO} + \beta_{13}\text{AUprice} + \varepsilon_i$$

where

Insideret	=	Percentage of shares retained by all insiders.
VCret	=	Percentage of shares retained by venture capitalists.
Corpret	=	Percentage of shares retained by corporate investors.
Instret	=	Percentage of shares retained by institutional investors.
Adjustup	=	Percentage of the difference between the offer price and the expected offer price, which is the middle price of the initial offer range.
Lockup	=	Length of the Lock-up period.

Under the third hypothesis, predictor **Adjustup** is expected to be positively related to the reputation ranking of the lead underwriter. **Insideret, VCret, Corpret, Instret, Underprice**, and **Lockup** are all expected to be negatively related to the Rank. However, by controlling for the **Tech** variable, **Underprice** and **Adjustup** are expected to be positively related to the reputation ranking of the investment banker.

5. Empirical Findings

5.1. Empirical Findings for Hypothesis 1

The mean comparison result in Panel B of Table 2 is contrary to the previous findings (Carter and Manaster (1990) and Michaely and Shaw (1994)). The average underpricing for IPOs underwritten by prestigious investment bankers is 47.89%, which is significantly higher than the corresponding value of 13.83% for IPOs underwritten by the less reputable investment banker subgroup during the NASDAQ Bubble period. In addition, within the more reputable investment banker subgroup, underpricing for IPOs backed by venture capital is significantly greater than it is for non-VC-backed IPOs. The degree of underpricing for VC-backed and non-VC-backed IPOs is not significantly different within the less reputable investment banker subgroup. For IPOs backed by venture capitalists, the average underpricing for those that belong to the more reputable investment banker subgroup is significantly higher than for those that belong to the less reputable investment banker subgroup. This result suggests that prestigious investment bankers underprice IPOs that were VC-backed more compared to IPOs than were not VC-backed IPOs. However, IPOs underwritten by less prestigious investment bankers are less underpriced and there is no significant difference whether it is a VC-backed or non-VC-backed IPO.

In Panel C, the result of Model 1 confirms that the degree of underpricing is significantly positively related to the reputation ranking of the underwriter. By controlling for the VC dummy in Model 2 and the Tech dummy in Model 3, similar results as in Model 1 are obtained. However, after controlling for firm size, measured by Log(size), in Models 4, 6 and 7, the degree of underpricing is no longer significant. It

suggests that within the same size range, the degree of underpricing is not determined by who the underwriter is, but rather whether the IPO is backed by a venture capitalist or not. These results are in striking contrast to the results documented in the literature with regard to the certification role of the reputation of the investment banker and the backing by a venture capitalist. The results reported here suggest that the certification hypothesis did not hold in the "NASDAQ Bubble" period.

5.2. Empirical Findings for Hypothesis 2

5.2.1 Mean Comparison Results

The mean comparison results of selected variables between the more reputable investment banker subgroup and the less reputable investment banker subgroup are presented in Panel A of Table 3.

As predicted, the percentage of IPOs with venture capitalists and corporate investors is significantly higher in the more reputable investment banker subgroup. There is no significant difference for the percentage of IPOs with institutional investors between the more reputable and less reputable investment banker subgroups. For IPOs with each third-party investor, the percentage of holding owned by venture capitalist for VC-backed IPOs is significantly higher for the more reputable investment banker subgroup. This result is consistent with the finding by Megginson and Weiss (1991) who suggest that the certification service provided by the venture capitalist could reduce the uncertainty of IPOs and attract more reputable investment bankers. The difference in the percentage holdings owned by corporate investors for IPOs with corporate investors between the two groups is insignificant. Even though the difference of percentage holdings owned by institutional investors for IPOs with institutional investors is opposite to my prediction, I argue that the presence of institutional investors in an IPO at the pre-IPO stage is relative uncommon, only 9.2% in this study, compared to that for the venture capitalists. Hence, after controlling for the other two third-party investor variables (venture capitalists and corporate investors), it is not surprising that it is not significant. Due to the small number of institutional investor participation, we have only six IPOs

where all three third-party investors are present in the less reputable investment banker subgroup and 42 in the other group.

The average offering size for the IPOs underwritten by more reputable investment bankers is found to be significantly greater than that for IPOs underwritten by less reputable investment bankers. This result is consistent with my prediction that large size IPOs are more attractive to the reputable investment bankers.

The percentage of tech IPOs in the more reputable investment banker subgroup is significantly larger than that of the comparison group. This result, though in conflict with the argument that more reputable investment bankers more likely market low risk IPOs to protect their reputation (Carter and Manaster (1990)), perhaps can be justified if we consider that the overpricing risk was relatively small for tech IPOs in the NASDAQ Bubble period.

5.2.2 Linear Regression Analysis

Panel B of Table 3 reports the correlation matrix of market condition variables, which are similar to those used by Wolfe, Cooperman, and Ferris (1994). Four market condition variables are highly positively correlated except that the market volatility and the number of IPOs six months preceding the IPO, which is significantly negatively correlated. The regression results of the reputation ranking of investment bankers on selected control variables are reported in Panel C. Among them, size, industry and average underpricing six months preceding the IPO, variables are significantly positively related to the reputation of the underwriter. As the correlation matrix suggests, the number of IPOs six month preceding the IPO is significantly negatively related to the

reputation of the investment banker. However, in the cross-sectional OLS regression, the market condition variables are not significant when size and industry variables are present. The high degree of collinearity between the market condition variables is also a reason for the inflation in R-square in the regression when they are included.

Panel D of Table 3 shows the regression of reputation of underwriter on the dummy variables for whether the third-party investor is present or not as well as the control variables. Without the presence of control variables, the VC and Corporate dummy variables are significantly positively related to the reputation ranking of the underwriter. By controlling for size, industry and market condition variables, only the VC dummy is significant. It suggests that more prestigious investment bankers were most likely underwriting and severely underpricing VC-backed IPOs during the "NASDAQ Bubble" period.

Regression results also suggest that the offering size is the most attractive characteristic the investment banker would consider when it goes for an IPO candidate. To further control for the size effect, I divide the entire data set equally into larger and smaller size groups. Similar regression models are estimated for each group and the results are posted in Panels A and B of Table 4, respectively.

The regression results for the two panels are significantly different. For the larger size IPOs subgroup, none of the third-party variables are significant except the institutional dummy, which is marginally negatively significantly related to the reputation of the underwriter. The VC dummy is no longer significant. In contrast, the VC dummy and the percentage of VC holding for VC-backed IPOs are both positively significantly related to the reputation of the underwriter across all regression models in the smaller size

sample group. In addition, the percentage of corporate investors' holding for IPOs with corporate investors is marginally positively significant after controlling for industry and market condition variables. The results suggest that since larger offering size IPOs are more likely to attract more attention from investors and are also more likely well established before they go public, the potential short-term and long-term risk for larger size IPOs are relatively smaller than those for smaller offering size IPOs. As a result, underwriters for larger offering size IPOs might rely less on the risk sharing mechanism from the third-party investors compared to those underwriters for smaller offering size IPOs. My results more robustly test the findings of Megginson and Weiss (1991) and give a more detailed analysis for the risk sharing roles of third-party investors in different size groups.

5.3 Empirical Finding for Hypothesis 3

5.3.1 Mean Comparison Results

Contrary to my prediction, Panel A of Table 5 shows that the percentage of shares retained by all insiders as well as each third-party investor is not significantly different between the more reputable investment banker group and the less reputable investment banker group except those IPOs backed by venture capital. It is possible that risk sharing and certification efforts from third-party investors even for the more reputable investment bankers may be more valuable for smaller IPOs compared to larger IPOs. If this is true, the third-party retention ratios should be significantly related to investment banker reputation for the smaller offering size group but not for the larger offering size group. As subsequent cross-sectional tests show, this is true.

As discussed earlier, the average underpricing for IPOs underwritten by prestigious investment bankers is significantly higher than for IPOs underwritten by the less reputable investment banker subgroup. However, I find that for the more reputable investment banker subgroup, on average, the final offer price is 2.691% higher than the expected (or initial) offer price. In contrast, it is –3.868% for IPOs in the less reputable investment banker subgroup. Thus, even after the offer price is adjusted up, IPOs belonging to the more reputable investment banker group are underpriced more. This result is consistent with Hanley's (1993) finding which suggests that issuers can manage to reclaim part of the underpricing after investment bankers gather good information from investors. In addition, consistent with my prediction, the lock-up period for IPOs underwritten by more reputable investment bankers is significantly shorter than for IPOs underwritten by less reputable investment bankers.

In the same panel, as predicted, the lock-up period for IPOs in the more reputable investment banker subgroup is significantly shorter than that for IPOs in the lower reputable investment banker subgroup. It suggests that by using a more reputable investment banker, firms can reduce their lock-up period, which is costly to the shareholders since they cannot sell their shares and diversify their portfolio within the lock-up period.

5.3.2 Linear Regression Analysis

Panel B of Table 5 shows that without controlling for other variables, among insiders retention and retention of all third-party investors, only the VC retention for VC backed IPOs is marginally positively significantly related to the reputation of the investment banker. Similar to the results documented earlier in the mean comparison table, the degree of underpricing and pre-IPO offer price adjustment is significantly positively related to the reputation of the investment banker. In addition, the lock-up period is found to be significantly negatively related to the reputation ranking of the investment banker, as is predicted.

Panel C shows the regression results for selected variables by controlling for Logsize, the Tech dummy, and market condition variables. Among three third-party investors, the retention of venture capitalists is still marginally positively significant, while for corporate investors, I find a significant negative sign as expected. It suggests that corporate investors are more likely to sell more of their holdings while venture capitalists sell fewer of their holdings as the reputation of the investment banker increases. In contrast, the degree of underpricing and price adjustment are no longer

significant after controlling for size, industry and market condition variables. The lock-up period is still negatively significantly related to the reputation of the underwriter with the presence of the control variables. It suggests that with a similar offering size and within a similar risk level industry, investors in IPOs underwritten by prestigious investment bankers tend to commit to withhold their shares for a shorter period.

In the cross-sectional regression model, retention ratios for all third-party investors are insignificant as well as the degree of underpricing. The lock-up period is still negatively significant as before. However, the price adjustment preceding the IPO is now marginally negatively related to the reputation of the investment banker. This result is contrary to my prediction. Overall, results from Panel C of Table 5 are mixed. There is no consistent evidence that insiders as well as third-party investors are able to reduce their holdings, which is considered as cost related to the IPO, by using the service from more reputable investment bankers. There is no evidence that IPOs underwritten by more reputable investment bankers can reduce underpricing cost. However, the result does suggest that IPOs underwritten by more prestigious investment bankers are able to shorten the lock-up period This is partially consistent with Courteau's (1995) optimal structure of insider retention and retention commitment hypothesis. In addition, tech IPOs are found to be severely underpriced if they are underwritten by more reputable investment bankers.

Using the same method as in Hypothesis 2, I re-run the regression of the reputation of investment bankers on the signaling cost variables for the two different size subgroups. Significant differences are found between the results for the two groups. First, in the smaller offering size group, signs of all the retention variables for insiders are

negative with the retention for corporate investors being significantly negatively related to the reputation of the investment banker. In the larger size group, the sign of retention of venture capitalist is positive but none of them is significant. It suggests that smaller offering size IPOs are more likely to reduce the signaling costs by using the service from more prestigious investment bankers. In addition, both underpricing and the length of the lock-up period are negatively significantly related to the reputation of the investment banker. The results may indicate that as smaller IPOs are not as attractive as larger IPOs, they are more willing to use more reputable investment banker, if the investment banker agrees to undertake the underwriting, to reduce other signaling costs. However, in this study, the underpricing cost is higher for IPOs using the service from more reputable investment bankers.

5.4 A Further Study of Underpricing

To further investigate the relationship between underpricing and the reputation of the investment banker during this bubble period, I consider the "Hot Issue" market study from Ritter (1984). Ritter finds that the extraordinary hot market for natural resource IPOs in 1980 produced unique results that were contrary to those predicted in Rock's (1986) model. Two charts are created to compare the number of IPOs, the number of tech issues, the average underpricing, and the average of offering size by year. Chart 1 and 2 show that year 1999 has the largest number of IPOs, the largest number of tech IPOs, and the highest average of underpricing among the five years studied.[16] As a result, IPOs from year 1999 are isolated and a mean comparison table is created to test if the selected variables for IPOs that went public in 1999 are different from those in other years.

Results are posted in Table 7. All the selected variables are significantly different between two groups at the 1% level except the average percentage of shares held by VC, which is significant at the 5% level. Average IPO underpricing in 1999 is 77.67%, which is three times the average underpricing of 27.77% for IPOs that went public in other years. The degree of underpricing in 1999 is much higher than the average 48.4% underpricing found by Ritter in 1980. Even the degree of underpricing for 1996, 1997, 1998, and 2000 are much higher than the value of 16.70% found by Ibboston, Sindelar, and Ritter (1988) for the period from 1960 to 1987.

Table 7 also shows that the percentage of underpricing for tech IPOs in 1999 is 62.95%, which is significantly higher than the 42.13% in the other years. The overall

[16] Year 1996 has the largest number of IPOs in the REAL WORLD, however, in this database, year 1999 has the largest number of IPOs, due to part of 1996 data not available from my data source.

comparison results suggest that 1999 should be considered a "Hot Issue" year dominated by high-tech IPOs. Comprehensive studies are shown in Table 8 on tech IPOs versus non-tech IPOs covering the entire sample period. The results show that tech IPO underpricing in the more reputable investment banker subgroup is significantly higher than that in the less reputable investment banker subgroup. Within the same subgroup, tech IPOs are more severely underpriced than non-tech IPOs. In addition, as predicted, only tech IPOs in the more reputable investment banker subgroup are able to partially reclaim the underpricing costs.

I suggest that two of Ritter's (1984) three hypotheses for hot natural resource issues might be applicable for the "hot" tech issues in this study: the speculative bubble hypothesis and the monopsony power hypothesis.

5.4.1. The Speculative Bubble Hypothesis

Ritter suggests that the testable implication for the speculative bubble hypothesis is that when the bubble bursts, the market should crash. In my study period, the tech heavily weighted NASDAQ composite index climbed from 1052 to 5048 from the beginning of 1996 to the middle 2000. The highly inflated listed tech stocks might increase both pre-market and aftermarket demand for the new tech issues. Consequently, as suggested by Benveniste and Spindt (1989)[17] and Hanley (1993), investment bankers partially increase the offer price and still leave room for price run-up after the IPO date. The NASDAQ market, and correspondingly the IPO market, crashed after May 2000, which is consistent with Ritter's prediction that when the bubble bursts, the hot IPO

[17] Benveniste and Spindt (1989) suggest that investment bankers only partially adjust the price upwards and leave the surplus to motivate investors to truthfully reveal the level of demand.

market should crash too. Therefore, evidence suggests that the speculative bubble hypothesis also holds during my study period, especially in 1999.

5.4.2 The Monopsony Power Hypothesis

The monopsony power hypothesis suggests that underwriters intend to underprice hot issues and profit by allocating these issues only to favored customers. As indicated in Table 8, Panel C, the average underpricing for tech issues for the more reputable investment banker subgroup is 68.89%, which is significantly higher than the corresponding value of 18.56% for the less reputable investment banker subgroup. Given that the average offering size of tech issues in the more reputable investment banker subgroup is significantly larger than that in the less reputable investment banker subgroup, and that tech IPOs are more likely to partially reclaim the underpricing, it implies that prestigious investment bankers underpriced tech IPOs more than was necessary to market the IPO. My finding is consistent with Ritter (1984. However, in Ritter's paper, most of the hot natural resource issues were brought to the market by small and less reputable investment bankers. The findings in this study are, however, different because most tech issues were brought to the market by reputable investment bankers. One possible explanation is that prestigious investment bankers used the higher degree of underpricing to compensate for the potential damage to their reputation in marketing high risk tech IPOs by compensating their regular clients for investing in high risk tech issues.

6. Summary and Conclusions

This paper examines the certification role of investment banker prestige and other investors, such as venture capitalists, in the "Hot Issues" IPO market of the late 1990s. Carter and Manaster (1990) and Michaely and Shaw (1994) have documented a negative relationship between the prestige of investment bankers and the first-day price run-up of the IPOs they bring to the market. By using IPO sample data from 1996 to 2000, this paper is able to perform empirical tests on the signaling hypothesis and winner's-course hypothesis in the unique "NASDAQ Bubble" era. Three research questions are addressed in this paper: 1) Do the previous findings on the relation between the reputation of the investment banker and the degree of IPO underpricing still hold in my study period? 2) Did the rising stock market have any influence on how the investment banker evaluated individual IPO candidates? 3) Does paying higher fees for using the services of high reputable investment banker help issuing firms to reduce other cost associated with its IPO? I develop and test three hypotheses: the certification hypothesis, the risk sharing hypothesis, and the issue costs hypothesis.

From the mean comparison tests and OLS regression analysis, I find that IPOs underwritten by more prestigious investment bankers are underpriced more than IPOs underwritten by less prestigious investment bankers. This result is inconsistent with the findings by Carter and Manaster (1990) and Michaely and Shaw (1994). I also find that offering size is the most attractive characteristic the investment banker would consider when it considers an IPO candidate. For IPOs with similar offering size, prestigious investment bankers are more likely to underwrite tech IPOs with the presence of venture

capitalists. This is especially significant for small offering size IPOs. It suggests that the results for the risk-sharing hypothesis are driven mostly by smaller IPOs.

Empirical results for hypothesis 3 are mixed. On one hand, I find that by using the services from more reputable investment bankers, issuing firms are able to significantly reduce the lock-up period. On the other hand, underpricing costs increase as the reputation of the investment banker increases. In addition, insiders, including third-party investors, are able to reduce their stock holdings, which is a proxy for the signaling cost, in the small offering size subgroup. My finding is partially consistent with Courteau's (1995) optimal structure of insider retention and retention commitment schedule.

Further research focusing on the difference between tech IPOs and non-tech IPOs reveals that more reputable investment bankers require more severe underpricing when marketing tech IPOs; however, they partially adjust the offer price upward if good information is gathered from investors during the waiting period. The partial adjustments phenomenon is consistent with the finding from Hanley (1993). However, this result does not hold for other non-tech IPOs, irrespective of whether they are handled by more reputable investment bankers or less reputable investment bankers.

I also find two hypotheses - the speculative bubble hypothesis and the monopsony power hypothesis - from Ritter's (1984) "Hot Issue" market paper to be relevant for the "hot issue" market in this study. The speculative bubble hypothesis helps to explain that part of the extraordinary higher degree of underpricing of IPOs in my study period is due to the "High Flying" stock market. The monopsony power hypothesis is helpful in explaining that prestigious investment bankers tend to underprice IPOs, especially tech

IPOs, more than they should have been. The result is a significantly positive relationship between the degree of underpricing and the reputation ranking of the investment banker.

7. Suggestions for Future Research

The previous suggestion by Carter and Manaster (1990) that reputable investment bankers only market lower risk IPOs in order to maintain their reputation does not hold in this study. In contrast, this study finds that during the "NASDAQ Bubble" period, more prestigious investment bankers were engaged in underwriting high risk technology IPOs. The findings in this study seriously question the previous belief that the fear of losing reputation will prevent high quality investment bankers as well as auditors from participating in high risk IPOs. It will be interesting to investigate if this phenomenon was only temporary and specific to the "NASDAQ Bubble" period and vanishes once the historic stock return period stabilized. Two interesting implications that can be tested in the future research could be the following.

First, a test of the relationship between the reputation ranking of the investment banker with the long-term price performance as well as the price volatility of the IPO he brings to the market can be investigated to see if the findings in this paper hold in the long run.

Second, after the Enron and Andersen crisis, the certification hypothesis should be re-tested as both the investors and the issuers might reconsider the premium they may be willing to pay for the services supplied by more reputable investment bankers and auditors.

References

Allen, Franklin, and Faulhaber, Gerald, 1989, "Signaling by Underpricing in the Market," *Journal of Financial Economics*, 23, 303 – 323

Barry, Christopher, Muscarella, Chris, Peavy, John, and Vetsuypens, Michael, 1990, "The role of Venture Capital in the Creation of Public Companies," *Journal of Financial Economics*, 27, 447 – 471

Beatty, Randolph, and Ritter, Jay, 1986, "Investment banking, Reputation, and the Underpricing of Initial Public Offerings," *Journal of Financial Economics*, 15, 213 – 232

Benveniste, Lawrence and Spindt, Paul, 1989, "How Investment Bankers Determine the Offering Price and Allocation of New Issues," *Journal of Financial Economics*, 24, 343 – 361

Booth, James, and Smith, Richard, 1986, "Capital Raising, Underwriting and the Certification Hypothesis," *Journal of Financial Economics*, 15, 261 – 281

Busaba, Walid, Benveniste, Lawrence, and Guo, Re-Jin, 2001, "The option to withdraw IPOs during the premarket: Empirical analysis," *Journal of Financial Economics*, 60, 73 – 102

Cai, X., and Keasey, K., 2000, "Dotcom IPO: Valuation and Underpricing," *International Institution of Banking and Financial Services*, 39, December

Carter, Richard, Dark, Frederick, and Singh, Ajai, 1998, "Underwriter Reputation, Initial Returns, and the Long-Run Performance of IPO Stocks," *Journal of Finance*, 53, 285 – 311

Carter, Richard, and Manaster, Steven, 1990, "Initial Public Offerings and Underwriter Reputation," *Journal of Finance*, 45, 1045 – 1067

Courteau, Lucie, 1995, "Under-Diversification and Retention Commitments in IPOs," *Journal of Financial and Quantitative Analysis*, 30, 487 – 517

Field, Laura, and Hanka, Gordon, 2001, "The expiration of IPO share lockups," *Journal of Finance*, 56, 471 – 500

Grinblatt, Mark, and Hwang, Chuan Yang, 1989, "Signalling and the Pricing of New Issues," *Journal of Finance*, 44, 393 – 420

Hanley, Kathleen, 1993, "The Underpricing of Initial Public Offerings and the Partial Adjustment Phenomenon," *Journal of Financial Economics*, 34, 231 – 250

Hughes, Patricia, 1986, "Signalling by Direct Disclosure Under Asymmetric Information," *Journal of Accounting and Economics*, 8, 119 – 142

Ibbotson, Roger, 1975, "Price Performance of Common Stock New Issues," *Journal of Financial Economics*, 2, 235 – 272

Jegadeesh, Narasimhan, Weinstein, Mark, and Welch, Ivo, 1993, "An Empirical Investigation Of IPO Returns And Subsequent Equity Offerings," *Journal of Financial Economics*, 34, 153-175

Leland, Hayne, and Pyle, David, 1977, "Informational Asymmetries, Financial Structure, and Financial Intermediation," *Journal of Finance*, 32, 371-387

Loughran, Tim, and Ritter, Jay, 1995, "The New Issues Puzzle," *Journal of Finance*, 50, 23 – 51

Megginson, William, and Weiss, Kathleen, 1991, "Venture Capitalist Certification in Initial Public Offerings," *Journal of Finance*, 46, 879 – 903

Michaely, Roni, and Shaw, Wayne, 1994, "The Pricing of Initial Public Offerings: Tests of Adverse-Selection and Signaling Theories," *Review of Financial Studies*, 7, 279 – 319

Ritter, Jay, 1984, "The 'Hot Issue' Market of 1980," *Journal of Business*, 57, 215 – 240

Rock, Kevin, 1986, "Why New Issues are Underpriced," *Journal of Financial Economics*, 15, 187 – 212

Titman, Sheridan, and Trueman, Brett, 1986, "Information Quality and Valuation of New Issues," *Journal of Accounting and Economics*, 8, 159 – 172

Welch, Ivo, 1989, "Seasoned Offerings, Imitation Costs, and the Underpricing of Initial Public Offerings," *Journal of Finance*, 44, 421 – 449

Wolfe, Glenn, Cooperman, Elizabeth, and Ferris, Stephen, 1994, "An Analysis of the Underwriter Selection Process for Initial Public Offerings," *Journal of Financial Research*, 42, 77 – 90

Appendix 1: Rule 144, Rule 144(K), and Rule 701

RULE 144

In general, under Rule 144 as currently in effect, beginning 90 days after the date of this prospectus, a person who has beneficially owned shares for at least one year would be entitled to sell, within any three-month period, a number of shares that does not exceed the greater of:

- 1% of the number of shares of common stock then outstanding; or

- the average weekly trading volume of the common stock on the stock market during the four calendar weeks preceding the filing of a notice on Form 144 with respect to such sale.

Sales under Rule 144 are also subject to certain other requirements regarding the manner of sale, notice filing and the availability of current public information about us.

RULE 144(k)

Under Rule 144(k), a person who is not deemed to have been one of the "affiliates" at any time during the 90 days preceding a sale, and who has beneficially owned the shares proposed to be sold for at least two years, including the holding period of any prior owner other than an "affiliate," is entitled to sell such shares without complying with the manner of sale, notice filing, volume limitation or notice provisions of Rule 144. Therefore, unless otherwise restricted, "144(k) shares" may be sold immediately upon the completion of this offering.

RULE 701

In general, under Rule 701, any of the employees, directors, officers, consultants or advisors who purchases shares from the issuing firm in connection with a compensatory stock or option plan or other written agreement before the effective date of this offering is entitled to resell such shares 90 days after the effective date of this offering in reliance on

Rule 144, without having to comply with certain restrictions, including the holding period, contained in Rule 144.

The SEC has indicated that Rule 701 will apply to typical stock options granted by an issuer before it becomes subject to the reporting requirements of the Securities Exchange Act of 1934, along with the shares acquired upon exercise of such options (including exercises after the date of this prospectus). Securities issued in reliance on Rule 701 are restricted securities and, subject to the contractual restrictions described above, beginning 90 days after the date of this prospectus, may be sold by persons other than "affiliates," as defined in Rule 144, subject only to the manner of sale provisions of Rule 144 and by "affiliates" under Rule 144 without compliance with its one year minimum holding period requirement.

Table 1. Descriptive Statistics on Selected Variables for 1355 IPOs Went Public During May 1996 to December 2000

Panel A: 1355 IPOs between 1996 and 2000

	Underpricing (%)	Offering Size (million)	Percentage of Shares Held by All Insiders	Percentage of Shares Held by VC for VC Backed IPOs (N=894)	Percentage of Shares Held by Corporate Investors (N=603)	Percentage of Shares Held by Institutional Investors (N=124)	Lock-up Period (days)	Retention of VC (%)	Retention of Corporate Investors (%)	Retention of Institutional Investors (%)
Mean	39.99	59.52	63.46	41.13	24.88	15.91	202.72	96.76	95.89	94.50
Standard Deviation	70.86	61.52	25.49	23.96	21.41	15.69	81.25	12.69	16.27	19.56
25% tile	1.56	29.00	46.10	21.60	9.5	6.6	180	100	100	100
Median	14.58	45.00	64.80	20.97	17.80	8.9	180	100	100	100
75% tile	43.33	69.60	84.70	58.10	33.80	22.40	180	100	100	100

Table 2: Empirical Results for Hypothesis 1

Panel A: Summary of the Dispersion of IPOs for the Two Investment Banker Groups: Prestigious and Non-Prestigious

To qualify in the prestigious investment banker group, the IPO must be underwritten by the investment banker with a Carter and Manaster's (1990) reputation ranking not less than 7. The rest of the IPOs are allocated to the Non-Prestigious investment banker group.

Group	Number of Observation	Number of IPOs with Venture Capitalist	Number of IPOs with Corporate Investor	Number of IPOs with Institutional Investors	Number of Investment Banker
Prestigious Investment banker	1033	773	506	94	37
Non-Prestigious Investment banker	322	121	97	30	118

Panel B: Mean Comparison Result of Underpricing

	Total	VC-Backed IPOs	Non-VC-backed	t -stat	P (T<=t) Two-tail
Total	-	49.19% (N = 894)	22.16% (N = 461)	8.182	*0.0000*
More Reputable Investment Banker Subgroup	47.89% (N= 1033)	55.07% (N = 769)	27.62% (N = 264)	6.461	*0.0000*
Less Reputable Investment Banker Subgroup	13.83% (N = 322)	13.01% (N = 125)	14.84% (N = 197)	0.695	*0.4877*
Difference in Means t -stat	12.152	11.985	3.589	-	-
P (T<=t) Two-tail	*0.0000*	*0.0000*	*0.0004*	-	-

Table 2 (Contd.)

Panel C: Regression of the Reputation Ranking of Investment Banker on Underpricing and Control Variables

Model	Constant	Underprice	VCdum	Tech	Logsize	Adjusted R^2	F value
1	7.401 105.60	0.006 7.815***				0.042	58.554*** (N = 1355)
2	6.480 70.173	0.004 5.808***	1.468 12.920***			0.147	117.747*** (N = 1355)
3	7.272 94.304	0.006 6.801***		0.292 2.482**		0.046	33.732*** (N = 1355)
4	-24.100 -24.314	0.001 1.505			4.147 31.795***	0.452	558.804*** (N = 1355)
5	6.435 65.542	0.004 5.247***	1.453 12.725***	0.150 1.339		0.148	79.142*** (N = 1355)
6	-22.540 -23.170	0.000 0.384	0.870 9.623***		3.872 29.912***	0.487	428.638*** (N = 1355)
7	-22.563 -23.199	0.000 0.008	0.858 9.447***	0.123 1.419	3.870 29.907***	0.487	322.233*** (N = 1355)

Underprice = Percentage of price run-up at the end of first trading date.
Vcdum = Dummy variable. 1 for VC-backed IPOs, 0 for non-VC-backed IPOs.
Tech = Dummy variable. 1 for Tech IPOs, 0 for non-Tech IPOs.
Logsize = Logarithmic expected offering amount.
* Statistic significant at 10% level.
** Statistic significant at 5% level.
*** Statistic significant at 1% level.

Table 3. Empirical Results for Hypothesis 2

Panel A: Tests of Differences in Sample Descriptive Statistics for IPOs with More Reputable and Less Reputable Investment Bankers.

Variable	Underwritten by More Reputable Investment Banker	Underwritten by Less Reputable Investment Banker	Difference in Means t -stat	P (T<=t) Two-tail
Number of Observation	1033	322		
Percentage of IPOs Backed by VC[1]	74.26%	38.54%	11.647	*0.0000*
Average Percentage of Holding by VCs for VC Backed IPOs	42.09% (N = 773)	35.01% (N = 121)	2.885	*0.0044*
Percentage of IPOs with Corporate Investor[1]	48.61%	30.89%	5.833	*0.0000*
Average Percentage Holding by Corporate Investor for IPOs with Corporate Investor	24.78% (N = 506)	25.38% (N = 97)	-0.248	0.8042
Percentage of IPOs with Institutional Investors[1]	9.03%	9.55%	-0.278	0.7809
Average Percentage Holding by Institutional Investor for IPOs with Institutional Investor	14.24% (N = 94)	21.13% (N = 30)	-1.872	*0.0683*
Average Offering Size (In million $)	70.685	22.515	21.939	*0.0000*
Percentage of Tech IPOs	49.76%	38.85%	3.450	*0.0006*
Number of IPOs with All Three Kinds of Third-Party Investors on Board	42	6		

1. A dummy variable is assigned to each third-party investor variable. The percentage of IPOs with each third-party investor is then calculated by using the sum of the dummy variable divides the total number of observation, which is 1355 in this study.

Table 3. Contd.

Panel B: Correlation Matrix of Market Condition Vaiables.

	N = 1143	MarR	MarV	NoIPO	AUprice
MarR	Pearson Correlation	1	0.429***	0.278***	0.811***
	Sig. (2 –tailed)	-	0.000	0.000	0.000
MarV	Pearson Correlation	0.429***	1	-0.213***	0.733***
	Sig. (2 –tailed)	0.000	-	0.000	0.000
NoIPO	Pearson Correlation	0.278***	-0.213***	1	0.207***
	Sig. (2 –tailed)	0.000	0.000	-	0.000
AUprice	Pearson Correlation	0.811***	0.733***	0.207***	1
	Sig. (2 –tailed)	0.000	0.000	0.000	-

MarR = The average return of NASDAQ stock index one year preceding the offering.
MarV = The standard deviation of NASDAQ stock index six months preceding the offering.
NoIPO = Number of IPOs six months preceding the offering.
Auprice = Average underpricing six months preceding the offering.
*** Correlation is significant at the 0.01 level (2 – tailed).

Table 3. Contd.

Panel C: Regression of the Reputation Ranking of Investment Banker on Selected Control Variables.

Model	Constant	Logsize	Tech	MarR	MarV	NoIPO	AUprice	Adjusted R^2	F value
1	-24.632 -25.525	4.224 33.480***						0.453	1120.840*** (N = 1355)
2	7.616 129.179		0.497 4.340***					0.013	18.839*** (N = 1355)
3	7.015 16.459			0.815 1.174	22.859 1.361	-0.004 -2.085**	1.300 2.558**	0.088	28.681*** (N = 1143)
4	-24.341 -21.215	4.174 28.347***	0.265 2.828***	0.041 0.077	-2.761 -0.214	-0.000 -0.144	-0.040 -0.101	0.468	168.617*** (N = 1143)

Logsize = Logarithmic expected offering amount.
Tech = Dummy variable. 1 for Tech IPOs, 0 for non-Tech IPOs.
MarR = The average return of NASDAQ stock index one year preceding the offering.
MarV = The standard deviation of NASDAQ stock index six months preceding the offering.
NoIPO = Number of IPOs six months preceding the offering.
Auprice = Average underpricing six months preceding the offering.
* Statistic significant at the 0.1 level.
** Statistic significant at the 0.5 level.
*** Statistic significant at the 0.01 level.

Table 3. Contd.

Panel D: Regression of the Reputation Ranking of Investment Banker on IPOs with All Third-Party Investors and Control Variables.

Model	Constant	VCdum	Corpdum	Instdum	Logsize	Tech	MarR	MarV	NoIPO	AUprice	Adjusted R^2	F value
1	6.450 60.414	1.543 12.421***	0.457 3.902***	-0.254 -1.160							0.144	65.207*** (N = 1143)
2	-22.654 -22.227	0.896 9.203***	-0.077 -0.840	-0.087 -0.522	3.887 28.647						0.502	289.264*** (N = 1143)
3	6.339 55.795	1.499 12.010***	0.424 3.607***	-0.197 -0.901		0.324 2.779**					0.149	51.125*** (N = 1143)
4	6.301 15.358	1.340 10.607***	0.303 2.590***	-0.132 -0.617			1.132 1.715*	13.846 0.867	-0.004 -2.206**	0.645 1.326	0.180	36.763*** (N = 1143)
5	6.188 14.844	1.323 10.439***	0.291 2.489**	-0.109 -0.504		0.176 1.504	1.128 1.710*	15.716 0.981	-0.003 -1.986**	0.560 1.144	0.181	32.486*** (N = 1143)
6	-23.125 -20.560	0.920 9.229***	-0.08 -0.867	-0.058 -0.348	3.970 27.219***	0.191 2.096**	0.323 0.628	-8.958 -0.717	-0.001 -0.599	-0.285 -0.747	0.504	130.033*** (N = 1143)

VCdum = Dummy variable. 1 for VC-backed IPOs, 0 for non-VC-backed IPOs.
Corpdum = Dummy variable. 1 for IPOs with corporate investors, 0 for IPOs without corporate investors.
Instdum = Dummy variable. 1 for IPOs with institutional investors, 0 for IPOs without institutional investors.
Logsize = Logarithmic expected offering amount.
Tech = Dummy variable. 1 for Tech IPOs, 0 for non-Tech IPOs.
MarR = The average return of NASDAQ stock index one year preceding the offering.
MarV = The standard deviation of NASDAQ stock index six months preceding the offering.
NoIPO = Number of IPOs six months preceding the offering.
Auprice = Average underpricing six months preceding the offering.
* Statistic significant at the 0.1 level.
** Statistic significant at the 0.5 level.
*** Statistic significant at the 0.01 level.

Table 4. Regression of the Reputation Ranking of Investment Banker on Insiders Holding Variables for Two Size Groups

Panel A: Regression of the Reputation Ranking of Investment Banker on IPOs with All Third-Party Investors and Control Variables in the Larger Offering Size Group.

Model	Constant	VCdum	VCPer	Corpdum	CorpPer	Instdum	InstPer	Tech	MarR	MarV	NoIPO	AUprice	Adjusted R^2	F value
1	8.516 165.384	0.109 1.427	0.001 1.261										0.014	5.027*** (N = 571)
2	8.634 236.092			-0.049 0.772	-0.001 -0.605								-0.002	0.310 (N = 571)
3	8.657 337.618					-0.195 -1.616	0.005 0.780						0.001	1.331 (N = 571)
4	8.500 145.862	0.115 1.427	0.002 1.309	0.020 0.304	0.001 0.275	-0.223 -1.856*	0.007 1.165						0.014	2.316** (N = 571)
5	8.463 137.232	0.096 1.189	0.002 1.500	0.015 0.229	0.001 0.294	-0.211 -1.755*	0.007 1.162	0.089 1.795*					0.018	2.453** (N = 571)
6	8.705 49.251	0.097 1.164	0.002 1.513	0.009 0.138	0.001 0.405	-0.213 -1.769*	0.007 1.206	0.076 1.479	0.107 0.382	-5.271 -0.856	-0.002 -2.253**	0.131 0.665	0.020	2.405** (N = 571)

VCdum = Dummy variable. 1 for VC-backed IPOs, 0 for non-VC-backed IPOs.
VCPer = Percentage of share held by all venture capitalists, 0 for non-VC-backed IPOs.
Corpdum = Dummy variable. 1 for IPOs with corporate investors, 0 for IPOs without corporate investors.
CorpPer = Percentage of share held by all corporate investors, 0 for IPOs without corporate investor.
Instdum = Dummy variable. 1 for IPOs with institutional investors, 0 for IPOs without institutional investors.
InstPer = Percentage of share held by all institutional investors, 0 for IPOs without institutional investor.
Tech = Dummy variable. 1 for Tech IPOs, 0 for non-Tech IPOs.
MarR = The average return of NASDAQ stock index one year preceding the offering
MarV = The standard deviation of NASDAQ stock index six months preceding the offering.
NoIPO = Number of IPOs six months preceding the offering.
Auprice = Average underpricing six months preceding the offering.
* Statistic significant at the 0.1 level.
** Statistic significant at the 0.5 level.
*** Statistic significant at the 0.01 level.

Table 4. Contd.

Panel B: Regression of the Reputation Ranking of Investment Banker on IPOs with All Third-Party Investors and Control Variables in the Smaller Offering Size Group.

Model	Constant	VCdum	VCPer	Corpdum	CorpPer	Instdum	InstPer	Tech	MarR	MarV	NoIPO	AUprice	Adjusted R^2	F value
1	5.570 37.430	1.499 5.113***	0.013 2.305**										0.156	56.681*** (N = 572)
2	6.380 47.744			0.824 2.840***	0.001 0.143								0.023	7.686*** (N = 572)
3	6.687 0.501					0.501 0.842	-0.019 -0.711						-0.002	0.362 (N = 572)
4	5.425 34.109	1.391 4.556***	0.015 2.614***	0.139 0.489	0.015 1.827*	-0.044 -0.080	-0.009 -0.348						0.164	19.629*** (N = 572)
5	5.282 30.934	1.282 4.161***	0.015 2.775***	0.102 0.362	0.014 1.761*	0.039 0.070	-0.008 -0.314	0.456 2.251**					0.170	17.669*** (N = 572)
6	5.108 6.505	1.311 4.234***	0.015 2.634***	0.008 0.027	0.016 1.896*	0.187 0.334	-0.012 -0.468	0.398 1.905*	1.609 1.319	3.456 0.096	-0.002 -0.643	-0.103 -0.104	0.171	11685*** (N = 572)

VCdum = Dummy variable. 1 for VC-backed IPOs, 0 for non-VC-backed IPOs.
VCPer = Percentage of share held by all venture capitalists, 0 for non-VC-backed IPOs.
Corpdum = Dummy variable. 1 for IPOs with corporate investors, 0 for IPOs without corporate investors.
CorpPer = Percentage of share held by all corporate investors, 0 for IPOs without corporate investor.
Instdum = Dummy variable. 1 for IPOs with institutional investors, 0 for IPOs without institutional investors.
InstPer = Percentage of share held by all institutional investors, 0 for IPOs without institutional investor.
Tech = Dummy variable. 1 for Tech IPOs, 0 for non-Tech IPOs.
MarR = The average return of NASDAQ stock index one year preceding the offering.
MarV = The standard deviation of NASDAQ stock index six months preceding the offering.
NoIPO = Number of IPOs six months preceding the offering.
Auprice = Average underpricing six months preceding the offering.
* Statistic significant at the 0.1 level.
** Statistic significant at the 0.5 level.
*** Statistic significant at the 0.01 level.

Table 5. Empirical Results for Hypothesis 3

Panel A: Tests of Differences in Signaling Costs for IPOs with More Reputable and Less Reputable Investment Bankers.

	More Reputable Group	Less Reputable Group	Difference in Means t -stat	P (T<=t) Two-tail
Percentage of Shares Retained by All Insiders After IPO	97.92% (N = 1033)	98.41% (N = 322)	-1.427	0.1540
VC Retention (%) for VC-Backed IPOs[1]	97.23% (N = 773)	93.78% (N = 121)	2.057	*0.0416*
Corporate Investor Retention (%) for IPOs With Corporate Investors[1]	95.89% (N = 506)	95.88% (N = 97)	0.006	0.9954
Institutional Investor retention (%) for IPOs with Institutional Investors[1]	95.47% (N = 94)	91.48% (N = 30)	0.767	0.4482
Underpricing (%)	47.89%	13.83%	12.152	*0.0000*
Percentage of the difference between the offer price and the expected offer price[2]	2.69%	-3.87%	6.435	*0.0000*
Lock-up period (days)	182.45	267.75	-10.712	*0.0000*

1. Retention Ratio = Number of shares held by insiders after the IPO/Number of share held by insiders before the IPO.
2. The expected offer price equals to the middle price of the expected offer price range, which is printed on the preliminary prospectus.

Table 5. Contd.

Panel B: Regression of the Reputation Ranking of Investment Banker on Variables Related to Signaling Costs.

Model	Constant	Insideret	VCret	Corpret	Instret	Underprice	Adjustup	Lockup	R^2	Adjusted R^2	F value
1	8. 907 9. 906	-1. 256 -1. 375							0.002	0.001	2.566 (N = 1355)
2	7. 462 19.084		0.750 1.872*						0.004	0.003	3.503* (N = 894)
3	8.277 19.859			-0. 257 -0.599					0.001	-0.001	0.359 (N = 603)
4	6.390 6.824				1.142 1.177				0.011	0.003	1.385 (N = 124)
5	7. 401 105. 60					0. 610 7. 652***			0.043	0.042	58. 554*** (N = 1355)
6	7. 673 119. 127						1.895 5.787***		0.024	0.023	33. 494*** (N = 1355)
7	10. 905 86. 762							-0. 016 -27. 797***	0.373	0.373	772. 662*** (N = 1355)

Insideret = Percentage of share retained by all insiders after IPO. Retention level = (Post-IPO shares)/ (Pre-IPO shares).
VCret = Percentage of share retained by all venture capitalists after IPO.
Corpret = Percentage of share retained by all corporate investors after IPO.
Instret = Percentage of share retained by institutional investors after IPO.
Underprice = Percentage of price run-up at the end of first trading date.
Adjustup = Percentage of the difference between the offer price and the expected offer price, which is the middle price of the initial offer range.
Lockup = Lock-up period that measured in days.
* Statistic significant at the 0.1 level.
** Statistic significant at the 0.5 level.
*** Statistic significant at the 0.01 level.

Table 5. Contd.

Panel C: Regression of the Reputation Ranking of Investment Banker on Selected Explanatory Variables and Control Variables.

Model	Constant	Insideret	VCret	Corpret	Instret	Underprice	Adjustup	Lockup	Logsize	Tech	MarR	MarV	NoIPO	AUprice	Adjusted R^2	F value
1	-25.671 -17.516	1.011 1.457							4.219 28.062***	0. 269 2.853***	0.082 0.155	-2.765 -0.214	-0.0001 -0.086	-0.119 -0.300	0.469	144.976*** (N = 1143)
2	-13.517 -9.239		0.74 1.906*						2.729 15.446***	0.154 1.668*	0.922 1.879*	0.888 0.074	-0.002 -1.614	-0.408 -1.050	0.295	46.618*** (N = 765)
3	-13.038 -8.159			-0.960 -2.527**					2.802 14.040***	0.267 2.305**	-0.491 -0.726	2.366 0.156	0.0005 0.260	0.524 1.086	0.344	40.171*** (N = 525)
4	-19.893 -3.853				-0.590 -0.597				3.815 5.880***	0.015 0.041	-2.913 -1.185	-43.97 -1.109	-0.0002 -0.504	2.560 1.695*	0.393	8.767*** (N = 85)
5	-24.165 -20.884					0.078 1.165			4.147 27.831***	0.24 2.500**	-0.023 -0.043	-1.026 -0.079	-0.0001 -0.044	-0.087 -0.219	0.461	144.769 (N = 1143)
6	-24.383 -21.013						-0.072 -0.244		4.179 28.055***	0.269 2.824***	0.073 0.314	-2.977 -0.230	-0.0003 -0.175	-0.044 -0.113	0.468	144.418 (N = 1143)
7	-13.090 -10.890							-0.009 -17.586***	2.962 20.056***	0.162 1.949*	0.297 0.631	-1.031 -0.090	-0.0005 -0.386	-0.083 -0.237	0.582	227.927 (N = 1143)
8	-1.695 -0.857	-0.781 -0.915	0.814 1.596	-0.433 -1.220	-0.236 -0.261	0.110 1.537	-0.588 -1.740*	-0.013 -9.931***	1.624 7.522***	0.231 2.140**	0.302 0.486	4.847 0.364	-0.0019 -1.169	0.138 0.315	0.410	24.358*** (N = 404)

Logsize = Loged expected offering amount.
Tech = Dummy variable. 1 for tech IPOs and 0 for non-tech IPOs.
MarR = Stock market return one year preceding the offering.
MarV = Stock market volatility six months preceding the offering.
NoIPO = Number of IPOs six months preceding the offering.

Auprice = Average underpricing six months preceding the offering.
* Statistic significant at the 0.1 level.
** Statistic significant at the 0.5 level.
*** Statistic significant at the 0.01level.

Table 6. Regression of the Reputation Ranking of Investment Banker on Signaling Costs for Two Size Groups

Panel A: Regression of the Reputation Ranking of Investment Banker on Signaling Costs and Control Variables in the Larger Offering Size Group.

Model	Constant	Insideret	VCret	Corpret	Instret	Underprice	Adjustup	Lock-up Period	Tech	MarR	MarV	NoIPO	AUprice	Adjusted R^2	F value
1	8.746 28.869	-0.101 -0.328												-0.002	0.108 (N = 571)
2	8.597 28.744		0.051 0.168											-0.002	0.028 (N = 571)
3	8.719 33.660			-0.072 -0.277										-0.002	0.077 (N = 571)
4	9.549 7.821				-0.903 -0.739									-0.001	0.545 (N = 571)
5	8.596 285.488					0.079 2.948***								0.013	8.688*** (N = 571)
6	8.640 329.567						0.135 0.874							0.000	0.763 (N = 571)
7	8.992 57.288							-0.002 -2.224**						0.007	4.944** (N = 571)
8	9.354 7.673		0.077 0.251	-0.056 -0.215	-0.908 -0.735									-0.004	0.216 (N = 571)
9	10.211 8.069		-0.090 -0.287	-0.060 -0.228	-1.251 -1.012				0.080 1.564	0.065 0.231	-5.380 -0.870	-0.002 -2.227**	0.217 1.095	0.005	1.353 (N = 571)
10	10.525 8.296		-0.090 -0.288	-0.108 -0.412	-1.241 -1.008	0.073 2.280**	-0.219 -0.724	-0.129 -0.724	-0.002 2.006	0.053 1.006	-3.526 -0.566	-0.002 -2.050**	0.119 0.597	0.016	1.846* (N = 571)

Table 6. Contd.

Panel B: Regression of the Reputation Ranking of Investment Banker on Signaling Costs and Control Variables in the Smaller Offering Size Group.

Model	Constant	Insideret	VCret	Corpret	Instret	Underprice	Adjustup	Lock-up Period	Tech	MarR	MarV	NoIPO	AUprice	Adjusted R^2	F value
1	9.622 4.764	-2.969 -1.448												0.002	2.096 (N = 572)
2	7.537 8.046		-0.855 -0.898											0.000	0.806 (N=572)
3	8.646 9.679			-2.193 -2.364**										0.008	5.590** (N = 572)
4	7.382 4.357				-0.684 -0.402									-0.001	0.162 (N = 572)
5	6.440 54.634					1.076 4.828***								0.038	23.306*** (N = 572)
6	6.725 62.975						1.389 2.211**							0.009	4.888** (N= 572)
7	9.990 53.613							-0.015 - 19.675***						0.403	387.113*** (N= 572)
8	8.027 4.453		0.033 8.793***	-2.051 -2.353**	-0.059 -0.037									0.124	27.937*** (N = 572)
9	9.979 4.639		-0.680 -0.716	-2.331 -2.530**	-1.091 -0.648				0.669 3.039***	0.478 0.367	13.747 0.357	-0.001 -0.245	0.890 0.835	0.039	3.886*** (N = 572)
10	10.938 6.561		-0.158 -0.215	-1.247 -1.738*	-0.153 -0.117	0.767 3.991***	-0.020 -0.038	-0.014 - 18.882***	0.178 1.008	0.096 0.092	-1.625 -0.054	0.001 0.169	0.417 0.502	0.423	39.098*** (N = 572)

Chart 1. Number of IPOs and Number of Tech IPOs by Year

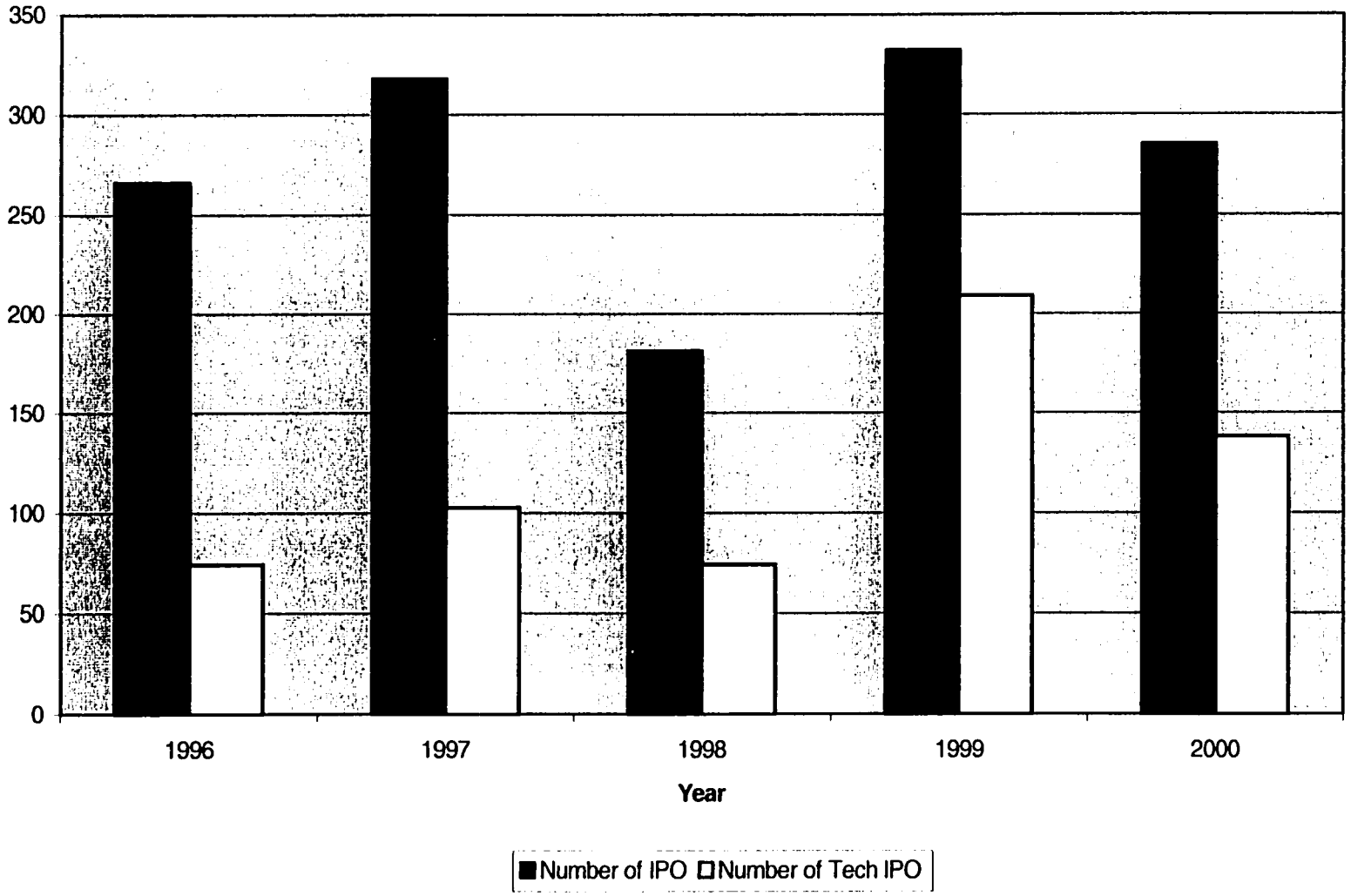

Chart 2. Average Underpricing and Offer Size by Year

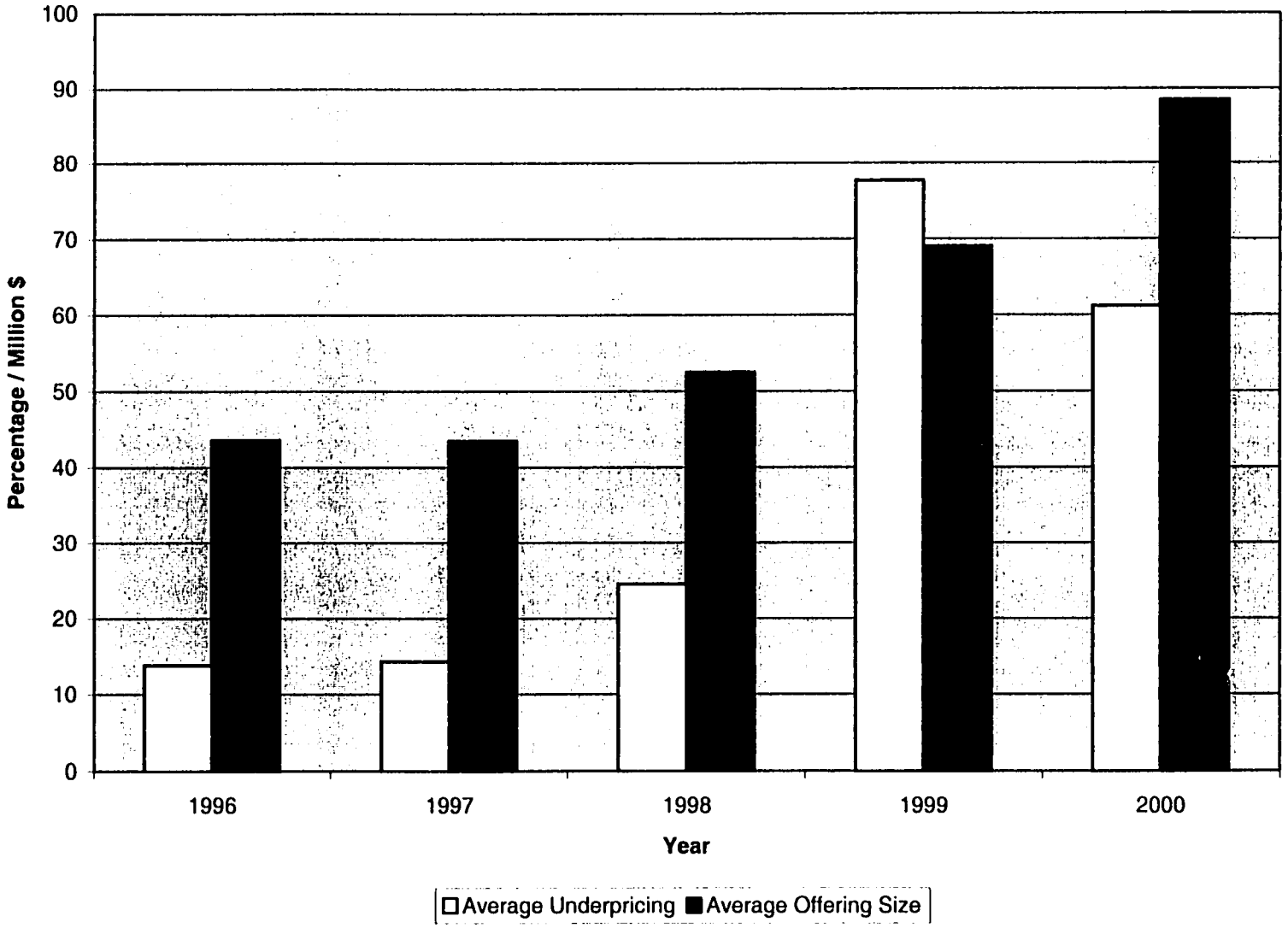

Table 7. Tests of Differences in Sample Descriptive Statistics for IPOs in 1999 (Hot Issue Year) and Other Years.

	IPOs in 1999	IPOs in Other Years	Difference in Means t -stat	P (T<=t) Two-tail
Number of Observation	332	1023		
Average Reputation Ranking of the Lead Underwriter (0 – 9)	8. 266	7. 443	7. 804	*0. 0000*
Average Number of VC Before IPO	1. 979	1. 641	3. 110	*0. 0019*
Average Percentage of Shares Held by VC for VC-backed IPOs	30. 07%	26. 18%	2. 305	*0. 0215*
Average Percentage of Total Offering Shares Sold by Insiders	3. 89%	7. 31%	-4. 491	*0. 0000*
Average Underpricing (%)	77. 67%	27. 77%	8. 759	*0. 0000*
Average Lock-up Period (days)	188. 52	207. 33	-5. 290	*0. 0000*
Average Offering Size (in million $)	69.033	56.436	3.767	*0. 0001*
Percentage of Tech IPOs	62. 95%	42. 13%	6. 780	*0. 0000*

Table 8. Tech IPOs Versus Non-Tech IPOs

Panel A: Mean Comparison of Tech IPOs and Non-Tech IPOs

	Tech IPOs	Non-Tech IPOs	Difference in Means t -stat	P (T<=t) Two-tail
Number of Firms	638	717		
Average Offer price ($)	13.32	12.31	3.814	*0.0001*
Percentage of Price Adjusted Up (%)	33.54%	19.53%	5.874	*0.0000*
Average Offering Size (in million $)	63.211	56.608	1.926	*0.0543*
Average Underpricing (%)	40.59%	18.43%	6.1157	*0.0000*

Table 8. Contd.

Panel B: Average Underpricing by Investment Banker Reputation and Industry

	Tech IPOs	Non-Tech IPOs	Difference in Means t -stat	P (T<=t) Two-tail
More Reputable Underwriter Subgroup	68.89%	27.08%	8.953	*0.0000*
Less Reputable Underwriter Subgroup	18.56%	10.81%	2.337	*0.0210*
Difference in Means t -stat	9.783	6.488	-	-
P (T<=t) Two-tail	*0.0000*	*0.0000*	-	-

Panel C: Average Offer Price Adjustment by Investment Banker Reputation and Industry

	Tech IPOs	Non-Tech IPOs	Difference in Means t -stat	P (T<=t) Two-tail
More Reputable Underwriter Subgroup	6.18%	-0.76%	6.437	*0. 0000*
Less Reputable Underwriter Subgroup	-2.55%	-4.70%	1.159	0.2477
Difference in Means t -stat	4.935	3.245	-	-
P (T<=t) Two-tail	*0.0000*	*0.0013*	-	-

Table 9. The Best Performing-IPOS on Their First Day of Trading

Company/ business	-----Price----- First day[1]	12/29/00	Offer value ($mil)	Offer date	-Performance- First day	Offer to 12/29/00	Underwriter
VA Linux Systems/ computer software	$239. 25	$8. 13	$132	12/09/99	698%	-72%	Credit Suisse First Boston
Foundry Networks/ telecom products	78. 13	15. 00	125	09/27/99	525	20	Deutsche Banc Alex Brown
WebMethods/ Internet software	212. 63	88. 94	144	02/10/00	508	154	Morgan Stanley Dean Witter
FreeMarkets / Internet retailing	280. 00	19. 00	173	12/09/99	483	-60	Goldman Sachs
Cobalt Networks[2]/ network equipment	128. 13	42. 81[3]	110	11/04/99	482	94	Goldman Sachs
Akamai Technologies/ Internet svcs	145. 19	21. 06	234	10/28/99	458	-19	Morgan Stanley Dean Witter
theglobe. com/ Internet svcs	24. 38	0. 28	28	11/12/98	442	-93	Bear Stearns
CacheFlow/ network equipment	126. 38	17. 06	120	11/18/99	427	-28	Morgan Stanley Dean Witter
Sycamore Networks / network equipment	61. 58	37. 25	284	10/21/99	386	194	Morgan Stanley Dean Witter
Avanex/ telecom products	172. 00	59. 56	216	02/03/00	378	65	Morgan Stanley Dean Witter
Selectica/ Internet svcs	141. 23	24. 19	120	03/09/00	371	-19	Credit Suisse First Boston
Ask Jeeves/ Internet svcs	64. 94	2. 44	42	06/30/99	364	-82	Morgan Stanley Dean Witter
Finisar/ telecom products	28. 96	29. 00	155	11/11/99	357	357	Merrill Lynch
FirePond/ Internet svcs	100. 25	9. 44	110	02/04/00	356	-57	Robertson Securities
Crossroads Systems/ network equipment	78. 72	4. 69	68	10/19/99	337	-74	SG Cowen
Priceline. com/ Internet svcs	69. 00	1. 31	160	03/29/99	331	-91	Morgan Stanley Dean Witter
Andover. Net[4]/ Internet svcs	77. 50	16. 043	72	12/08/99	331	-10	JP Morgan Chase
Integrated Systems Consulting[5]/ IT consulting svcs	21. 50	14. 533	13	04/17/96	330	190	Tucker Anthony
Wireless Facilities/ telecom svcs	62. 00	36. 25	60	11/04/99	313	141	Credit Suisse First Boston
Neoforma. com/ Internet svcs	52. 38	0. 81	91	01/24/00	303	-93	Merrill Lynch

Venture capital backed IPOs are in italics. [1]Per share adjusted for splits. [2]Acquired by Sun Microsystems on Dec. 12, 2000. [3]Acquisition price. [4]Acquired by VA Linux Systems on June 7, 2000. [5]Acquired by First Consulting Group on Dec. 21, 1998.

Sources: Interactive Data Corp. via FactSet Research Systems; Thomson Financial/Securities Data; Wilshire Associates; Forbes.

Table 10. The Biggest Underwriters of the 1990s

Underwriter	Number of issues	----% of issues that-----		----Performance[1]----		Total offer value ($mil)
		Went up	Beat the market	Actual	Relative to S&P 500[2]	
Goldman Sachs	248	56%	40%	174%	157	$56,282
Morgan Stanley Dean Witter	253	56	38	467	238	43,395
Credit Suisse First Boston[3]	349	48	37	80	114	41,504
Merrill Lynch	185	50	33	82	102	24,224
Salomon Smith Barney	221	52	32	117	103	22,379
Deutsche Banc Alex Brown[4]	247	48	36	295	168	11,878
Lehman Brothers	148	53	37	208	151	10,783
JP Morgan[5]	203	43	33	141	132	10,217
Robertson Stephens[6]	200	46	34	161	151	8,965
Bear Stearns	84	37	27	85	95	5,399
Banc of America Securities[7]	143	43	24	121	108	5,340
UBS Warburg[8]	65	52	23	76	73	2,894
Prudential Securities	52	38	21	41	77	2,114
William Blair	58	47	24	107	87	1,967
SG Cowen	48	42	25	396	195	1,606
Kidder Peabody	33	39	15	68	64	1,488
US Bancorp Piper Jaffray	43	30	19	65	79	1,418
Friedman Billings Ramsey	12	33	17	-8	66	1,268
CIBC World Markets[9]	13	23	23	-44	60	935
Raymond James & Associates	29	41	34	68	89	927

[1]Based on Dec. 29, 2000 closing price. [2]Relative performance is based on the ending value of $100 invested in each stock divided by $1 invested in the index. [3]Includes offerings managed by Donaldson, Lufkin & Jenrette, acquired on Nov. 3, 2000. [4]Formerly BT Alex. Brown. [5]Formerly J. P. Morgan. Includes offerings managed by Hambrecht & Quist, acquired through merger with Chase on Dec. 31, 2000. [6]Formerly Bancboston Robertson Stephens. [7]Formerly Nationsbanc Montgomery Securities. [8]Includes offerings managed by PaineWebber, acquired on Nov. 3, 2000. [9]Formerly CIBC Oppenheimer.

Sources: Interactive Data Corp. via FactSet Research Systems; Thomson Financial/Securities Data; Wilshire Associates; Forbes.