Executive IPO Stock Option Compensation and IPO Underpricing

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ABSTRACT

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Do executives influence IPO underpricing when they stand to gain from the increased value of their IPO stock options? The present thesis examines this question for 422 U.S. software IPO firms from 1996 to 2000. The specificity of the software industry coupled with the bull market of the late 90s affects the cost-benefit tradeoff an executive faces with respect to the offer price of an IPO. I consider the possible interplay of traditional underpricing theories (signaling, asymmetric information, litigation and managerial influence) with high human capital intensity in a tight labor market. I correct for an exhaustive list of variables including: pre-IPO stock ownership, underwriter quality, VC backing, founder-manager. OLS regression results show no difference in underpricing between option-granting and non-option-granting firms; however, greater underpricing is significantly associated with higher total dollar value of stock options granted to top management and/or CEOs. After controlling for endogeneity, I find no evidence that there's relation between option grants and underpricing. However, the bubble years 1998-2000 have significant explanatory power, under all specifications, with regard to the greater IPO underpricing for software companies compared to the average level of all industries in the same period.

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1. Introduction

Do executives influence IPO underpricing when they stand to gain from the increased value of their IPO stock options? Recent literature has demonstrated that executives take actions to maximize the value of their options by timing option grants and company information announcements (Heron and Lie (2007)). On the other hand Lowry and Murphy (2007) find no evidence of a significant effect of executive IPO options on IPO underpricing. In the present study, I test this relationship in depth by focusing on a particular industry unique with its high dependence on human capital – the software industry.

Using hand-collected compensation data from 422 software companies which conducted IPOs in 1996-2000, I examine the effect of executive IPO stock option compensation on IPO underpricing and stock performance of newly-public U.S. software companies.

I find that the decision to grant options is not related to IPO underpricing. Interestingly, the dollar value of executive stock options appears to be associated with underpricing[1]. However, after controlling for endogeneity, using simultaneous equations framework, option grants do not have explanatory power for IPO underpricing[2]. I conclude that with human capital intensity, using different measures of underpricing and different specifications, there is still no significant relationship between executive options and IPO underpricing.

[1] Indicated by our OLS and Heckman results.
[2] Indicated by our Hausman tests and 3SLS results.

I focus on the software industry because it involves risky and large investments in innovative activities, where the outcomes are unanticipated, human-specific, and long-term in nature. The demand for software executives and other critical employees is intensive and competitive leading to high turnover rate of talented individuals. To cope with this problem, one of the most important organizational innovations that have emerged from the new-tech industries in 1960s [3] is the use of IPO stock options to attract and retain top executives and key employees and align their long-term incentives with the interests of the company[4]. Furthermore, start-up companies-without established income streams are often cash strapped and options can be the only source of compensation available (Davis and Edge, 2004).

This study tracks the initial returns and stock performance of software company IPOs from 1996-2000. Over this period, the number of companies going public is substantially higher and these IPOs are substantially more underpriced. As the software industry is very human-capital intensive in research and development activities, more companies willing to be listed demand more software engineers. For these new issuing firms with cash constraints while facing a challenge to attract human capital during the bubble years, issuing option grants was especially attractive[5].

Prior literature has not used the dollar value level of stock options conditional on the choice of granting option compensation as a long-term incentive to top executives

[3] Known as the technology explosion in the industries of mainframe computer, color television, space travel, nuclear power and telecommunications in 1960s (Delves, 2003).
[4] Stock options, for instance, provide the highest portion of the performance-based incentive compensation received by top executives in U.S. internet related business (Chen and Kleiner, 2004).
[5] Hence, I include 1997-2000 year dummies in most of my regression equations to capture the year effects.

possibly because of concerns about non-tradability. If the variation in the dollar value of option grants is very high, the coefficient on a grant option dummy may very well be insignificant. If, however the incentive effect to manipulate the IPO offer price kicks in at a sufficiently high threshold level in the dollar value of the option grant, then constructing a continuous variable to capture this effect is worthwhile. Precisely this constitutes the first contribution of the present work.

Second, I recognize and examine carefully the simultaneous relationship between executive option grants and IPO underpricing. I control for the inverse effect of the expectation of post-IPO performance, as a proxy for unobserved firm quality, on option grants using a Heckman sample selection filter. At the first stage of this procedure, I estimate the probability of whether firms choose to grant options to top executives through a sample selection regression and based on this likelihood, I further run an outcome regression to capture the potential effect of expected underpricing on the dollar value of the option granted.

Third, this thesis focuses on the software industry during the dot-com bubble years from 1996-2000. I attempt to capture and analyze the human capital intensity effect, as well as the bull market effect of the late 1990s. My summary statistics indicate that during this time period, the average IPO underpricing level of software IPOs amounts to more than three times that of the average IPO across all industries. It is not surprising that executive option grants reached such high levels precisely in this industry and during this time period as an incentive-based compensation. Hence, prior results on

the determinants of IPO underpricing based on data for all industries may not capture the specificities of the software industry.

Description of Executive Stock Option Grants

Stock option compensation gives employees the right to purchase the stock of their company at a specified price for a specified period of time (Turzak, 2007). The typical pay combination for top executives or CEOs in the U.S. currently is mainly (85%) composed of long term incentives-stock related remuneration-such as stock grants, restricted stock grants and stock option grants while the rest is fixed compensation (salary, bonus and other cash compensation) (Ibanez-Frocham, 2008).

Among long-term incentive compensation, stock options are more efficient compared to other equity instruments and are becoming more and more popular and wide-spread internationally since 1960s. For instance, Liang and Sharpe (1999) report that the total dollar value of new option grants per employee at large Standard and Poor's (S&P) 500 firms quadrupled between 1994 and 1998 and Weisbenner (2000) also documents that the total number of option grants at large public firms has grown by 50 percent from 1990 to 1998. Recent statistics from the S&P Execucomp database further support this tendency: the median value of executive stock option amounts to 71.2 percent of the total compensation for the S&P top executives in 2007[6], a 109 percent increase from 34 percent in 1992 (Cadman, Klasa and Matsunaga ,2007).

[6] EQUILAR (April 2008), retrieved from http://www.equilar.com/press_20080410.php

There are two types of employee stock option compensation in the United States: incentive stock options (ISO) and nonqualified stock options (NQSO)[7]. For ISOs, a pre-specified group of employees receive a pre-determined number of options according to their personal compensation plan which is endorsed by the entire shareholder base of the company[8]. NQSOs are usually utilized as compensation method for senior executives and CEOs and they are also the only type of options that are awarded to nonemployee board of directors. The offer price at the IPO is often given as the exercise price in the prospectus. To illustrate, an executive employment agreement may specify that if certain conditions are met, the executive will receive a certain number of options with the exercise price set equal to the IPO offer price at some future dates.

According to Yermack (1997), for "most executives in major companies, stock options are awarded once each year by a compensation committee of the board of directors, acting under the authority of periodic shareholder votes[9]. Compensation committees exercise discretion over the size and timing of stock option awards, and these parameters fluctuate substantially across companies and over time." Yermack (1995) also states that the increasing frequency and size of executive option pay since the 1990s has attracted attention from shareholder activists and government authorities such as the Securities and Exchange Commission (SEC) and the Financial Accounting Standards

[7] As illustrated in the company's SEC prospectus filings.
[8] There are several limitations on ISO: 1) once approved by the firm owners, the options must be granted during subsequent 10 years and may not have an exercise date longer than 10 years after the grant date; 2) the exercise price must be at least 100 percent of the offer price. If an employee possesses more than 10 percent of the firm's common shares, then the exercise price must be at least 110 percent of the offer price 3) the number of options for each employee is restricted to 100,000 divided by the offer price at the time of the grant. 4) The options cannot be transferred except in the event of death. NQSOs do not have those limitations.
[9] Occasionally CEOs receive multiple awards.

Board (FASB), all of which announced regulations encouraging shareholder inspection of executive compensation.

The effect of IPO option grants to executives in newly public companies is not unambiguously positive or negative from either managerial or financial point of view. Fife (1995) shows from a managerial perspective that option compensation establishes common objectives among top executives and the firm's owners and reduces agency costs, improves the retention of key executives, which demonstrates to potential investors that executives are committed to the firm and provides top executives with an opportunity for capital accumulation. On the other hand, granting stock options, according to Fife (1995), can generate some significant negative effects for private owners. For example, stock options force the firm owner to answer to minority shareholders, may result in failure to create incremental value for the money because of the increasing human capital cost, may risk the firm's "S-Corporation"[10] status if there are too many shareholders and leave the company with little choice but to repurchase the options if the IPOs does not take place.

From a financial perspective, option grants align executives' incentives with the interests of the firm's owners. Options are granted to reduce the moral hazard problem that stems from executives who possess very little of the firm's assets they manage. A substantial body of theoretical work, starting with Jensen and Meckling (1976), posits

[10] S-Corporation is an eligible domestic corporation that can avoid double taxation once to the shareholders and again to the corporation. Generally speaking, an S corporation is exempt from federal income tax other than tax on certain capital gains and passive income. On their tax returns, the S corporation's shareholders include their share of the corporation's separately stated items of income, deduction, loss, and credit, and their share of non-separately stated income or loss. Retrieved from United States Department of the Treasury, http://www.irs.gov/businesses/small/article/0,,id=98263,00.html

that option grants can align managers' incentives with that of common shareholders. In line with Jensen and Meckling (1976), Core and Guay (1999) and Rajgopal and Shevlin (2002) also give evidence that granting options is consistent with firm value maximization.

Hanlon et al. (2003) further empirically investigate whether option payoffs are connected with incentive alignment effects (they refer to it as optimal contracting). They concentrate exclusively on top-five executives and find that $1 of Black-Scholes option value granted to executives during the previous five years leads to $3.88 of undiscounted future operating earnings. Consistent with optimal contracting, they find that expected option values associated with proxies for incentive alignment are positively related to the future earnings per share.

Holmstrom and Kaplan (2004) also argue that contrary to the majority perspective attributing business scandals like Enron to the flaws in its long-term incentives, the stock option compensation does not deteriorate, but rather minimizes agency costs and improves internal control and corporate governance, under both regulatory change (new governance guidelines from the New York Stock Exchange and NASDAQ) and legislative change (the Sarbanes-Oxley Act of 2002).

However, Hall and Murphy (2002) and Lambert and Larcker (2002) argue that options are an inefficient means to compensate executives. Researchers also give evidence that managers abuse option grants for their own benefit by controlling the pay-setting process and compensate themselves in excess of the level optimal for shareholders (also known as rent extraction perspective) (Yermack,1997; Aboody and Kasznik, 2000).

Some authors claim that options also enable management focus on timing and maximizing option value instead of running the firm. Aboody and Kasznik (2000) demonstrate that firms accelerate the release of bad news and delay the disclosure of good news prior to stock option grant dates most likely to lower the options' exercise price. Carpenter and Remmers (2001) find that managers take advantage of their inside information to time the exercising of options. Bens et al. (2002) suggest that managers cut R&D expenditure to fund stock buybacks for option plans in order to avoid EPS dilution. Finally, option grants can lead to management free-riding problem. Bebchuk and Fried (2005) state that "……executives can profit even when their companies' performance significantly lags that of their peers, as long as market-wide and industry-wide movements provide sufficient lift for the stock price." If a substantial fraction of stock price increases is due to industry or market movements, rather than to firm-specific factors that might reflect the executives' own performance, granting options would be a windfall and jeopardize the shareholder's benefits.

Around most IPOs, some of the issuing companies decide to launch stock option programs for their top management. Stock options are regularly granted with the IPO or at pre-defined points of time (in this thesis I refer to both IPO and pre-IPO options as just IPO options). Issuers also determine the maximum quantity of shares to be allocated on a preferred basis to friends and families of the company and its management.

Do top executives or CEOs of software companies intentionally increase their personal wealth by underpricing their IPOs by a greater amount (or setting lower offer price) at the expense of company's common shareholders? In other words, is there a

significant difference in underpricing between software firms which grant IPO stock options to top executives and those which do not grant such compensation? Does the dollar value of those stock options actually matter in explaining IPO underpricing for U.S. software companies in 1996-2000? Do insiders extract private benefits by IPO underpricing? Do managerial incentives matter in explaining IPO underpricing?

To answer those questions, I first take a glance at the average magnitude of stock option grants for the software industry and the market as a whole. Option-holding executives (of software companies) extract an immediate benefit from underpricing known as the money left on the table. It is the product of the difference between the first market price and the IPO offer price (strike price) multiplied by the total number of shares held by executives.

$$\underset{from\ Underpricing}{Benefit} = (First\ Mkt\ Price - Offer\ Price) \sum \underset{to\ executives}{Number\ of\ shares}$$

	Company average level (Per Executive)	Standard Deviation	Total software companies in the sample	All IPOs over 1996 to 2000
Benefits executives received from IPO	$77 million	$0.3 billion	$13.3 billion	$ 83.23 billion[11]

My estimate for the average benefits for top executives is $77 million from IPO underpricing[12]. Adding up the dollar benefit of IPO underpricing accruing to executives

[11] Ritter J. (2008). Some Factoids About the 2007 IPO Market, http://bear.cba.ufl.edu/ritter.
[12] Calculated by the total option value awarded to management team divided by the number of executives in each company.

for the IPOs in my sample, gives $13 billion, which amounts to nearly 16 percent of the total money left on the table for all industries ($83.23 billion of total benefits) during 1996-2000. This magnitude requires careful consideration and partially motivates us to take a closer look at executives' incentives to maximize their personal dollar benefit from IPO underpricing in this particular industry.

The remainder of this thesis is organized as follows. Section 2 lists relevant prior literature on the topic of IPO underpricing and the relation between executive stock option compensation and IPO underpricing; Section 3 describes the sample and data. In Sections 4 to 6 I report the theoretical background, descriptive statistics and empirical results; Section 7 concludes and discusses.

2. Literature review

First, I broadly review three main theoretical frameworks on underpricing. I then investigate more detail the work that focuses on the relation among executive stock option awards, corporate governance and IPO underpricing, introducing the managerial influence hypothesis.

2.1 Underpricing

The literature has established three principal hypotheses on the determinants of IPO underpricing: signaling theory, information asymmetry theory, and litigation risk theory (Ibbotson et al., 1994).

2.1.1 Signaling Theory

Signaling theory suggests that investors may possess different information from the IPO firm and its underwriters, therefore any information or news released from the firm may convey a signal to potential investors about the quality (high or low) and the future performance of the firm. By underpricing their IPO stock, the high quality companies or so called "good companies" convey to investors a costly signal of their firm quality. This demonstrates that they are able to surrender the benefit of current IPO proceeds because they believe that they will get compensated for the difference through a combination of future seasoned equity offerings receiving more favorable higher pricing

and a more favorable market response to dividends, and by using current funds for high-quality projects thereby improving firm value.

From a theoretical standpoint, Allen and Faulhaber (1989) first develop arguments that "good" firms signal their quality to potential investors by underpricing their initial issues to a greater extent, which further enables them to raise more capital in future seasoned offerings at more favorable rates.

Grinblatt and Hwang (1989) develop a three-parameter signaling model with two attributes, two signals and a continuum of signal levels and attribute types to explain new issued stock discounting or underpricing. They posit that "both the fraction of the new issue retained by the issuer and its offering price convey to investors the unobservable intrinsic value of the firm and the volatility of its cash flows", which lends support to the signaling theory of underpricing Allen and Faulhaber (1989) developed.

The model in Welch (1989) also predicts that "good" issuing firms do not mind IPO underpricing since higher price at seasoned offerings eventually makes up for the intentionally lower IPO price. Welch explains that IPO underpricing can drive low-quality firms to reveal themselves as "bad" firms. Because the marginal cost of underpricing for high-quality firm is lower than that for low-quality firm owners; high-quality firm owners can signal their superior information and prospects to investors. To replicate "good" firms, those "bad" firms have to spend signaling cost and other tangible and intangible resources to imitate the real activities and attributes of "good" firms. Higher signaling costs then force a replicating firm to reveal itself as a "bad" firm.

To summarize, all these theoretical papers propose signaling models that issuers send their superior information to outsiders about the value of their projects and the variance of their cash flows by underpricing their IPOs. These models also indicate that compared with firms with low IPO underpricing, firms with large IPO underpricing are more likely to issue larger amounts of equity in their seasoned equity offerings subsequently and those seasoned offerings are issued sooner after their IPOs and these issuing firms tend to undergo a smaller price drop on the date of the SEO announcement.

However, Jegadeesh et al. (1993) and Garfinkel (1993) find little empirical support for the signaling story. Jegadeesh et al. (1993) find that it is the market returns or market movements following the IPOs, not IPO initial returns, that significantly positively relate to the probability, frequency and size of subsequent seasoned equity offerings. Their evidence indicates that IPO underpricing does not play a unique role in predicting future seasoned equity offerings and suggests issuers do not have to rely on the expensive underpricing mechanism to signal to potential investors and market for future equity issues.

Garfinkel's (1993) findings support Jegadeesh et al. (1993) that IPO underpricing has little signaling effect on both the likelihood and the abnormal return of seasoned equity offerings. He also finds that underpricing has no significant influence on the

likelihood of insider sale in the open market, which is contradictory to the signaling theory that firms with greater underpricing tend to exhibit greater insider selling[13].

Michaely and Shaw (1994) is another empirical study, which utilizes a sample of 947 IPOs that went public during the period 1984-1988 to test several signaling models of IPO underpricing. Consistent with the above papers, they conclude that IPO underpricing is substantially negatively related to the frequency and size of seasoned equity offerings and also negatively related to future earnings and dividend payouts, which is inconsistent with the signaling theory of underpricing.

Lastly, Spiess and Pettway (1997) examine the relation between initial public offerings and seasoned equity reissues for 172 industrial firms that went public during 1987-1991 and then made subsequent seasoned equity offerings within three years of their IPO. They find little evidence that "good" firms choose IPO underpricing to signal their firm quality and they also find no evidence that firms recoup the cost of IPO underpricing in either higher reissue proceeds or in greater wealth for the firm's initial owners in their subsequent offerings.

Since the empirical literature shows controversial evidence that IPO underpricing plays a unique role in anticipating subsequent offerings (as signaling theory argues), it should be more appropriate to construct the common controlling variables in a more conservative method under a theory that is better supported by empirical research. Information asymmetry theory is a case in point.

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[13] An insider sale is defined as the open market sale of 10,000 or more shares by an owner or director within two years of the IPO, while the sale of smaller share blocks is more likely to represent a liquidity trade.

2.1.2 Information Asymmetry Theory

Information asymmetry occurs when one group of participants has better or timelier information and news about an issuing company or an IPO than other groups. Since all market participants do not equally have access to information they need for their decision making process, the existence of information asymmetry introduces an element of market inefficiency. (D'Cruz and Kini, 2008)

Beatty and Ritter (1986), Benveniste and Spindt (1989) and Baron (1982) give theoretical evidence that information asymmetry among various parties can also explain IPO underpricing. In particular, IPOs with greater uncertainty and significant information asymmetry are underpriced to a greater extent to compensate for the greater costs that market participants spend on learning firms' intrinsic values. Beatty and Ritter (1986) report an equilibrium in which the ex ante uncertainty[14] of an IPO value expected by outside investors is significantly positively related to its expected initial return. They also contend that this underpricing equilibrium is enforced by investment bankers who have experience underwriting IPOs, and any investment banker who "cheats" on the underpricing equilibrium by persistently underpricing either by too little or by too much, will be penalized by the marketplace. Therefore, I include underwriter reputation as my control variable when examining the relation between option grants and underpricing.

Benveniste and Spindt (1989) also lend support to Beatty and Ritter (1986) in that underpricing is directly related to the ex ante value of investors' information. They

[14] They use two proxies for ex ante uncertainty, those are (i) the log of one plus the number of uses of proceeds listed in the prospectus, and (ii) the inverse of the gross proceeds.

further test the effect of underwriters on the initial returns and they demonstrate that the existence of an underwriter can reduce IPO underpricing by selling IPOs repeatedly to the same regular investors.

Baron (1982) further emphasizes the importance of underwriters by presenting a theory of the demand for investment banking advising and distribution services for new issues. According to Baron (1982), the underwriter-investment banker is always better informed about the capital market than the issuer; therefore the optimal option for an issuer prior to the IPO is to surrender the rights of deciding the offer price to the better informed banker in order to deal with the adverse selection and moral hazard problems resulting from the informational asymmetry. His model demonstrates a positive demand for investment banking advising and distribution services with respect to the issuer's decision to issue publicly for the first time. Therefore, there is strong evidence that underpricing exists for many other reasons except option grants and I make sure to control for these effects before concluding that option grants are also associated with underpricing.

Many papers, including Megginson and Weiss (1991) and Clarkson and Merkley (1994) find empirical evidence for the importance of information asymmetry as a determinant of underpricing. Megginson and Weiss (1991) lend support for the certification role of venture capitalists in IPOs by examining the influence of venture capitalists on IPO underpricing and subsequent ownership structure of IPOs. They compare VC backed IPOs and non-VC backed offers from 1983-1987 and their results indicate that VC backed firms are more likely to attract underwriters and auditors with

higher reputation than non-VC backed IPOs. They conclude that venture capitalists are able to lower the costs of going public and significantly lower IPO underpricing and underwriter compensation, by reducing the information asymmetry between the issuing firm and potential investors and financial specialists such as underwriters and auditors. As for the effect on the IPO ownership structure, they find that venture capitalists are not using the IPO as an opportunity to sell some of their holdings and realize a return on investment. Therefore, I also include venture capitalist dummy as a control variable when examining the relation between option grants and underpricing.

Clarkson and Merkley (1994) study the relation between ex ante uncertainty and underpricing in the Canadian context. They come to a conclusion that the greater this uncertainty is, the greater will be the underpricing. They base their argument on the winner's curse problem. To induce the uninformed investors to remain in the IPO market, issues need to be underpriced.

Overall, the evidence testing the information asymmetry theory is more supportive than that for the signaling theory. Therefore, I mostly base my theoretical justification on information asymmetry arguments and incorporate control variables determining underpricing based on the information asymmetry theory, while recognizing the contributing effect of signaling theory.

2.1.3 Litigation Risk Theory

The third theory which has gained popularity recently is the litigation risk theory. The litigation risk hypothesis according to Ibbotson (1975) and Tinic (1988) is that firms intentionally underprice their shares as a form of insurance against future liability (costs). A firm contending to be listed, should be prepared to bear the potential costs of litigation, and these costs, like settlement payments, can be very substantial. To reduce the likelihood of incurring litigation costs, firms and underwriters should reduce the possibility of being sued by underpricing their new issues by a greater amount to lower the potential damages that plaintiffs can be awarded. Tinic (1988) tests the litigation-risk hypothesis by comparing the underpricing of IPOs prior to and subsequent to the 1933 Securities Act, which substantially increased the legal exposure of IPO issues, and concludes that the 1933 Securities Act increased expected litigation costs and therefore resulted in more underpricing. Hughes and Thakor (1992) extend Tinic's analysis in a game-theoretic setting and specify the conditions required for equilibrium underpricing. Hensler (1995) formalizes Tinic's model using a utility-maximization single period model. Both models similarly predict a positive relationship between litigation risk and underpricing.

Lowry and Shu (2002) examine the relation between underpricing and litigation risk emphasizing the importance of cross-sectional approach and controlling for endogeneity. They find that firms with higher litigation risk underprice their IPOs by significantly greater amounts, which supports Ibbotson (1975) and Tinic (1988). Their evidence also demonstrates that firms experiencing more underpricing significantly lower

their litigation risks and reduce the possibility of being sued, especially for lawsuits occurring closer to IPO dates. Controlling for endogeneity of IPO underpricing and lawsuit probability, they find support for both the insurance and deterrence aspects of the litigation-risk hypothesis.

In line with the information asymmetry theory, IPOs backed by venture capitalists and high-ranked underwriters would be expected to have better governance and operations and thereby lower the risk of getting sued (litigation risk). In this case the company would not need to use higher underpricing to avoid lawsuits. I capture this effect by controlling for underwriter quality and whether an IPO is venture capitalist backed.

2.2 Executive Stock Option Compensation and IPO Underpricing-Managerial Influence Hypothesis

Some studies suggest that IPO and pre-IPO executive stock option compensation and IPO underpricing are positively related, and that IPOs are significantly more underpriced for IPO companies which issue option compensation to top executives than those which choose not to. This relationship is known as the managerial influence hypothesis. According to Rocholl (2005), approximately 80 percent of German Neuer Markt IPO firms grant IPO stock options to their top managers during 1997-2001. His empirical results indicate that issuing companies and in particular, their insiders do not demand less IPO underpricing per se, by using a dataset of prospectuses for 290 issuing companies and he arrives at a conclusion that these IPOs are significantly more underpriced than IPO companies in which no top managers hold IPO options. He

documents that insiders derive substantial private benefits from IPO underpricing and put more money on the table.

Taranto (2003) also provides evidence that the utilization of stock options explains a substantial part of the cross-sectional variation in IPO underpricing. He relates this result in U.S. IPOs to tax considerations by executives who exercise their options at the IPO. It is debatable since options are mainly granted shortly before the IPO and become part of the lock-up agreement making it impossible for top managers to sell them at the IPO. The author also states that underpricing allows the use of equity and options as a substitute for cash when paying employees, strengthening strategic alliances and rewarding important customers. Taranto further finds that insiders with options can also benefit from IPO underpricing: many CEOs gain private wealth when their offering is underpriced, firm option use is positively related to underpricing and options use is positively related to venture capital ownership.

Similarly, Ljungqvist and Wilhelm (2003) present proof supporting the managerial influence hypothesis of IPO underpricing. They show that CEO pre-IPO ownership and underpricing are negatively related. They explain that selling behavior and ownership structure affect the intensity of monitoring and the degree of realized underpricing and conclude that initial returns are greater when insiders sell fewer shares at the offer price and when insider ownership stakes are smaller and more fragmented. They also find that options granted to executives and their friends and family and underpricing are positively related.

In addition, Yermack (1997) claims that managers' influence over the terms (timings) of their stock options results in an approximate two percent increase in the value of their options, suggesting that CEOs benefit from favorable timing of stock option awards relative to corporate news announcements. Aboody and Kasznik (2000) also provide evidence that CEOs of firms with scheduled awards make opportunistic voluntary disclosures that maximize their stock option compensation. They suggest that top executives have compensation-related incentives to delay good news and rush forward bad news. Newer evidence in Heron and Lie (2007) documents wide-spread practice of timing executive option grants.

To conclude, the managerial influence hypothesis of IPO underpricing indicates the possible explanatory power of the company's ownership structure, executive compensation structure (particularly long-term performance-related incentives) and management's disclosure of their compensation and companies news announcements on the initial returns at the IPO date.

However, recent literature generates different results and explanations. Lowry and Murphy (2007) find no support that U.S. firms granting IPO options have higher first-day returns than firms not granting such options for all industries from 1996 to 2000, challenging prior literature. Their results are robust to controlling variables in the literature commonly linked to underpricing, and are inconsistent with the hypothesis that executives with IPO options extract private benefits by setting a lower offer price. They point to one possible explanation, namely the governance characteristics of issuing firms such as concentrated executive ownership and active potential investors place restrictions

on executive's IPO rent-seeking activities. One aspect of this study sheds more light on this debate.

The present work has a broader scope because it contrasts the relation between option grants and underpricing to the relation between option grants and 6-month and 1-year stock performance. Aboody (1996) finds a significant negative relation between the estimated value of outstanding employee stock options and the long term stock price, after controlling for the mechanical relation between option values and share prices. Aboody (1996) calculates the value of the options using estimates of inputs to an option pricing model in a same way as this thesis does. Following Aboody (1996)'s methodology, however, Rees and Stott (1998) find a significant positive relation between stock-based compensation expense and share prices and returns.

Kedia, Simi and Mozumdar (2002) also examine the effect of option grants to top executives on firm performance as measured by abnormal stock returns for 200 largest NASDAQ firms from 1995 to 1998. Their evidence suggests that option granting firms, especially those awarding options to attract and retain their key employees generate more positive abnormal stock returns for their shareholders. They also conclude that option grants by firms with financial constraints create an excess return suggesting that stock options may be one mechanism through which start-ups and other cash strapped firms like software firms can compete in the labor market effectively.

I acknowledge the potential endogeneity problem in my empirical tests and apply simultaneous equations approach. Some studies demonstrate reverse causality, whereby managerial influence variables (option grants and pre-IPO ownership) are dependent

variables and quality related variables are regressors. To illustrate, Weber and Dudney (2003) find that a company's board of directors, executive ownership and option grants are related. They note that CEO's tenure affects the level of option compensation because longer tenure CEOs would be expected to earn higher salaries and other long-term incentives. They also examine the effect of a CEO's age and ownership of the company on compensation level, controlling for company age, total assets, board size, and the presence of institutional holdings, founder-led dummy and education dummy. Their results show a positive correlation between CEO age and option compensation, as well as between CEO ownership and CEO compensation. Likewise, regarding the determinants of option grants, Roosenboom and Goot's (2006) empirical results provide evidence that employees are more likely to be compensated by options when the company has higher past accounting and stock price performance and firm's growth opportunities, while employees are not likely to be compensated by options when retained ownership is higher and the IPO is backed by venture capitalists. This inverse relation suggests that retained ownership and external monitoring can be seen as substitutes for option grants since "there is less need to address the agency problem by using stock option grants". Roosenboom and Goot (2006) also find that cash constraints play an important role when a firm considers an alternative to cash compensation. And finally, option grants are used more when employees represent a greater benefit to the firm and when the labor market is tight. (Oyer, 2004). All this literature on "reverse causality" improves the empirical work in a simultaneous way that eliminates the endogeneity problem this "reverse causality" may bring about. Based on the literature above, I further construct equation (2) and (3) to address this endogeneity problem.

In the present section I examine the prevalent theoretical and empirical evidence of IPO underpricing-signaling theory, information asymmetry theory and litigation risk theory. I base the research, assemble the control variables and build testable arguments on the information asymmetry theory since it provides both theoretical and empirical support with respect to IPO underpricing. The literature further introduces the managerial influence theory on underpricing and implies that top management has incentives to influence the method of long-term incentive awards and the announcement of timing of stock option grants to affect IPO underpricing and maximize the wealth effect of their options.

3. Data

I begin with compensation data for the whole software industry, which includes 422 software companies[15]. I retain executive compensation and option compensation data, underwriter information and shares owned by the top executives and total shares outstanding prior to the IPO. I also gather the information on the firm's management team and board of directors, including the board size, CEO age and tenure, etc. For the missing records of those 422 companies, I manually collect their executive stock option compensation data and ownership information from their IPO prospectus and proxy statements in Securities and Exchange Commission's (SEC's) Electronic Data Gathering, Analysis, and Retrieval (EDGAR) system between year 1996 and year 2000 (Final prospectuses are identified on EDGAR as document 424B at http://www.sec.gov).

Next I use the Securities Data Company (SDC) database to download U.S. market new issues over the period 1996-2000. There are 2,285[16] new issues during this time period. I collect a complete IPO record: Ticker, Issuer, Date of IPO, and Business Description, SIC code, High Tech Industry Dummy, State, Nation, Industry, Firm Age, Principal Amount, Proceeds Amount, Offer Price, Shares Filed, Amount Filed, Total Shares Offered, and Stock Price of 1 day, 1 week, 6 months and 1 year after the offer. I then calculate the percentage change in the stock price with respect to 1 day, 1 week, 6 month and 1 year as stock performance indicators of increasing length. I use the 1-day and 1-week returns to evaluate IPO underpricing, whereas I interpret the 6-months and 1-

[15] Generously provided by Prof. Martin L. Martens. The 422 issuing companies constitute the whole software industry from 1996 to 2000.

[16] Ritter J.(2008) Some Factoids About the 2007 IPO Market, http://bear.cba.ufl.edu/ritter

year as realized performance measures In addition, I obtain Log (Total Assets), NASDAQ price index, filing range/adjusted price and two types of IPO (dummy variables) - whether it is venture capitalist backed or not and whether it is founder-led IPO or professional-led IPO from SDC. To control for the effect of market return at the time of the IPO on underpricing, I collect from CRSP 15-day daily returns on NYSE/AMEX/NASDAQ composite index before each IPO date and compound them annually to obtain the Index market return. As an alternative measure of underpricing, I also use "price update", defined as the percentage change between the offer price and the midpoint of the filing range (as stated in a preliminary prospectus). An advantage of this approach is that it does not rely on the assumption that the first aftermarket closing price is an unbiased estimate of firm value, an assumption that Loughran and Ritter (2004) suggest might not hold during the dot-com bubble period. Nevertheless, this method assumes that all bargaining over the offer price occurs at the pricing meeting, when the offer price is set, rather than when the underwriter is chosen prior to the setting of the initial filing range.

I proceed to match the "422-firm" dataset and all 2,285 IPO issues during the same period. After the match, 377 out of the 422 companies can be perfectly matched with variables obtained from SDC and CRSP. The remaining 45 companies could not be matched because different ticker was used in the two data sets. For these 45 companies, I manually match by names and/or issue dates.

Executive ownership is defined as shares owned by the top executives as a fraction of shares outstanding prior to the IPO. Top underwriter names are extracted from

"422 company data" and I manually match the reputation ranking for each issuer from: http://bear.cba.ufl.edu/ritter/ipodata.htm. Underwriter ranks range from zero to 9.1, with higher ranks representing higher-quality underwriters. In general, underwriters with a rank of 8.0 to 9.1 (on a scale of 0 to 9.1) are considered to be prestigious national underwriters. Those with a rank of 5.0 to 7.9 are considered to be quality regional or niche underwriters. Underwriters with a rank of 0 to 4.9 are generally associated with penny stocks; many with ranks of 3.0 or lower have been charged by the SEC with market manipulation.

To calculate the total value of stock options, I first calculate the Black-Scholes[17] stock option value and then multiply by the total number of option granted to all top executives and CEOs for each company management team. To calculate Black-Scholes stock option value, I manually collect each IPO company's stock price S, strike price K, years to maturity for every option grant T, volatility σ, and risk free rate of return r. The measurement and source for each input are listed as Table 5 Panel A shows.

I compute an estimate of the stock option value for each listed software company. I calculate the dollar value of option grants of the CEO and of the entire top management

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[17] See Black, F. & Scholes, M. 1973. The Pricing of Options and Corporate Liabilities. Journal of Political Economy 81 (3): 637–654. Black–Scholes option pricing model: the price of the underlying instrument S_t follows a geometric Brownian motion with constant drift μ and volatility σ, and the price changes are log-normally distributed:

$dS_t = \mu S_t\,dt + \sigma S_t\,dW_t$ The formula for the price C of a European call option with exercise price K on a stock currently trading at price S, The risk free rate of return is r, and the constant stock volatility is σ.

$C(S,T) = S\Phi(d_1) - Ke^{-rT}\Phi(d_2)$ where $d_1 = \dfrac{\ln(S/K) + (r+\sigma^2/2)T}{\sigma\sqrt{T}}$

$d_2 = \dfrac{\ln(S/K) + (r-\sigma^2/2)T}{\sigma\sqrt{T}} = d_1 - \sigma\sqrt{T}.$ Φ is the standard normal cumulative distribution function.

team by multiplying the Black-Sholes option value times the number of options given to the CEO and the management team respectively.

4. Theoretical Background

I follow the stylized theoretical model developed by Rochell (2005) and its indications on the relationship among IPO option grants, managerial ownership, strike price settings, and IPO underpricing. The assumptions of this model are:

a) Prior to an IPO, a company holds m divisible shares with overall value V. Executive pre-IPO ownership is α, i.e., they own αm shares of the company, the remaining shares $(1-\alpha)m$ are owned by outside private investors like venture capitalists, financial intermediaries and corporate investors.

b) At the IPO the company grants to executives x executive stock options and sells to outside investors y new shares from a capital increase at the offer price OP per share. If the management exercise all their options and the company sells all the new shares, the number of outstanding shares after the IPO is m + x + y. The volume for x and y as well as the design of the executive stock options are determined by the company before the IPO.

c) If the company sets the strike price for the executive stock options equal to OP, it receives x*OP from executives or insiders who exercise their options. It also receives y*OP from selling the new shares. This means that the price P for the listed share is:

$$P = \frac{V + y*OP + x*OP}{m + x + y}$$

The insider's post-IPO wealth is $W = m\alpha *P + x*P - x*OP$, which can be rewritten as

$$W = m\alpha * (\frac{V + y*OP + x*OP}{m+x+y}) + x*(\frac{V + y*OP + x*OP}{m+x+y}) - x*OP$$
$$= \frac{m\alpha*V + m\alpha*OP*y + m\alpha*OP*x + x*V - m*x*OP}{m+x+y}$$
$$= \frac{m(\alpha*y + \alpha*x - x)}{m+x+y}*OP + \frac{m\alpha*V + x*V}{m+x+y}$$

To have the manager find it optimal to choose a lower offer price i.e., letting the offer price be small enough while maximizing the executive wealth, the coefficient of OP in the wealth expression should be negative. That means

$$\alpha*y + \alpha*x - x < 0 \Rightarrow \alpha < \frac{x}{x+y} \Rightarrow \alpha < \frac{1}{1+\frac{y}{x}}$$

With non-negative x and y and a sufficiently small α (no bigger than $\frac{1}{1+\frac{y}{x}}$), $\frac{m(\alpha*y + \alpha*x - x)}{m+x+y}$ becomes negative. To conclude, with an adequately small ownership α, insiders receiving options benefit from lowering the offer price and causing more IPO underpricing because underpricing is evaluated by the difference between stock price and offer price divided by offer price: offer price is a smaller value leading to a larger value of underpricing. Therefore, this simple model predicts that option grants should be positively related to underpricing, while pre-IPO ownership is negatively related to IPO initial returns.

5. Descriptive Results

Table 1 provides descriptive statistics on firms with and without IPO options issued to top executives. Approximately 75% of the sample of software firms grant IPO option compensation to executives (313 out of 422 firms). The second to fifth rows in the table provide some initial evidence that firms with IPO options tend to have greater underpricing and performance, in particular: firms with IPO options have average initial returns of 81.16%, compared to 50.59% for firms without IPO options, and the difference is statistically significant at the 1 percent level.

The executives' stock ownership before and after the IPO does not change much. The largest shareholders before the IPO are insiders -top executives- who hold a share above 64% (62.88% for option granting companies and 69.47% for non-option-granting companies). The executive team sells part of their holdings in the IPO, but the average volume of these sales amounts only to a small fraction of their pre-IPO holdings (49.58% post IPO share for option-granting companies and 52.03% share for non-option-granting companies). Insiders sell shares in 64% of the IPOs, they sell on average only 15% (64% minus 50%) of their shares in the IPO, but they do not sell all of their shares in any single IPO.

In addition, IPO companies with option compensation grants are venture capitalist-backed to a greater extent (73.81% vs. 46.79%), have better underwriter ranking (8.38 vs. 7.92), higher offer price ($14.55 vs. $13.21), larger IPO proceeds ($61.67 mil vs. $58.94mil), larger board size, however larger percentage of them fail within 3 years after the IPO compared those without IPO stock option grants. Except for

the IPO proceeds, these differences between option-granting and non-option-granting companies are significant at least at 10 percent significance level. On the other hand, option-granting companies are: founder-led to a lower extent (52.40% vs. 60.55%), younger before the IPO (firm age is 6.81 vs. 8.71), have lower assets prior to the IPO ($51.16 mil vs. $59.31 mil) and lower CEO tenure and CEO age compared to non-option-granting companies. The differences between the two groups (except for assets size and CEO age) are significant at the 1 percent level. The descriptive statistics indicate roughly that the IPOs of option granting firms with less pre-IPO executive stock ownership are more substantially underpriced, which is consistent with the theoretical notion that with an adequately small ownership, insiders benefit from lowering the offer price and greater IPO underpricing. The evidence in this table emphasizes the importance of controlling for firm specific characteristics in subsequent tests.Table **1** b shows the summary statistics of the number and value of stock options among option-granting companies. The average number of options to non-CEO executives is much lower than the average number of options granted to CEOs (270,435 vs. 537,921). Similarly, the average dollar value of options granted to non-CEO executives is also far below the average dollar value of options granted to CEOs (4,147,666 vs. 8,294,988). It is notable that the standard deviation of the value of option grants to CEOs is high, indicating a big CEO pay gap within the software industry.

Table 2 shows a detailed comparison of the degree of underpricing and performance. IPOs of option-granting firms are more substantially underpriced by all measurements at the 1 percent significance level. Furthermore, compared to the average underpricing level of all IPO issues in the same period including all industries, the

software industry IPOs are much more underpriced and this difference is also significant at 1 percent level. The variation in IPO underpricing is also much greater than that for all industries. This industry specific comparison is consistent with other research. For example, Merkley (1986) found that in "hot" industries like software and dot-com companies, "where growth possibilities are high and where the proceeds of the issues are used to finance new projects, IPOs are characterized by a higher level of underpricing". On the other hand, IPOs of firms in more regulated industries or IPOs for which the proceeds will be used for financing purposes are much less underpriced. In addition, Beatty and Ritter (1986) argue that underwriters, in order to keep their market share in the IPO market, need to underprice the issues so that the initial return is commensurate with the ex ante uncertainty of the issue. Figure 1 illustrates that option-granting software firms have the greatest underpricing, performance and variation, followed by non-option-granting firms. The overall average IPO underpricing and performance of all industries is smaller. Interestingly, the results show a stable level of average underpricing and performance from 1 day to 1 year after the IPO, for software companies and for all industries, in contrast to the decreasing underpricing after the IPO documented in prior literature[18]. For example, Ritter (1991) examines the long-run (0-36 month after IPO) performance of 1,526 IPOs in the period of 1975-1984 and finds that when compared with non-issuing matching companies, underpricing does not persist over time and IPOs significantly underperform in the long run. Assuming that post-IPO underpricing is decreasing over time, the consistent underpricing in my study can be still attributed to its time specificity. Software companies during the bull market years, when the entire

[18] Ritter (1991), Degeorge and Zeckhauser (1993), Jain and Kini (1994), Mikkelson, Partch, and Shah (1995), Pagano, Panetta and Zingales (1998)

market -particularly NASDAQ-was booming up, were considered over-valued, leading to abnormally high stock price over time. It is likely that the descriptive results are capturing the market up-turn, therefore I am careful to control for market return in my regressions.

Table 3 provides descriptive statistics of the number of new issues by year and compares average underpricing and performance levels from 1996 to 2000. For the years 1998-2000, there are more software companies going public and their IPOs are substantially underpriced at all levels: there are 54 IPOs in 1998, 178 IPOs in 1999 and 87 IPOs in the first quarter of 2000 compared to only 48 IPOs in 1996 and 55 IPOs in 1997. Not surprisingly, the one year performance is negative for the year 2000 IPOs possibly due to the steep market decline starting in March 2000. Figure 2 shows that all levels of underpricing and performance for software companies in 1998 and 1999 are very high while substantially decrease for the year 2000.I explore the year effects in the later part of this thesis.

6. Empirical Implications

The regression equations in this thesis are composed of three parts listed below: (1) is the main regression equation where measurements of option grants and pre-IPO ownership together with control variables with respect to IPO underpricing and post-IPO stock performance. I apply this equation to run the OLS regression. As illustrated in the literature, "reverse causality" may exist in equation (1), which could result in the problem of endogeneity. To cope with this problem, I then create equation (2) and (3) to generate a set of simultaneous equations. I apply this set of equations (1), (2) and (3) to run the Hausman test and 3SLS regression. To study the relationship between the IPO underpricing and the stock option value, I further apply equation (2) in Heckman filter test to correct for sample selection biases. Notation and construction of each variable are described in Table 5.

$$\begin{aligned} Underpricing = {} & \alpha_0 + \alpha_1(Option\ Grants) + \alpha_2(Pre\text{-}IPO\ own) + \alpha_3(Market\ Return) + \\ & + \alpha_4(Size) + \alpha_5(Venture\text{-}backed) + \alpha_6(Nasdaq) + \\ & + \alpha_7(Underwriter\ Rep) + \\ & + \alpha_8(Age) + \alpha_9(Founder) + \alpha_{10i}(Year)_i + \varepsilon \end{aligned} \quad (1)$$

$$\begin{aligned} Option\ Grants = {} & \beta_0 + \beta_1(Quality) + \beta_2(Pre\text{-}IPO\ own) + \beta_3(Size) + \\ & + \beta_4(Venture\text{-}backed) + \beta_5(Underwriter\ Rep) + \\ & + \beta_6(Age) + \beta_7(Founder) + \\ & + \beta_8(Board\ Size) + \beta_9(Tenure) + \beta_{10i}(Year)_i + \eta \end{aligned} \quad (1)$$

$$Pre\text{-}IPO\ own = \gamma_0 + \gamma_1(Quality) + \gamma_2(Size) + \\ + \gamma_4(Age) + \gamma_5(Founder) + \\ + \gamma_6(Tenure) + \gamma_{7i}(Year)_i + \zeta \quad (2)$$

Market Return: "market return" evaluates the market movements before the IPO. Loughran and Ritter (2002 and 2004) state that market returns on the stock index are positively related to underpricing.

Firm size (Pre-IPO assets): "assets" is negatively related to underpricing since larger companies may disclose more information to outsiders (Lowry and Murphy, 2007). Other research also indicates that larger IPO firms tend to outperform smaller ones in terms of stock appreciation (e.g., Megginson and Weiss, 1991; Mikkelson, Partch, and Shah, 1997).

Venture-backed dummy: Megginson and Weiss (1991) predict that on the one hand venture capitalists endorse the new offer price which decreases going-public firm's uncertainty, further decreases the information asymmetry between the issuing firm and potential investors, finally lower the underpricing. On the other hand, venture capitalists in the issuing company never sell shares at the IPO date and therefore they will unsurprisingly seek to reduce "money left on the table" in IPOs, which also leads to lower underpricing. However, Ljungqvist and Wilhelm (2003) find that venture-backed firms experience more underpricing during this period. Taranto (2003) also discusses some possible reasons why venture backed IPOs have more executive options and higher

underpricing around IPOs. VC backed is a dummy variable that takes a value of 1 if a venture capitalist is a shareholder before the IPO and 0 otherwise.

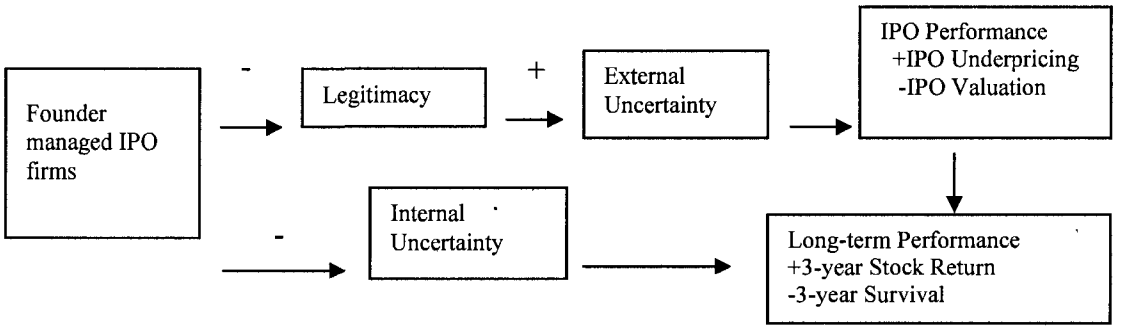
Nasdaq price index: Table 3 shows both the number of firms listed and the magnitude of IPO underpricing tend to increase during 1996 to 2000, in which the NASDAQ index climbed from 1,052 to 5,048. Therefore I include the Nasdaq composite index to control for this effect. And I expect a positive relationship.

Underwriter Reputation: Similar to the role of venture capitalists, Carter and Manaster (1990) state that higher-ranked underwriters- investment banks also reduce the uncertainty of issuing firms before IPOs and thereby further reduce the level of underpricing. Loughran and Ritter (2002) also find that underwriter prestige is significantly inversely related to IPO initial returns within 1990-1998. However, Loughran and Ritter (2004) argue that underwriters tend to have more influence to underprice IPO shares, which generates more valuable currency to distribute to current or potential investment banking clients, indicating a positive relation between underwriter reputation and underpricing.

Firm age at the time of the IPO is also controlled for since younger firms are more vulnerable. Older firms tend to perform better both before and after the IPO (Ritter 1998) indicating a positive relationship between firm age and IPO underpricing.

Founder dummy reflects the third IPO type besides underwriter and venture-capitalist backed IPO. Wasserman (2003) points out the significance of differentiating between founder-led firms and professionally managed firms with respect to IPO

underpricing[19]. Certo et al. (2001) claim that the presence of a founder CEO could sway underwriters to suspect that "founders overestimate the strengths and associated prospects for long-term success of their firms, and this lack of objectivity may result in poor management decisions". Hence, underwriters may set a lower offer price which promotes underpricing. Arcand (2008) re-examines the effect of founder-managers on underpricing in more detail by explaining the external and internal effects of founder CEO at the time of IPO. [20] The results show in the figure below that the IPO firm led by a founder lowers the legitimacy, raises the external uncertainty, lowers the offer price and finally raises underpricing. This figure also shows that the founder-CEO has a positive influence on the long-term post-IPO firm performance. I adopt a dummy variable Founder-led IPO equal to 1 if the IPO is Founder-led, and equals to 0 otherwise.



1996-2000 year dummies: to account for the especially high initial returns during the "Dot-com Bubble" during 1998-2000 as discussed above, I also include year dummy variables.

[19] Professionally managed refers to hiring an experienced manager from outside the firm rather than the founder to serve as the CEO of the firm (Moschella, 2006)

[20] The external effect is the effect of founder-led firms on potential institutional investors, and thus on IPO performance-the level of underpricing and offer price. The internal effect is the effect of founder-led firms on the long-term firm performance.

6.1 Pair-wise Correlation Test

Table 4 shows the Pearson correlation matrix among underpricing/performance, Option Grant-Dummy/Value, executive pre-IPO ownership and other control variables. Underpricing is defined as Underpricing over 1 day through 1 week and Price Update (defined as the percentage change between the offer price and the midpoint of the filing range). Performance is defined as stock return after 6 months and after 1 year with respect to offer price after the IPO date. Option Dum is a dummy variable that reflects the choice of whether to grant IPO options to the executives or not. Option value is the product of Black-Scholes option value multiplied by the number of options granted to the management team. Pre-IPO own is defined as shares owned by the top executives as a fraction of shares outstanding prior to the IPO. According to Rochell (2005), underpricing has an ambiguous effect on insiders' wealth. On the one hand, their stock options become more valuable. On the other hand, they suffer from the dilution of their shares. Therefore, their incentives depend on their ownership stake and lower management stake leads to higher underpricing. By contrast, Ljungqvist and Wilhelm (2003) find that underpricing is positively related to the proportion of IPO shares offered to top executives.

The results of the Pearson correlation test show that the Underpricing-1d/1w and Price Update are positively and significantly correlated with IPO Option Dum at 5 percent level and Performance-6m is also significantly related to Option Dum at 10 percent level. Option value is more significantly correlated to Underpricing-1d/1w and Price Update at 1 percent significance level. While the underpricing and performance by

all measures is negatively related to pre-IPO ownership but this relationship is insignificant. Furthermore, the option grant dummy is negatively related to pre-IPO ownership at the 5 percent significance level. Market Return, Firm Size, Venture-backed dummy, Nasdaq and Underwriter Rep are positively and significantly correlated to underpricing and performance; while the correlation coefficient is significantly negative for firm Age. The year dummies correlations show that for the years 1996 and 1997; there is a strong negative effect on underpricing and performance, while this correlation becomes significantly positive in 1999 and 2000 (for 1998, only the effect on Price Update and on Performance-1y is significant), confirming the same trend of increasing IPO underpricing in the bubble years as shown in Table 3.

6.2 OLS Regression

I begin my examination of whether the choice to grant options affects the degree of underpricing and performance by running an OLS regression with control variables in Equation (1).

Table 6 reports estimated coefficients of OLS regressions explaining IPO underpricing and performance over the 1996-2000 period, including measures of IPO Options Dummy and Option Value and executive pre-IPO ownership as well as all the control variables discussed above. The coefficients on the Option Dummy are positive and insignificant for all underpricing measures (Underpricing 1d/1w and Price Update) and performance (Performance-6m/1y); while the coefficient on Option Value is

significantly positive for underpricing denoted by Underpricng-1d/1w and Price Update. Pre-IPO executive shareholdings are negatively related to IPO underpricing and performance as predicted, but this relation is insignificant.

The inferences on the control variables are generally similar to prior results in the literature. I find that Market Return and Underwriter Rep are always significantly positively related to Underpricing-1d/1w and Price Update. Firm size is only significantly positively related to underpricing at the one-week horizon. For all other horizons, there is no substantial difference in underpricing between large and small software firms. The reason behind this result could be that compared to a regular manufacturing company relying on tangible assets, software companies rely mainly on non-quantifiable human capital or other intangible assets (Freeware, Shareware and Open Source) not reflected in measures of size. The coefficient on the NASDAQ composite index is significantly positive for Underpricing -1d and Price Update, but becomes significantly negative in one year on post-IPO stock performance. In addition, I find that the year dummies 1998 and 1999 are significantly positively related to Performance 6m/1y, meaning that the bubble years account for some of the post IPO stock performance. Not surprisingly, year 2000 has a significantly negative impact on underpricing (Price Update), as that is the year when the stock market crashed. Firm Age is negatively related to Underpricing-1w, Price Update and Performance-6m in the regressions where Option grant is a dummy, meaning that younger firms perform better than older firms and this relationship is fairly significant. In the option-grant-dummy regressions, the Founder dummy is significantly negatively related to Price Update, while the Venture-backed dummy is significantly positively related to Price Update. Firm Size positively relates to Underpricing-1w.

The principal results are in line with Lowry and Murphy (2007), finding no evidence that U.S. software companies granting IPO options have higher first-day returns than firms not granting such options when considering a variety of specifications and control variables. In addition, I also find that there's no clear relationship between the choice of whether to grant options and first-week returns, Price Update, 6-month and 1-year stock performance. However, I do find that the dollar value of stock options granted to executives is substantially positively related to underpricing when evaluated by undepricing-1d/1w and price update models. Among option granting companies, underpricing appears to depend more on the managerial influence theory. Executives' principal concern is to maximize their benefit by affecting the discounted value and terms of options: the time to maturity and exercise price of their options, and more importantly, the expected volatility of the firm (according to Black-Scholes option value). They then deliberately set lower offer price or more underpricing so that they can make more money in the long run to compensate this volatility risk and mitigate this uncertainty when they are able to exercise the options.

6.3 Year Specific Valuation

Table 7 analyzes the effect of executive IPO option compensation on different measures of underpricing and performance for each of the years from 1996 to 2000. I find no evidence of significant relationship between IPO underpricing (Underpricing-1d/1w and Price Update) and the executive option grant dummy or option value for the years 1996-1998. However, I find that in 1999 and 2000, the total dollar value of stock options granted to top executives is positively related to underpricing. The control variables also have more explanatory power in 1999 and 2000. The pronounced Market Returns effect shows that the overall market movements substantially explain the large level of underpricing and performance of software companies in 1999 and 2000.

6.4 Heckman Two-Step Sample Selection Model

So far, I have examined the managerial influence on the level of IPO underpricing and performance. Option-holding executives may intentionally set lower offer price for their options resulting in immediate post IPO price increase or a longer-term performance effect. I am also interested in the managerial influence on the choice of being granted stock options when they have expectations with respect to underpricing and post-IPO performance. The "Quality-3 year fail dummy" in regression equation (2) captures the management expectation of the quality of the firm. If the "3-year fail" dummy is 1, this new issue would be delisted in the subsequent 3 years, which could be anticipated by executives and they may push for greater IPO underpricing. This may lead to lower number and value of options the executives will receive today. I then test the inverse relationship between the levels of IPO underpricing and the total dollar value of the stock

options awarded to either top executives or CEOs among the firms granting options. Simply regressing the total dollar value of IPO stock options on the underpricing among the group of companies who issue stock options would be biased because there is a concentration of values of the dependent variable at a limit (in this case \$0, I only observe value of options that is worth more than \$0). In other words, OLS estimates are biased since the dependent variable is not continuous and unbounded. According to Heckman (1979), I should do a two-step sample selection regression:

First step: I use a selection regression as Equation (2) shows to determine the probability of censoring (the probability to grant options or the probability that the value of the options is observed among the firms) and then;

Second step: I use an outcome regression to determine the value of dependent variable (the dollar value of these options) given the fact that the value of the options is observed.

The form of sample selection model according to Heckman (1979) is

Selection Equation is:

$$z_i^* = w_i'\alpha + e_i$$

Where, Z is the event that issuing companies grant options to executives. If they choose to grant options, z=1; otherwise z=0. w is a set of predictive variables.

$$z_i = 0 \; if \; z_i^* \leq 0;$$

$$z_i = 1 \; if \; z_i^* > 0$$

Outcome Equation is:

$$y_i^* = x_i'\beta + u_i$$

$$y_i = y_i^* \; if \; z_i{=}1$$

$$y_i \; not \; observed \; if \; z_i = 0$$

Where Y is the option value under z equals 1. I begin by estimating a probit model for the probability that z=1, in my case, for the probability that an IPO company grants option compensation to their executives. This model is estimated with all of my observations using a set of predictive variables called w and yielding a coefficient vector α.

$$pr(z_i = 1) = \Phi(w_i'\alpha)$$

Next, I estimate the expected dollar value of the options y, conditional on z=1, and x:

$$E(y_i|z = 1, x_i) = x_i'\beta + E(u_i|z_i = 1)$$

$$= x_i'\beta + E(u_i|e_i > w_i'\alpha) \text{ (a)}$$

Then I evaluate the conditional expectation of u in (a):

$$E(u_i|e_i > w_i'\alpha) = \rho\sigma_e\sigma_u \frac{\phi(w_i'\alpha)}{\Phi(w_i'\alpha)} \text{ (b)}$$

Substitute (b) into (a)

$$E(y_i|z = 1, x_i) = x_i'\beta + \rho\sigma_e\sigma_u \frac{\phi(w_i'\alpha)}{\Phi(w_i'\alpha)} \text{ (c)}$$

Use OLS to regress y on x_i and $\lambda_i = \frac{\phi_i}{\Phi_i}$:

$$E(y_i|z = 1, x_i)=x_i'\hat{\beta} + \Theta\hat{\lambda} \text{ (d)}$$

To estimate the OLS, I first obtain the probit results, i.e., the probability for the IPO companies to grant options to their executives and, for the subsample for which option value is observed (z=1), I compute the estimate of ϕ over Φ, also called the inverse mills ratio, denoted by λ. Then, for this same subsample, I use OLS to regress the dollar value of the stock options y on x and on my estimate of λ. This will yield estimates of the vector of coefficients (β), and of Θ, which is the covariance between u and e. Equation (d) shows that the resulting estimates of the vector β, in general, will be biased if the variable λ had been omitted. I report the results in Table 8.

Table 8 shows estimates for the two equations. The results for the selection equation (dependent variable is option dummy) are on the bottom and the results for the outcome equation (dependent variable is option value) are on the top. To illustrate, for the Undpericing-1d, I can see on the bottom that there are 301 observations in the dataset, but that 68 of them are censored (z=0), which means I do not have observations on the dependent variable in the outcome equation (y). STATA gives an estimate for $\rho = 1$, and a test statistic that rejects the null that $\rho = 0$. The two steps (equations) are correlated, so indeed the Heckman filter is appropriate for the data.

The principle result from the Table 8 is that underpricing-Underpricing 1d/1w and Price Update are positively significantly related to the total dollar value of the stock options awarded to the top executives, and the level of significance is 1 percent. I do not find that Performance-6m/1y is related to option values after controlling for censorship.

Pre-IPO assets (Size) is positively and significantly related to Option Value while Founder-led IPO dummy appears significantly negative with respect to Option Value. The selection model reports a higher probability to issue options to executives when the IPO company is venture backed and has a higher-rank underwriter.

In summary, there is still no difference in underpricing between the firms which grant stock options and those which choose not to. The relationship between IPO underpricing and the total dollar value of stock options to top executives remains significantly positive.

Following the same method, I get similar results on the relation between IPO underpricing and the total value of stock options granted to CEOs only. The results are shown in Table 9. Underpricing-1d/1w and Price Update are significantly positively correlated to the dollar value of the stock options granted to CEOs only and this relationship (bigger z value) is much stronger than the relationship between underpricing and the option value granted to the top management team, which indicates that CEOs have more control over the offer price compared to other executives. Furthermore, pre-IPO assets are significantly positively related to the dollar value of options granted to CEOs only, while the coefficient estimate on firm age is significantly negative, meaning that younger firms are more likely to issue larger value of stock options to their CEOs to attract and retain them in the management team. In the selection models, compared to OLS, for CEOs only Pre-IPO Own is significantly negatively related to Option Dummy.

6.5 Hausman Test for Endogeneity

The results of the OLS regressions would be biased because of the endogeneity problem induced by a simultaneous relationship between the dependent variable and some explanatory variables. Suppose the quality of the firm and the talents of the manager are unobservable but they affect the degree of underpricing and long-term performance, as well as option grants. These unobservable factors are not controlled for in the OLS regression and a significant coefficient of option grant may be simply reflecting a spurious relationship through unobserved quality. The test contains two steps: First, Option Grants is regressed on all its determinants in the Option Grants equation (2); then, underpricing is regressed on its determinants in the Underpricing equation as well as the residual vector generated from step 1. If the coefficient estimate on the residual vector is significantly different from 0, then the OLS is inconsistent, the simultaneous regression should be used to control for endogeneity. Pre-IPO ownership may similarly be determined by the manager's perception of the prospects of the firm. I first regress Pre-IPO on all its determinants in equation (3) and then I regress underpricing on all its determinants and the vectors of the residuals of Pre-IPO own in equation (1). I finally assume Pre-IPO is endogenous in the Option Grants equation (2) by regressing Pre-IPO on all its determinants in equation (3) first and then regressing Option Grants on all its determinants and the vectors of the residuals of Pre-IPO own in equation (2).

The results are presented in Table 10 Hausman Test for Endogeneity (Option Grants as Dummy) and Table 11 Hausman Test for Endogeneity (Option Grants as Value). In Table 10 none of the coefficients on the residuals appear significantly different from 0 for the equations containing option grants as dummy variables. But for Table 11

when Option Grants is a dollar value, I conclude that both Underpricing and Performance may be spuriously related to Option Value, since the coefficients on the residual are all significant at 10 percent level. Panel C also indicates that Pre-IPO own is endogenous in the Option Grants equation (2). In the following section, I perform a set of simultaneous equations regressions to control for this endogeneity.

6.6 Three-Stage Least Square Regressions

The three-stage least square regression estimates a simultaneous system of structural equations, where some equations contain endogenous variables among the predictors. I rely on the results of Hausman test to determine which explanatory variables will be treated as endogenous. Specifically, Pre-IPO own is endogenous in the Option Value equation (2); Option Values is endogenous in the Underpricing equation (1). Results are shown in Table 12 and Table 13. The OLS results are reinforced, where by the option dummy is not significantly related to Underpricing. Only the coefficient estimates of Market Return are significantly different from 0 in all regressions. For the option grants as dollar value in Table 13, Pre-IPO ownership is significantly related to option value and all other control variables are significantly related to the total dollar value of stock options granted to top executives. I find no evidence that the dollar value of options granted to executives is related to underpricing and performance when I control for the endogeneity of pre-IPO ownership and stock option value. The OLS significance disappears, which is consistent with the suspicion that the significance was due to a spurious relation.

7. Conclusion and Discussion

The main purpose of this thesis is to investigate the relationship between executive IPO stock option compensation and IPO underpricing of U.S. software companies during the period 1996 to 2000.

I begin by applying OLS regressions on the predictive power on IPO underpricing of the choice to grant option compensation to top executives and of the dollar value of the options granted. My results indicate that there is no substantial difference in underpricing between firms issuing IPO stock option compensation to top executives and firms that choose not to. However, I find that the total dollar value of the stock options granted to top management and/or CEOs increases with underpricing for the software industry.

Skeptical of possible sample selection bias, I then do a Heckman sample selection filter to test the relationship between Underpricing and Option options controlling for censorship. This approach leads to the initial conclusion that option value is positively and significantly related to underpricing. To address potential endogeneity, I further run Hausman tests and employ 3SLS regressions and find that total option value for executives and underpricing/performance are simultaneously related and their positive relationship from OLS disappears.

I conclude no evidence of a significant relation between option grants and underpricing for the human-intensified software industry. Additionally, I find that the bubble year 1998-2000 have significant explanatory power with regard to the greater IPO underpricing for software companies compared to the average industry in the same period.

Discussion: Why there is no relation between option grants and underpricing (performance) for the software industry?

a) There may be third factors both affecting option grants and underpricing; hence, OLS result indicating a positive relationship would be spurious. For example, in our Hausman test and 3SLS regression, we capture this effect by adding "Quality-3 year fail" as the quality of the company and CEO traits as the quality of the manager.

b) Options as a percentage of new shares outstanding at the IPO also matters. In section 4 I show that executives should own no more than $\frac{1}{1+\frac{y}{x}}$ pre-IPO shares in order to maximize their benefit by underpricing the IPO. I calculate in the sample that the ratio of average executive option numbers out of totals shares outstanding is 16.67%,i.e., $\frac{x}{y}$=16.67%. This implies that α should be no more than 14.29%. However, the descriptive result demonstrates that the average pre-IPO ownership for option-granting firms is 63%, which is substantially higher than 14.29%. Therefore, the executives' wealth is not increasing in the IPO offer price consistent with the lack of significant relationship between option grants and underpricing.

c) If executives also sell shares at the IPO, there can be a "trade-off" issue. Executives are reluctant to influence the offer price since they would lose more by selling their pre-IPO shares in their "intentionally-set" low price at the IPO. To illustrate, I calculate the benefit and loss for the sub-sample where

both new option grants and shares sold by executives can be observed. The total benefit from exercising options is $740,165,146 (average: $6,017,603) while the total loss from selling pre-IPO shares is $847,853,107(average: $6,893,115). The "trade-off" generated when executives exercise all their options is $-107,687,961 (average: $-875,512). Apparently, for this set of option granting executives, they cannot benefit themselves by setting lower strike price for their options.

d) Option granting executives not influencing the IPO offer price may also be due to anticipated EPS dilution and management dilution effect[21]. The dilution effect makes executives indifferent in setting lower offer price, since executives expect that no matter how low the offer price would be, when they exercise the options, the resulting market price due to dilution is not high enough to compensate their effort and time in price setting. Therefore, the intrinsic value of the options is not of interest to them.

e) The maturity of executive stock options is another reason why executives may find option compensation and offer price setting unattractive. Most executives in software firms are granted options with a maturity of ten years or more. Software industry firms are risky, with high exposure to takeovers and high failure rate. The descriptive results show that the percentage of 3-year fail is fairly high. Therefore, executives may expect the firm to fail before they can

[21] When executives exercise their options, there would be more shares outstanding, which dilutes the earnings per share and further deteriorate the stock returns. This is called EPS dilution. Management dilution is that management spends more time attempting to maximize their option payouts and financing stock buybacks than running the business.

exercise the options. Instead, they would prefer to exert effort in current "profit maximization" activities.

f) Following recent business scandals like Enron's bankruptcy, the "grey area" of executive compensation has become more regulated and restricted by law. In addition, concentrated executive ownership and active institutional investors' monitoring role may restrain the executives from "rent seeking" activities in IPOs.

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Table 1 Summary Statistics

a. Firm characteristics with and without executive stock options granted

The sample consists of 422 software firms that went public between 1996 and 2000. All the variables shown in the table are defined in the thesis. Asterisks denote significance differences between the two samples, based on t-statistics. ***, **, and * denote significance at the 1%, 5%, and 10% level.

	All firms	Firms granting IPO options	Firms not granting IPO options	Differences (T-statistic)
Number of firms	422	313	109	N/A
Underpricing-1d (%)	73.77	81.16	50.59	10.52***
Underpricing-1w	69.05	75.48	49.82	10.61***
Price Update (%)	19.11	21.77	10.98	2.40**
Performance-6 m (%)	107.50	121.78	65.50	32.04***
Performance-1y (%)	78.05	84.59	58.47	34.35***
Offer Price ($)	14.21	14.55	13.21	1.85*
IPO proceeds ($ mil)	60.97	61.67	58.94	0.43
Assets prior to IPO ($mil)	53.14	51.16	59.31	-0.91
Underwriter Rank	8.27	8.38	7.92	3.20***
Pre-IPO Ownership (%)	64.36	62.88	69.47	-2.39**
Post-IPO Ownership (%)	50.14	49.58	52.03	-1.13
Firm age	7.29	6.81	8.71	-2.87***
Board Size	4.16	4.34	3.61	3.46***
CEO Tenure	5.15	4.75	6.33	-2.88***
CEO Age	43.36	43.17	43.91	-0.83
Quality-3year fails (%)	29.62	30.99	25.69	N/A
	(125/422)	(97/313)	(28/109)	
VC backed (%)	66.83	73.81	46.79	N/A
	(282/422)	(231/313)	(51/109)	
Founder-led IPO (%)	55.50	52.40	60.55	N/A
	(230/422)	(164/313)	(66/109)	

b. Option Summary Statistics among Option Granting Firms

This table shows summary statistics of number and value of stock options among option-granting companies. Number of options to all executives is the total number of stock options granted to top management team. Average number of options to all executives is the number of options to all executives divided by the total number of executives. Number of options to CEOs is the total number of stock options granted to CEO only. Value of stock options to all executives is the total value of stock options to top management team by multiplying number of stock options with Black-Scholes value of stock options Average Value of stock options to all executives is the value of stock options to all executives divided by the number of executives. Value of stock options to CEOs is the value of stock options granted to CEOs. Black-Scholes Stock Option Value is computed by Black-Scholes option pricing model using company fundamentals.

	Obs.	Mean	Std. Dev.	Minimum	Maximum
NO. of options to all executives	311	726,114.90	1,135,825	6,004	10,700,000
Average NO. of options to all executives	311	270,434.70	508,908.90	3,666.67	6,286,383
NO. of options to CEOs	173	537,921.30	773,906.60	3,800	6,286,383
Value of options to all executives	298	11,200,000	20,500,000	77,437.50	163,000,000
Average Value of options to all executives	298	4,147,666	8,629,011	38,718.75	101,000,000
Value of options to CEOs	164	8,294,988	13,600,000	26,600	101,000,000
Black-Sholes Stock Option Value	299	14.59	6.88	5	88

Table 2 Comparison of the Level of Underpricing

This table compares the average underpricing level of IPO firms with IPO options and without IPO options and compares average underpricing of all IPO firms of all industries with software industries from 1996 to 2000. Asterisks denote significance differences between the two samples, based on t-statistics in brackets. When two sample size and the variance are assumed to be unequal, the t statistic to test whether the means are different can be calculated as $t = \frac{\overline{X}_1 - \overline{X}_2}{s_{\overline{X}_1 - \overline{X}_2}}$, where $s_{\overline{X}_1 - \overline{X}_2} = \sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}}$. s^2 is the unbiased estimator of the variance of the two samples; n is number of participants for the two samples; the distribution of significance test is a Student's t distribution with the degree of freedom: $\text{D.F.} = \frac{(s_1^2/n_1 + s_2^2/n_2)^2}{(s_1^2/n_1)^2/(n_1 - 1) + (s_2^2/n_2)^2/(n_2 - 1)}$. (O'Mahony, 1986). ***, **, * Denote significance at the 1%, 5%, and 10% level.

	Underpricing (%)		Price Update	Performance (%)	
ID in terms of IPO date (435)	1d	1w	(%)	6m	1 y
Mean Underpricing (with IPO options)	81.16	75.48	21.77	121.78	84.59
Mean Underpricing (no IPO options)	50.59	49.82	10.98	65.50	58.47
Std. dev (with IPO options)	99.56	94.64	37.80	321.77	336.24
Std. dev (no IPO options)	78.55	97.60	35.89	154.17	210.53
Difference	10.52***	10.61***	2.41***	32.04***	34.35***
Mean underpricing of All IPO issues	19.12	18.51	10.01	23.82	20.18
Std. dev of All IPO issues	47.97	47.99	59.67	113.02	135.11
Difference	21.88***	26.77***	21.31***	8.11***	11.92***

Figure 1 Underpricing comparison among firms with and without option grants with all-industry level

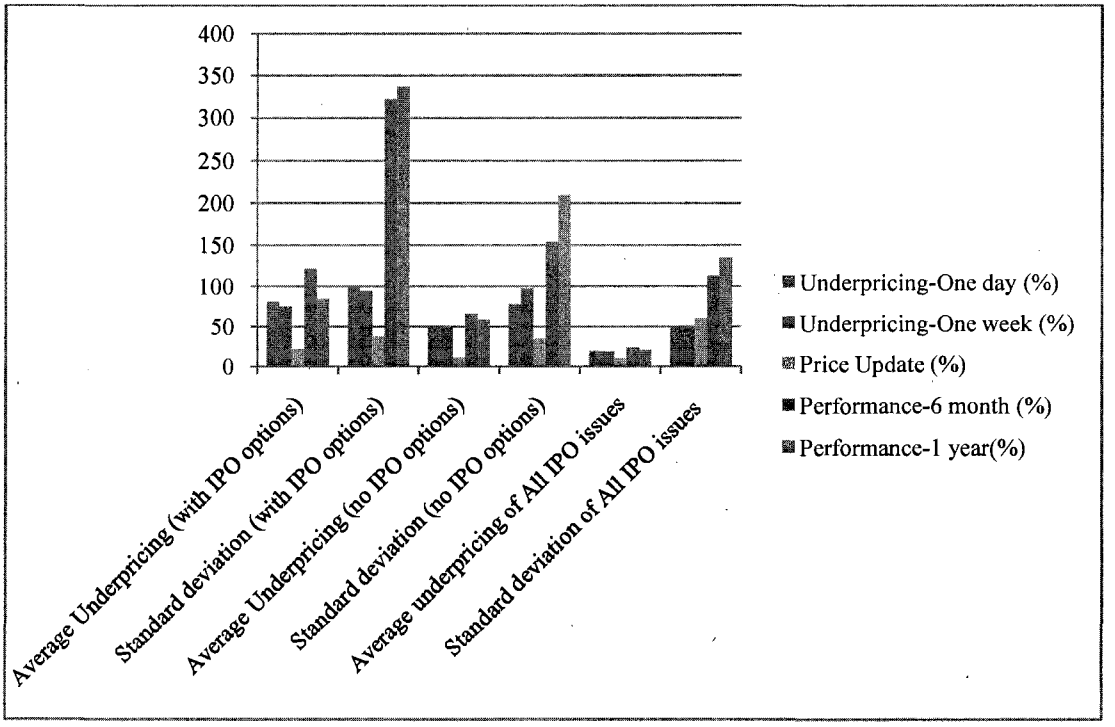

Table 3 Underpricing Comparison by Years

This table illustrates the number of new issues by years and compares average underpricing level for each year with software industries and with all IPOs among all industries from 1996 to 2000. Asterisks denote significance differences between the two samples, based on t-statistics in brackets. When two sample size and the variance are assumed to be unequal, the t statistic to test whether the means are different can be calculated as $t = \frac{\bar{X}_1 - \bar{X}_2}{s_{\bar{X}_1 - \bar{X}_2}}$, where $s_{\bar{X}_1 - \bar{X}_2} = \sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}}$. s^2 is the unbiased estimator of the variance of the two samples; n is number of participants for the two samples; the distribution of significance test is a Student's t distribution with the degree of freedom: $\text{D.F.} = \frac{(s_1^2/n_1 + s_2^2/n_2)^2}{(s_1^2/n_1)^2/(n_1 - 1) + (s_2^2/n_2)^2/(n_2 - 1)}$. (O'Mahony, 1986). ***, **, * Denote significance at the 1%, 5%, and 10% level.

IPO year	No. of IPOs	Underpricing-One day (%)	Underpricing-One week (%)	Price Update (%)	Performance-6 month (%)	Performance-1 year (%)
1996	48	19.94	21.44	3.57	12.96	22.32
1997	55	24.69	21.28	4.15	49.20	62.99
1998	54	70.27	55.72	9.10	135.44	201.96
1999	178	89.59	89.57	23.88	207.64	83.95
2000	87	90.39	81.89	76.37	-14.84	-57.92
Total	422	58.98	53.98	30.19	78.08	62.66
Average underpricing of all IPOs	2,285	19.12	18.51	10.01	23.82	20.18
Difference		***	***	***	***	***

Figure 2 Underpricing comparison each year within industry and with all-industry level

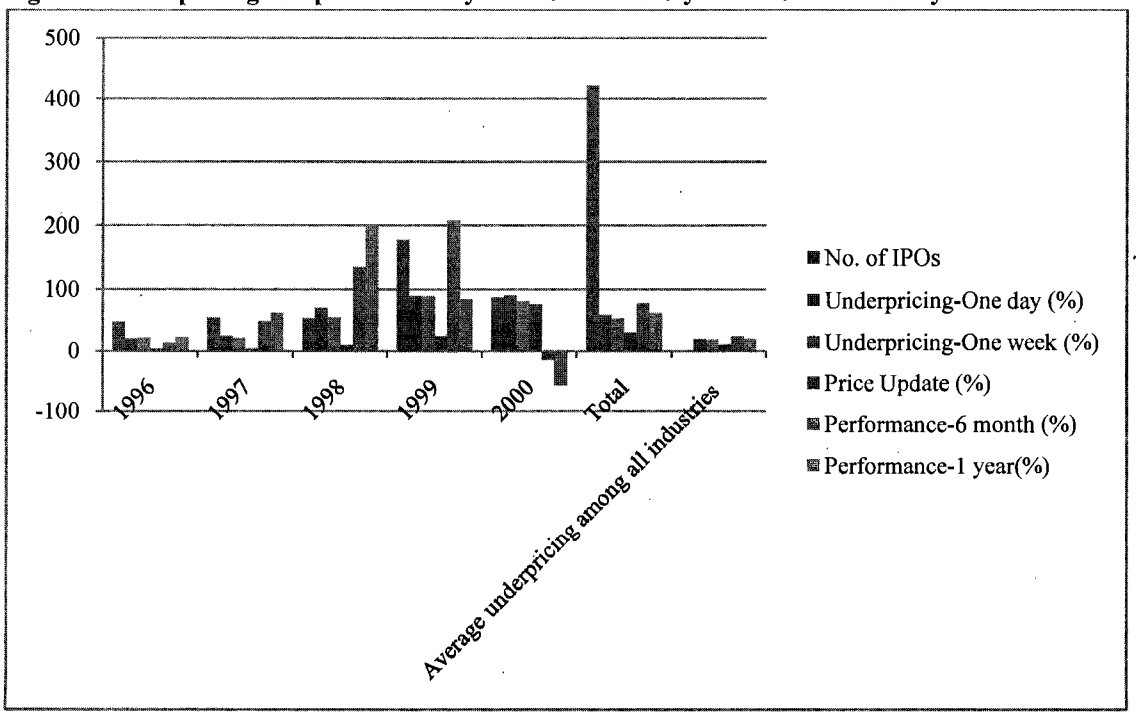

Table 4 Correlation Test among All Variables

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
1. Underpricing -1d	1.00																			
2. Underpricing -1w	0.85	1.00																		
	0.00*																			
3. Price Update	0.62	0.60	1.00																	
	0.00*	0.00*																		
4. Performance -6 m	0.28	0.30	0.08	1.00																
	0.00*	0.00*	0.13																	
5. Performance -1y	0.17	0.19	0.13	0.59	1.00															
	0.00*	0.00*	0.02*	0.00*																
6. Option Dum	0.14	0.12	0.12	0.08	0.04	1.00														
	0.01*	0.02*	0.02*	0.09*	0.47															
7. Option Value	0.27	0.31	0.40	0.04	0.06	.	1.00													
	0.00*	0.00*	0.00*	0.45	0.29	1.00														
8. Pre-IPO own	-0.06	-0.08	-0.07	-0.08	-0.08	-0.12	-0.05	1.00												
	0.27	0.15	0.22	0.11	0.15	0.02*	0.43													
9. Market	0.22	0.21	0.35	-0.06	-0.01	-0.01	0.11	-0.01	1.00											
Return	0.00*	0.00*	0.00*	0.27	0.86	0.90	0.06*	0.79												
10. Size	0.08	0.13	0.10	-0.09	-0.08	-0.05	0.29	-0.11	0.04	1.00										
	0.12	0.02*	0.05*	0.08*	0.12	0.36	0.00*	0.03*	0.43											
11. Venture-backed	0.14	0.16	0.23	0.08	0.08	0.25	0.09	-0.15	0.00	-0.14	1.00									
	0.01*	0.00*	0.00*	0.11	0.10	0.00*	0.12	0.00*	0.97	0.01*										
12. Nasdaq	0.25	0.23	0.32	-0.07	-0.18	0.17	0.22	-0.15	0.08	0.21	0.23	1.00								
	0.00*	0.00*	0.00*	0.14	0.00*	0.00*	0.00*	0.00*	0.09*	0.00*	0.00*									
13. Underwriter Rep	0.24	0.22	0.29	0.11	0.09	0.16	0.19	-0.12	0.00	0.19	0.25	0.15	1.00							
	0.00*	0.00*	0.00*	0.03*	0.11	0.00*	0.00*	0.03*	0.97	0.00*	0.00*	0.00*								
14. Age	-0.19	-0.22	-0.22	-0.15	-0.10	-0.14	-0.20	0.18	-0.06	-0.04	-0.29	-0.23	-0.19	1.00						
	0.00*	0.00*	0.00*	0.00*	0.06*	0.00*	0.00*	0.00*	0.22	0.42	0.00*	0.00*	0.00*							
15. Founder	-0.06	-0.03	-0.12	0.00	0.01	-0.08	-0.19	0.11	-0.03	-0.04	-0.05	-0.06	0.02	-0.12	1.00					
	0.28	0.52	0.03*	0.98	0.79	0.09*	0.00*	0.03*	0.58	0.46	0.33	0.22	0.70	0.01*						
16. 1996	-0.20	-0.18	-0.14	-0.12	-0.07	-0.11	-0.11	0.12	-0.15	-0.12	-0.03	-0.47	0.00	0.19	-0.07	1.00				
	0.00*	0.00*	0.01*	0.02*	0.20	0.02*	0.07*	0.02*	0.00*	0.02*	0.48	0.00*	0.93	0.00*	0.15					
17. 1997	-0.19	-0.19	-0.15	-0.08	-0.02	-0.17	-0.12	0.08	0.11	-0.05	-0.18	-0.40	-0.15	0.22	0.06	-0.14	1.00			
	0.00*	0.00*	0.00*	0.12	0.71	0.00*	0.04*	0.11	0.03*	0.37	0.00*	0.00*	0.00*	0.00*	0.20	0.00*				
18. 1998	-0.01	-0.05	-0.10	0.04	0.16	0.03	-0.09	0.04	-0.17	0.06	-0.12	-0.27	-0.05	0.05	0.08	-0.14	-0.15	1.00		
	0.79	0.29	0.05*	0.45	0.00*	0.52	0.14	0.40	0.00*	0.24	0.01*	0.00*	0.31	0.35	0.10	0.00*	0.00*			
19. 1999	0.19	0.22	0.11	0.28	0.14	0.12	0.10	-0.07	0.12	-0.10	0.11	0.12	0.05	-0.23	0.04	-0.31	-0.33	-0.33	1.00	
	0.00*	0.00*	0.03*	0.00*	0.01*	0.01*	0.09*	0.15	0.01*	0.04*	0.03*	0.01*	0.30	0.00*	0.36	0.00*	0.00*	0.00*		
20. 2000	0.09	0.07	0.18	-0.21	-0.23	0.06	0.12	-0.10	0.02	0.20	0.15	0.79	0.11	-0.09	-0.12	-0.18	-0.20	-0.20	-0.44	1.00
	0.08*	0.18	0.00*	0.00*	0.00*	0.22	0.05*	0.04*	0.65	0.00*	0.00*	0.00*	0.03*	0.08*	0.02*	0.00*	0.00*	0.00*	0.00*	

* Denote significance at the 10% level at least.

Table 5 Description of Variables

Panel A: Data Description for Black-Scholes Stock Option Value Calculation		
Inputs	Measure	Source
S	Offer price at IPO date	SDC
K	Offer price at IPO date	Prospectus & SDC
T	Years to maturity	Prospectus
σ	Standard deviation of firm's post-IPO 6 month daily returns standardized to 1 year	Daily returns drawn from CRSP
r	Return on the U.S. government 10-year Treasury notes	Yahoo! Finance

Panel B: Dependent Variable		
Underpricing	Underpricing-1d/1w	Percent price change with respect to the offer price for 1 day and 1 week
	Price Update	Percent price change between the offer price and the midpoint of the filing range
Performance	Underpricing-6m/1y	Percent price change with respect to the offer price for 6 months and 1 year

Panel C: Predictive Variables in Underpricing Equation			
Variables	Denotation	Measurements	Expected Sign
Option Grants	Option dummy	If options granted, value=1, or else, value=0	+
	Total option value to executives	The product of Black-Scholes option value multiplied by the number of options	?
Pre-IPO own	Pre-IPO ownership of executives	The ratio as shares owned by the top executives as a fraction of shares outstanding prior to the IPO	-
Market Return	Index market return	Compounded 15-day daily returns before IPO on NYSE/AMEX/NASDAQ Composite Index	
Size	Pre-IPO assets	Logarithm form of the book value of assets, adjusted for inflation using the 2000 Consumer Price Index	-
Venture-backed	Venture capitalist backed dummy	If VC-backed IPO, value=1; or else, value=0	?
Nasdaq	NASDAQ index	Price index at the IPO date	+
Underwriter Rep	Underwriter reputation rank	Ranging from zero to 9.1, with higher ranks representing higher-quality underwriters	?
Age	Firm age	The difference between the year of IPO and the year when the firm founded	+
Founder	Founder-led firm dummy	If founder-led IPO, value=1; or else, value=0	+
Year	Year dummies	1997-2000 dummies set separately	+ for 1998-2000 ? for other years

Panel D: Variables appeared in both Option Grants Equation and Pre-IPO own Equation		
Quality	Firm's anticipated performance	3 year fail dummy, if IPO firms fail in 3 years, value=1; or else, value=0
Board Size	NO. of board of directors	
CEO Tenure	The years CEO served in the position	

Table 6 OLS Regression

This table reports estimated coefficients of variables explaining IPO underpricing over 1996-2000 period, including measures of IPO options, dummy and value and executive pre-IPO ownership as well as the control variables defined in the text. All predictable variables are defined in the thesis. P-value is stated below each coefficient estimate. ***, **, * Denote significance at the 1%, 5%, and 10% level.

	Underpricing-1d		Underpricing-1w		Price Update		Performance-6m		Performance-1y	
Intercept	-183.06	-203.33	-80.63	-107.17	-79.05	-93.65	-39.00	-141.52	73.46	-93.84
	0.00***	0.01***	0.09*	0.10	0.00***	0.00***	0.82	0.61	0.70	0.74
Option Dummy	16.46		13.31		5.46		35.87		3.40	
	0.21		0.27		0.27		0.40		0.94	
Option Value		9.02		7.52		5.16		4.02		11.5
		0.00***		0.01***		0.00***		0.72		0.30
Pre-IPO own	0.00	-0.27	-0.13	-0.28	0.07	0.00	-0.44	-0.58	-0.05	-0.59
	0.99	0.34	0.53	0.27	0.44	0.98	0.56	0.56	0.95	0.56
Market Return	5,755.98	6,025.85	5,369.70	5,049.26	4,056.25	4,185.19	-8,528.03	-8,139.99	-2,252.02	-3,487.89
	0.00***	0.01***	0.00***	0.01***	0.00***	0.00***	0.15	0.28	0.73	0.66
Size	0.05	-0.07	0.15	0.05	0.03	-0.02	-0.18	-0.21	-0.10	-0.07
	0.48	0.46	0.036**	0.62	0.29	0.57	0.48	0.54	0.72	0.85
Venture-backed	4.29	1.79	9.72	8.27	8.43	8.46	8.27	12.93	58.18	55.14
	0.72	0.90	0.38	0.52	0.070*	0.11	0.84	0.80	0.18	0.29
Nasdaq	0.04	0.04	0.03	0.02	0.02	0.02	-0.08	-0.08	-0.18	-0.21
	0.03**	0.05*	0.13	0.27	0.00***	0.02**	0.20	0.32	0.01***	0.01***
Underwriter Rep	18.91	21.87	11.02	15.49	7.22	8.87	26.67	43.56	24.38	54.48
	0.00***	0.00***	0.01***	0.01***	0.00***	0.00***	0.10	0.11	0.19	0.05**
Age	-0.64	0.88	-2.09	-1.30	-0.71	0.24	-6.07	-7.47	-5.45	-5.65
	0.55	0.51	0.03**	0.27	0.08*	0.64	0.08*	0.12	0.14	0.24
Founder	-10.77	0.85	-7.06	0.32	-9.51	-6.26	-31.71	-36.18	-38.07	-65.30
	0.30	0.95	0.46	0.98	0.01**	0.18	0.35	0.43	0.30	0.17
1997	-18.87	-15.27	-17.65	-14.13	-9.48	-9.20	103.22	93.17	116.16	130.85
	0.40	0.59	0.39	0.58	0.26	0.38	0.16	0.35	0.14	0.19
1998	16.06	29.88	2.27	13.52	-8.32	-3.00	171.78	191.62	320.15	336.33
	0.49	0.28	0.92	0.58	0.35	0.76	0.03**	0.05**	0.00***	0.00***
1999	-12.24	-8.21	-0.13	9.13	-27.07	-22.49	279.35	297.86	362.02	429.36
	0.71	0.83	1.00	0.79	0.03**	0.10	0.01***	0.03**	0.00***	0.00***
2000	-73.98	-67.36	-50.09	-28.72	-47.48	-42.90	191.21	191.37	426.23	508.18
	0.22	0.33	0.37	0.64	0.03**	0.08*	0.33	0.44	0.05**	0.04**
Adj R-square	0.16	0.16	0.18	0.18	0.28	0.32	0.09	0.08	0.11	0.14
NO. of Obs	302	233	309	237	293	226	320	245	298	227
Prob >F	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Table 7 OLS Regressions by Year

This table analyzes the effect of measurement of executive IPO option compensation (dummy and value) on underpricing and performance in respect years from 1996 to 2000 using an OLS regression. All other control variables in the table are defined in the prior parts of the paper. P-values are stated below each coefficient estimate. ***, **, * Denote significance at the 1%, 5%, and 10% level.

1996	Underpricing-1d		Underpricing-1w		Price Update		Performance-6m		Performance-1y	
Intercept	-82.58	-48.46	-12.15	-7.31	-175.51	-116.48	490.31	517.15	81.06	212.75
	0.49	0.77	0.94	0.97	0.09	0.40	0.05**	0.11	0.83	0.63
Option Dummy	6.83		4.62		7.66		44.02		54.25	
	0.64		0.80		0.50		0.14		0.18	
Option Value		3.67		4.67		15.00		10.70		18.10
		0.78		0.80		0.10*		0.68		0.62
Pre-IPO own	0.37	0.41	0.41	0.34	0.49	0.44	0.21	0.14	0.65	0.40
	0.17	0.31	0.23	0.54	0.03**	0.11	0.70	0.86	0.42	0.73
Market Return	1,162.74	-1,291.73	1,290.20	-80.45	2,090.97	3,363.62	-17,012.01	-10,239.71	-11,558.70	-15,983.47
	0.67	0.77	0.74	0.99	0.34	0.33	0.01***	0.27	0.16	0.20
Size	-0.03	-0.02	-0.12	-0.11	-0.04	-0.05	0.15	0.11	0.34	0.27
	0.84	0.90	0.47	0.63	0.66	0.68	0.59	0.74	0.37	0.53
Venture-backed	-0.56	1.96	23.18	29.86	9.66	15.82	-57.56	-51.72	-32.98	-50.28
	0.97	0.93	0.22	0.31	0.38	0.35	0.05**	0.21	0.44	0.41
Nasdaq	0.04	0.00	-0.10	-0.14	0.07	0.06	-0.27	-0.19	0.08	0.23
	0.68	0.98	0.47	0.51	0.39	0.57	0.20	0.54	0.79	0.58
Underwriter Rep	4.99	6.63	15.94	22.04	7.09	1.33	-24.19	-34.06	-36.39	-60.98
	0.56	0.62	0.20	0.26	0.28	0.90	0.18	0.20	0.14	0.10*
Age	-0.96	-0.93	-1.24	-1.31	-0.44	-0.21	0.72	0.45	2.96	2.01
	0.25	0.42	0.27	0.44	0.56	0.82	0.67	0.84	0.21	0.52
Founder	-7.81	-9.02	-9.40	-9.14	-6.63	-5.36	55.84	49.16	81.17	48.76
	0.51	0.58	0.56	0.70	0.44	0.61	0.03**	0.13	0.03**	0.30

1997	Underpricing-1d		Underpricing-1w		Price Update		Performance-6m		Performance-1y	
Intercept	-135.78	-7.56	-6.92	111.22	-24.23	-114.39	88.59	25.50	-60.76	107.39
	0.19	0.96	0.90	0.38	0.55	0.20	0.44	0.93	0.79	0.85
Option Dummy	-1.86		-2.28		3.44		-56.93		-85.28	
	0.86		0.82		0.67		0.01***		0.05**	
Option Value		24.40		9.61		24.4		13.3		33.7
		0.26		0.64		0.12		0.72		0.65
Pre-IPO own	0.08	-0.22	0.15	0.05	0.15	0.32	0.40	0.42	0.70	0.78
	0.71	0.54	0.44	0.87	0.37	0.13	0.34	0.45	0.38	0.48
Market Return	1,210.82	6,697.14	894.66	926.52	4,190.33	8,625.39	-6,881.75	-9,275.21	6,023.70	-2,506.41
	0.66	0.20	0.73	0.82	0.04**	0.02**	0.21	0.23	0.56	0.87
Size	0.00	-0.02	0.06	0.18	0.01	-0.04	0.07	0.25	0.23	0.66
	0.94	0.90	0.34	0.18	0.81	0.64	0.61	0.32	0.34	0.19
Venture-backed	13.17	23.57	10.37	8.06	4.41	14.83	42.94	25.61	59.74	13.22
	0.20	0.27	0.30	0.63	0.60	0.25	0.05**	0.44	0.15	0.84
Nasdaq	0.03	-0.06	0.00	-0.06	-0.02	0.00	-0.02	-0.08	-0.05	-0.15
	0.53	0.32	0.95	0.35	0.51	0.98	0.79	0.50	0.74	0.52
Underwriter Rep	13.13	11.64	1.26	-0.09	4.46	10.06	-6.37	8.71	7.74	4.15
	0.06*	0.21	0.67	0.99	0.07	0.03**	0.39	0.64	0.62	0.91
Age	0.41	2.30	0.39	-0.16	0.03	0.87	2.43	1.49	3.17	1.24
	0.65	0.34	0.69	0.94	0.96	0.46	0.21	0.68	0.38	0.86
Founder	-3.53	-18.51	-9.17	-20.84	-4.70	-22.85	2.80	-6.22	48.01	8.54
	0.76	0.36	0.38	0.22	0.59	0.08*	0.90	0.86	0.28	0.90

1998	Underpricing-1d		Underpricing-1w		Price Update		Performance-6m		Performance-1y	
Intercept	-255.97	-1,147.55	-49.09	-49.16	-78.57	-162.04	-255.54	-199.84	403.45	1,038.98
	0.37	0.08*	0.71	0.87	0.24	0.27	0.79	0.86	0.75	0.48
Option Dummy	66.72		27.81		8.53		97.03		-152.52	
	0.26		0.29		0.51		0.62		0.57	
Option Value		19.70		2.25		-4.88		290.00		268.00
		0.31		0.80		0.21		0.00***		0.00***
Pre-IPO own	0.82	0.12	0.27	0.22	0.02	0.03	3.14	0.63	1.14	-1.07
	0.36	0.92	0.55	0.68	0.91	0.89	0.30	0.73	0.77	0.67
Market Return	8,555.34	14,081.71	8,554.51	7,501.04	2,616.57	2,775.62	13,529.42	1,942.11	23,010.10	8,543.60
	0.15	0.07*	0.00***	0.04**	0.06*	0.11	0.49	0.88	0.37	0.62
Size	-0.10	-0.08	-0.02	0.10	0.01	0.09	-0.21	-0.38	-0.49	-0.23
	0.60	0.78	0.87	0.52	0.83	0.14	0.76	0.43	0.63	0.79
Venture-backed	-50.74	-70.72	0.46	-9.92	11.26	3.88	-90.71	-239.24	75.01	-171.11
	0.27	0.20	0.98	0.70	0.32	0.74	0.56	0.01***	0.71	0.17
Nasdaq	0.09	0.42	0.06	0.03	0.03	0.05	0.08	0.08	-0.12	-0.58
	0.57	0.12	0.39	0.78	0.34	0.40	0.87	0.86	0.86	0.34
Underwriter Rep	11.61	54.35	-0.04	9.93	4.99	14.29	34.35	35.95	35.02	52.06
	0.52	0.18	1.00	0.57	0.20	0.11	0.58	0.57	0.66	0.51
Age	-0.78	5.64	-4.65	-4.85	-1.44	-0.87	-21.32	-21.07	-27.22	-27.47
	0.83	0.33	0.01***	0.06*	0.08*	0.45	0.07*	0.03**	0.08*	0.02**
Founder	-7.16	-9.25	-5.62	-17.96	-14.71	-34.60	-137.65	9.39	20.59	46.59
	0.87	0.87	0.78	0.49	0.13	0.01***	0.34	0.92	0.91	0.71

1999	Underpricing-1d		Underpricing-1w		Price Update		Performance-6m		Performance-1y	
Intercept	-113.76	-98.27	-118.50	-65.20	-80.97	-48.48	594.40	538.70	1,166.67	954.01
	0.35	0.52	0.35	0.67	0.06*	0.29	0.19	0.39	0.017**	0.13
Option Dummy	25.80		26.25		12.72		103.12		100.84	
	0.30		0.29		0.11		0.22		0.26	
Option Value		8.63		7.99		6.58		-14.30		0.49
		0.03**		0.05**		0.00***		0.39		0.98
Pre-IPO own	-0.31	-0.61	-0.42	-0.65	-0.07	-0.17	-2.87	-3.35	-2.57	-3.61
	0.45	0.22	0.30	0.17	0.61	0.23	0.05**	0.10*	0.09*	0.07*
Market Return	3,938.76	3,904.81	2,240.51	1,204.57	3,163.75	3,099.58	-15,108.56	-15,914.98	-11,588.24	-17,086.72
	0.23	0.30	0.49	0.74	0.00***	0.01***	0.20	0.30	0.35	0.29
Size	0.25	-0.10	0.30	-0.02	-0.03	-0.14	-0.15	-0.14	0.03	-0.18
	0.13	0.62	0.07*	0.94	0.63	0.02**	0.80	0.87	0.97	0.82
Venture-backed	21.27	12.26	13.08	4.79	8.57	6.79	53.73	40.81	79.46	67.41
	0.32	0.62	0.54	0.85	0.23	0.36	0.49	0.69	0.31	0.50
Nasdaq	0.02	0.01	0.03	0.01	0.01	0.00	-0.20	-0.16	-0.40	-0.43
	0.57	0.82	0.36	0.83	0.46	0.69	0.07*	0.26	0.00***	0.00***
Underwriter Rep	17.62	23.24	15.64	20.74	9.08	9.50	34.29	53.12	18.83	82.99
	0.08*	0.07*	0.13	0.10*	0.01***	0.01***	0.35	0.31	0.64	0.13
Age	-2.78	-0.84	-3.53	-2.72	-0.92	0.50	-7.88	-14.43	-3.81	-9.98
	0.24	0.78	0.14	0.35	0.23	0.55	0.37	0.24	0.67	0.42
Founder	-18.65	-11.97	-7.47	1.69	-9.38	-3.74	-23.33	-50.76	-87.40	-132.73
	0.31	0.57	0.69	0.94	0.11	0.54	0.72	0.55	0.20	0.12

2000	Underpricing-1d		Underpricing-1w		Price Update		Performance-6m		Performance-1y	
Intercept	-428.02	-465.27	-237.80	-301.01	-273.38	-285.15	-293.83	-291.00	-57.14	-21.22
	0.01***	0.01***	0.13	0.10*	0.01***	0.01***	0.12	0.20	0.51	0.81
Option Dummy	5.34		5.40		-5.53		23.74		-4.57	
	0.87		0.87		0.79		0.54		0.80	
Option Value		18.20		11.20		10.10		7.23		5.55
		0.05**		0.20		0.04**		0.48		0.20
Pre-IPO own	-0.78	-0.86	-0.34	-0.22	0.15	0.11	-0.16	-0.18	0.29	0.27
	0.17	0.18	0.52	0.70	0.62	0.74	0.80	0.80	0.33	0.34
Market Return	11,430.54	10,682.53	10,781.70	9,614.48	6,967.43	7,897.93	-9,176.66	-11,369.14	-5,978.82	-7,301.24
	0.00***	0.01**	0.00***	0.02**	0.00***	0.00***	0.03**	0.02**	0.00***	0.00***
Size	-0.05	-0.34	0.27	0.01	0.11	-0.13	-0.21	-0.31	0.00	-0.06
	0.80	0.21	0.13	0.97	0.26	0.35	0.33	0.32	0.99	0.64
Venture-backed	1.12	3.71	-0.20	4.18	7.05	-0.62	-22.70	-15.95	-19.90	-26.97
	0.97	0.91	0.99	0.90	0.67	0.97	0.51	0.70	0.21	0.11
Nasdaq	0.06	0.08	0.01	0.03	0.04	0.04	0.05	0.06	-0.01	0.00
	0.02**	0.01***	0.67	0.32	0.02**	0.01**	0.15	0.09*	0.75	0.85
Underwriter Rep	31.46	27.08	26.13	23.89	15.28	12.38	12.96	7.38	0.82	-7.17
	0.01***	0.06*	0.02**	0.09*	0.08*	0.18	0.33	0.67	0.89	0.30
Age	1.74	2.40	4.63	4.27	0.77	1.62	0.84	1.02	2.39	2.37
	0.54	0.44	0.10*	0.16	0.65	0.37	0.80	0.78	0.12	0.12
Founder	13.92	33.05	19.40	25.93	-13.51	3.69	13.84	21.00	3.41	6.43
	0.55	0.23	0.40	0.32	0.32	0.81	0.61	0.51	0.79	0.62

Table 8 Heckman Two Step Selection Model for the Top Executives

Dependent Variable	Independent Variable	Underpricing-1d		Underpricing-1w		Price Update		Performance-6m		Performance-1y	
		Coef.	P>|z|	Coef.	P>|z|	Coef.	P>|z|	Coef.	P>|z|	Coef.	P>|z|
Option Value	Intercept	-50,600,000	0.33	-40,500,000	0.30	-63,900,000	0.53	-58,600,000	0.23	-59,900,000	0.34
	Underpricing	42,700	0.02**	43,300	0.01***	188,000	0.04**	1,430	0.78	4,260	0.45
	Pre-IPO own	19,500	0.85	-18,400	0.83	-45,700	0.83	-23,500	0.83	-32,300	0.79
	Market Return	22,400,000	0.97	184,000,000	0.69	-494,000,000	0.66	443,000,000	0.44	468,000,000	0.45
	Size	65,800	0.05**	68,100	0.04**	52,200	0.43	61,400	0.09*	73,200	0.12
	Venture-backed	6,120,000	0.54	5,490,000	0.47	11,200,000	0.61	6,620,000	0.50	7,000,000	0.53
	Nasdaq	7,680	0.19	7,890	0.10*	4,810	0.66	9,860	0.09*	11,500	0.07*
	Underwriter Rep	4,250,000	0.24	3,580,000	0.19	4,810,000	0.49	5,210,000	0.14	4,880,000	0.27
	Age	-515,000	0.33	-576,000	0.14	-529,000	0.57	-470,000	0.34	-490,000	0.42
	Founder	-10,600,000	0.01***	-9,990,000	0.01***	-10,100,000	0.21	-10,300,000	0.01***	-9,900,000	0.02**
	1997	-6,420,000	0.58	-5,220,000	0.54	-7,670,000	0.72	-6,400,000	0.55	-6,570,000	0.55
	1998	-3,590,000	0.71	-1,340,000	0.87	2,200,000	0.91	-1,430,000	0.88	-1,560,000	0.89
	1999	-6,370,000	0.58	-7,110,000	0.45	2,150,000	0.92	-7,300,000	0.52	-8,860,000	0.48
	2000	-16,500,000	0.41	-16,900,000	0.30	-2,700,000	0.94	-19,800,000	0.31	-23,500,000	0.29
Option Dummy	Intercept	-1.23	0.15	-0.91	0.26	-0.80	0.33	-1.15	0.17	-1.29	0.13
	Quality	0.01	0.96	-0.01	0.97	-0.03	0.87	0.02	0.93	0.00	1.00
	Pre-IPO own	0.00	0.46	0.00	0.48	0.00	0.40	0.00	0.41	0.00	0.39
	Size	0.00	0.44	0.00	0.28	0.00	0.43	0.00	0.35	0.00	0.23
	Venture-backed	0.44	0.03**	0.40	0.05**	0.47	0.02**	0.44	0.03**	0.42	0.04**
	Underwriter Rep	0.17	0.04**	0.15	0.06*	0.13	0.09*	0.17	0.03**	0.18	0.02**
	Age	0.04	0.23	0.03	0.26	0.03	0.33	0.03	0.24	0.04	0.20
	Founder	-0.05	0.81	-0.09	0.68	-0.04	0.87	-0.06	0.79	0.00	1.00
	Board Size	0.06	0.30	0.05	0.36	0.03	0.56	0.06	0.31	0.05	0.43
	CEO Tenure	-0.01	0.74	-0.02	0.57	-0.02	0.59	-0.01	0.68	-0.02	0.62
	1997	-0.32	0.33	-0.23	0.47	-0.28	0.40	-0.28	0.38	-0.24	0.47
	1998	0.27	0.43	0.30	0.38	0.27	0.44	0.29	0.39	0.29	0.40
	1999	0.22	0.44	0.24	0.43	0.25	0.40	0.19	0.52	0.20	0.51
	2000	0.40	0.24	0.42	0.22	0.43	0.22	0.38	0.26	0.47	0.18
Mills	Lambda	30,400,000	0.46	24,700,000	0.44	55,700,000	0.51	30,700,000	0.44	32,200,000	0.49
	Rho	1		1		1		1		1	
	Sigma	30,400,000		24,700,000		55,700,000		30,700,000		32,200,000	
	Lambda	30,400,000		24,700,000		55,700,000		30,700,000		32,200,000	
	NO. Of Obs	301		305		294		313		295	
	Censored Obs	68		68		68		68		68	
	P>chi2	0.00		0.00		0.07		0.00		0.00	

***, **, * Denote significance at the 1%, 5%, and 10% level.

Table 9 Heckman Two Step Selection Model for the CEOs Only

Dependent Variable	Independent Variable	Underpricing-1d		Underpricing-1w		Price Update		Performance-6m		Performance-1y	
		Coef.	P>|z|	Coef.	P>|z|	Coef.	P>|z|	Coef.	P>|z|	Coef.	P>|z|
Option Value	Intercept	-7,860,000	0.63	-6,420,000	0.63	3,720,000	0.80	-16,000,000	0.31	-10,200,000	0.56
	Underpricing	46,700	0.00***	46,900	0.00***	170,000	0.00***	-1,080	0.68	-289	0.92
	Pre-IPO own	52,700	0.58	-7,250	0.93	-2,100	0.98	-6,170	0.95	-3,910	0.97
	Market Return	-247,000,000	0.00***	-186,000,000	1.00	-674,000,000	0.00***	155,000,000	1.00	48,100,000	0.90
	Size	29,400	0.20	22,700	0.35	18,500	0.40	23,900	0.32	59,700	0.08*
	Venture-backed	4,190,000	0.16	4,740,000	0.08*	3,140,000	0.29	4,410,000	0.14	4,980,000	0.10
	Nasdaq	1,060	0.75	1,260	0.70	-2,160	0.49	4,070	0.23	5,030	0.17
	Underwriter Rep	1,100,000	0.47	926,000	0.45	277,000	0.84	2,090,000	0.16	1,230,000	0.45
	Age	-555,000	0.01***	-563,000	0.02**	-693,000	0.06***	-687,000	0.00***	-776,000	0.00***
	Founder	-4,850,000	0.32	-6,370,000	0.16	-5,080,000	0.27	-6,840,000	0.14	-6,750,000	0.14
	1997	-1,540,000	0.84	-2,390,000	0.72	788,000	0.90	-4,160,000	0.54	-4,520,000	0.50
	1998	-7,160,000	0.11	-5,470,000	0.22	-1,670,000	0.71	-5,430,000	0.24	-5,540,000	0.27
	1999	-3,500,000	0.57	-3,620,000	0.56	3,580,000	0.54	-4,960,000	0.45	-5,960,000	0.39
	2000	-2,770,000	0.80	-2,010,000	0.85	9,460,000	0.35	-9,460,000	0.38	-13,800,000	0.23
Option Dummy	Intercept	0.17	0.84	0.70	0.39	0.51	0.53	0.35	0.68	0.17	0.85
	Quality	0.05	0.75	0.04	0.81	-0.02	0.93	0.08	0.64	0.04	0.83
	Pre-IPO own	-0.01	0.00***	-0.01	0.00***	-0.01	0.00***	-0.01	0.00***	-0.01	0.00***
	Size	0.00	0.12	0.00	0.06*	0.00	0.12	0.00	0.08*	0.00	0.02**
	Venture-backed	0.21	0.29	0.18	0.35	0.24	0.22	0.20	0.31	0.22	0.27
	Underwriter Rep	0.07	0.40	0.03	0.70	0.04	0.59	0.07	0.42	0.09	0.32
	Age	0.02	0.41	0.02	0.47	0.01	0.75	0.02	0.43	0.03	0.29
	Founder	-0.35	0.07*	-0.34	0.07*	-0.35	0.07*	-0.32	0.09*	-0.27	0.16
	Board Size	-0.02	0.70	-0.03	0.52	-0.04	0.47	-0.02	0.74	-0.04	0.47
	CEO Tenure	-0.06	0.06*	-0.06	0.03**	-0.05	0.10	-0.06	0.04**	-0.07	0.03**
	1997	-0.61	0.10	-0.46	0.20	-0.37	0.30	-0.49	0.16	-0.40	0.27
	1998	0.09	0.79	0.14	0.65	0.14	0.68	0.10	0.75	0.06	0.85
	1999	-0.02	0.95	-0.02	0.94	0.01	0.97	-0.10	0.72	-0.04	0.90
	2000	0.23	0.45	0.23	0.44	0.31	0.33	0.20	0.51	0.35	0.26
Mills	Lambda	2,198,000	0.85	6,260,000	0.55	5,447,000	0.63	5,017,000	0.64	4,248,000	0.69
	Rho	0.21		0.56		0.53		0.44		0.38	
	Sigma	10,400,000		11,200,000		10,400,000		11,500,000		11,300,000	
	Lambda	2,200,000		6,260,000		5,450,000		5,020,000		4,250,000	
	NO. Of Obs	317		322		313		324		311	
	Censored Obs	194		194		194		194		194	
	P>chi2	0.00		0.00		0.07		0.00		0.00	0.00

***, **, * Denote significance at the 1%, 5%, and 10% level.

Table 10 Hausman Test for Endogeneity (Option Grants as Dummy)

		Underpricing-1d		Underpricing-1w		Price Update		Performance-6m		Performance-1y	
		Coef.	P>|z|	Coef.	P>|z|	Coef.	P>|z|	Coef.	P>|z|	Coef.	P>|z|
A. Suspect Option Dummy is endogenous in Underpricing	Intercept	-167.53	0.01***	-66.52	0.18	-73.84	0.00***	9.20	0.96	141.38	0.48
	Option	-39.27	0.52	-41.74	0.46	-14.01	0.55	-154.52	0.44	-259.62	0.23
	Option_Res	21.75	0.35	21.60	0.31	7.48	0.39	73.96	0.33	101.56	0.21
	Pre-IPO own	-0.09	0.73	-0.22	0.35	0.04	0.66	-0.73	0.37	-0.46	0.60
	Market Return	5,752.03	0.00***	5,307.60	0.00***	4,036.97	0.00***	-8,660.65	0.15	-2,432.71	0.71
	Size	0.03	0.67	0.13	0.07*	0.02	0.44	-0.24	0.35	-0.19	0.50
	Venture-backed	12.49	0.40	17.80	0.20	11.24	0.05**	36.72	0.46	98.05	0.07*
	Nasdaq	0.04	0.03**	0.03	0.12	0.02	0.00***	-0.07	0.23	-0.17	0.01***
	Underwriter Rep	21.60	0.00***	13.79	0.01***	8.19	0.00***	36.31	0.06*	37.28	0.08
	Age	-0.43	0.69	-1.91	0.05**	-0.65	0.12	-5.37	0.13	-4.50	0.24
	Founder	-10.18	0.33	-6.54	0.49	-9.27	0.02**	-29.27	0.39	-34.32	0.36
	1997	-22.94	0.32	-21.62	0.30	-11.05	0.20	89.31	0.23	99.28	0.21
	1998	21.14	0.38	7.07	0.75	-6.74	0.46	187.83	0.02**	343.32	0.00***
	1999	-7.63	0.82	4.03	0.90	-25.64	0.04**	293.96	0.01***	384.93	0.00***
	2000	-68.84	0.25	-45.69	0.41	-45.90	0.04**	205.08	0.30	448.09	0.04**
B. Suspect Pre-IPO own is endogenous in Underpricing	Intercept	-583.39	0.27	367.23	0.46	-24.75	0.91	190.42	0.91	240.60	0.90
	Option	16.79	0.20	12.57	0.30	5.51	0.26	35.67	0.40	3.20	0.95
	Pre-IPO own	6.68	0.45	-7.63	0.36	-0.84	0.82	-4.28	0.88	-2.85	0.93
	Pre-IPO own_res	-6.68	0.45	7.51	0.37	0.91	0.81	3.85	0.90	2.80	0.93
	Market Return	5,835.45	0.00***	5,319.63	0.00***	4,050.59	0.00***	-8,559.75	0.15	-2,272.18	0.73
	Size	0.20	0.33	-0.01	0.95	0.01	0.92	-0.26	0.71	-0.16	0.83
	Venture-backed	5.74	0.64	8.13	0.47	8.30	0.08*	7.42	0.86	57.49	0.19
	Nasdaq	0.04	0.03**	0.03	0.15	0.02	0.00***	-0.08	0.20	-0.18	0.01***
	Underwriter Rep	18.90	0.00***	11.22	0.01***	7.22	0.00***	26.76	0.10	24.46	0.19
	Age	-5.12	0.39	2.94	0.61	-0.09	0.97	-3.48	0.86	-3.57	0.87
	Founder	-51.69	0.34	38.67	0.46	-3.89	0.87	-8.25	0.96	-20.90	0.92
	1997	-14.08	0.55	-23.15	0.28	-10.23	0.26	100.37	0.19	114.00	0.16
	1998	15.50	0.51	2.96	0.89	-8.37	0.35	172.15	0.03**	320.44	0.00***
	1999	8.78	0.84	-23.76	0.56	-30.11	0.08*	267.17	0.06*	353.19	0.02**
	2000	-52.33	0.43	-74.52	0.23	-50.75	0.05**	178.62	0.41	417.32	0.08*
C .Suspect Pre-IPO own is endogenous in Option Grants	Intercept	-0.68	0.88								
	Quality	0.01	0.98								
	Pre-IPO own	-0.02	0.73								
	Pre-IPO own_res	0.02	0.80								
	Size	0.00	0.39								
	Venture-backed	0.75	0.03**								
	Underwriter Rep	0.26	0.04**								
	Age	0.06	0.19								
	Board Size	0.12	0.24								
	CEO Tenure	-0.01	0.85								
	1997	-0.34	0.53								
	1998	0.52	0.36								
	1999	0.37	0.50								
	2000	0.65	0.31								

***, **, * Denote significance at the 1%, 5%, and 10% level.

Table 11 Hausman Test for Endogeneity (Option Grants as Value)

		Underpricing-1d		Underpricing-1w		Price Update		Performance-6m		Performance-1y	
		Coef.	P>|z|	Coef.	P>|z|	Coef.	P>|z|	Coef.	P>|z|	Coef.	P>|z|
A. Suspect Option Dummy is endogenous in Underpricing	Intercept	-223.47	0.02**	-139.05	0.10*	-130.67	0.00***	-482.21	0.16	-444.88	0.20
	Option	-9.73	0.86	-23.10	0.64	-30.20	0.14	-320.00	0.11	-341.00	0.10*
	Option_Res	18.80	0.73	30.80	0.54	35.50	0.09*	325.00	0.10*	353.00	0.09*
	Pre-IPO own	-0.22	0.51	-0.18	0.53	0.11	0.38	0.40	0.73	0.46	0.70
	Market Return	6,108.13	0.01***	5,162.02	0.01***	4,355.42	0.00***	-7,030.06	0.35	-2,762.14	0.72
	Size	0.09	0.85	0.31	0.48	0.28	0.12	2.57	0.14	2.98	0.10*
	Venture-backed	1.91	0.90	8.31	0.52	8.74	0.10*	13.55	0.79	51.10	0.33
	Nasdaq	0.04	0.06*	0.02	0.30	0.02	0.03**	-0.09	0.26	-0.23	0.00***
	Underwriter Rep	27.04	0.11	23.86	0.11	18.39	0.00***	131.92	0.03**	149.94	0.02**
	Age	-0.52	0.90	-3.63	0.36	-2.34	0.14	-31.91	0.04**	-32.46	0.05**
	Founder	-15.91	0.76	-27.13	0.56	-37.85	0.05**	-327.06	0.08*	-383.01	0.05**
	1997	-10.18	0.75	-6.10	0.83	-0.61	0.96	180.47	0.11	225.24	0.05**
	1998	31.29	0.26	15.27	0.54	-1.55	0.88	215.28	0.03**	365.65	0.00***
	1999	2.27	0.96	25.70	0.56	-3.99	0.82	476.33	0.00***	625.90	0.00***
	2000	-56.11	0.46	-11.00	0.87	-23.56	0.38	382.38	0.16	725.89	0.01***
B. Suspect Pre-IPO own is endogenous in Underpricing	Intercept	-787.28	0.27	645.67	0.31	188.90	0.51	920.06	0.72	240.01	0.93
	Option	8.92	0.00***	7.60	0.01***	5.23	0.00***	4.21	0.70	11.60	0.30
	Pre-IPO own	9.38	0.42	-12.76	0.23	-4.70	0.32	-18.16	0.67	-6.13	0.89
	Pre-IPO own_res	-9.67	0.41	12.51	0.24	4.71	0.32	17.62	0.68	5.55	0.90
	Market Return	6,089.24	0.01***	5,015.58	0.01***	4,142.11	0.00***	-8,212.45	0.28	-3,507.15	0.66
	Size	0.14	0.61	-0.22	0.36	-0.12	0.26	-0.60	0.55	-0.19	0.85
	Venture-backed	4.39	0.77	5.44	0.68	7.58	0.16	8.33	0.88	53.50	0.32
	Nasdaq	0.04	0.05**	0.02	0.35	0.02	0.03**	-0.08	0.30	-0.21	0.00***
	Underwriter Rep	22.49	0.00***	14.99	0.02**	8.69	0.00***	42.66	0.12	54.28	0.05**
	Age	-5.39	0.48	6.80	0.33	3.36	0.29	3.96	0.89	-2.05	0.94
	Founder	-58.26	0.42	77.03	0.24	22.64	0.44	71.48	0.79	-31.23	0.91
	1997	-10.99	0.71	-20.37	0.43	-12.20	0.26	85.26	0.40	128.27	0.21
	1998	26.85	0.33	18.05	0.47	-2.21	0.83	197.40	0.05**	338.33	0.00***
	1999	20.58	0.69	-27.07	0.56	-37.14	0.07*	245.76	0.19	412.96	0.03**
	2000	-37.89	0.62	-64.76	0.35	-58.00	0.05**	138.98	0.62	492.08	0.08*
C .Suspect Pre-IPO own is endogenous in Option Grants	Intercept	97,700,000	0.02**								
	Quality	1,200,000	0.66								
	Pre-IPO own	-1,760,000	0.00***								
	Pre-IPO own_res	1,780,000	0.00***								
	Size	44,800	0.07*								
	Venture-backed	554,000	0.86								
	Underwriter Rep	2,740,000	0.07*								
	Age	89,800	0.81								
	Board Size	-549,000	0.52								
	CEO Tenure	544,000	0.37								
	1997	517,000	0.93								
	1998	675,000	0.90								
	1999	-515,000	0.92								
	2000	-949,000	0.87								

***, **, * Denote significance at the 1%, 5%, and 10% level.

Table 12 Three-Stage Least Square Regressions (Option Grants as dummy)

Dependent Variable	Independent Variable	Underpricing-1d		Underpricing-1w		Price Update		Performance-6m		Performance-1y	
		Coef.	P>|z|	Coef.	P>|z|	Coef.	P>|z|	Coef.	P>|z|	Coef.	P>|z|
Pre-IPO own	Intercept	59.72	0.00***	62.08	0.00***	59.23	0.00***	58.76	0.00***	59.96	0.00***
	Quality	-0.47	0.86	-0.45	0.86	2.05	0.45	1.23	0.65	0.80	0.78
	Size	-0.03	0.13	-0.02	0.42	-0.02	0.19	-0.03	0.15	-0.02	0.26
	Age	0.47	0.21	0.24	0.53	0.52	0.22	0.51	0.17	0.45	0.23
	Founder	6.09	0.05**	5.46	0.07*	3.35	0.30	4.54	0.13	4.59	0.14
	CEO Tenure	0.20	0.65	0.38	0.41	0.31	0.54	0.32	0.48	0.39	0.40
	1997	1.14	0.83	-2.35	0.66	0.47	0.93	-0.46	0.93	-2.61	0.62
	1998	1.39	0.79	-0.50	0.92	3.29	0.53	0.73	0.88	-1.51	0.77
	1999	-3.04	0.48	-5.48	0.21	-2.67	0.55	-2.70	0.53	-4.57	0.30
	2000	-2.55	0.60	-4.58	0.35	-3.96	0.43	-2.38	0.62	-3.44	0.48
Option	Intercept	-0.98	0.57	-0.40	0.86	0.43	0.80	-0.65	0.64	-0.57	0.70
	Quality	-0.04	0.51	-0.04	0.30	0.05	0.27	-0.02	0.71	0.08	0.10*
	Pre-IPO own	0.02	0.41	0.01	0.78	0.00	0.95	0.01	0.53	0.01	0.61
	Size	0.00	0.63	0.00	0.63	0.00	0.67	0.00	0.92	0.00	0.74
	Venture-backed	0.12	0.03**	0.11	0.06*	0.14	0.08*	0.13	0.02**	0.15	0.03**
	Underwriter Rep	0.07	0.24	0.06	0.37	0.03	0.46	0.07	0.09*	0.06	0.08*
	Age	0.00	0.98	0.01	0.12	0.00	0.99	0.01	0.51	0.01	0.58
	Founder	-0.13	0.38	-0.04	0.82	-0.02	0.87	-0.06	0.58	-0.04	0.75
	Board Size	0.04	0.38	0.03	0.60	0.01	0.86	0.03	0.41	0.02	0.69
	CEO Tenure	0.00	0.80	-0.01	0.23	0.00	0.68	-0.01	0.50	-0.01	0.57
	1997	-0.15	0.15	-0.05	0.68	-0.16	0.11	-0.11	0.24	-0.04	0.69
	1998	0.03	0.75	0.09	0.34	0.03	0.76	0.06	0.53	0.13	0.18
	1999	0.10	0.24	0.12	0.21	0.04	0.60	0.06	0.49	0.15	0.10*
	2000	0.10	0.33	0.12	0.19	0.08	0.38	0.08	0.41	0.16	0.09*
Underpricing	Intercept	-345.80	0.33	-626.72	0.14	48.88	0.71	433.14	0.75	661.22	0.40
	Option	141.35	0.70	409.31	0.34	-61.08	0.73	-81.44	0.96	-635.22	0.60
	Pre-IPO own	1.89	0.60	6.40	0.16	-1.36	0.18	-6.97	0.65	-7.50	0.38
	Market Return	6,462.89	0.01***	6,271.63	0.01***	3,904.87	0.00***	-9,412.52	0.26	-4,224.47	0.60
	Size	0.12	0.46	0.35	0.13	-0.02	0.79	-0.37	0.67	-0.51	0.46
	Venture-backed	-12.49	0.81	-37.17	0.50	14.92	0.56	11.96	0.96	132.51	0.42
	Nasdaq	0.04	0.26	0.01	0.83	0.02	0.02**	-0.06	0.64	-0.15	0.05**
	Underwriter Rep	15.93	0.17	0.55	0.97	7.93	0.19	24.70	0.73	51.51	0.39
	Age	-2.00	0.49	-6.20	0.08*	0.20	0.82	-1.63	0.92	1.97	0.85
	Founder	-20.03	0.29	-40.63	0.13	-3.88	0.60	1.26	0.98	-0.01	1.00
	1997	-4.73	0.93	33.24	0.63	-20.63	0.53	80.33	0.77	43.16	0.77
	1998	7.67	0.80	-28.70	0.51	-3.59	0.80	174.62	0.11	362.55	0.01***
	1999	-11.80	0.74	8.81	0.86	-28.37	0.08*	249.88	0.07*	373.24	0.02**
	2000	-66.07	0.39	-26.42	0.80	-48.39	0.08*	147.04	0.60	429.52	0.07*

***, **, * Denote significance at the 1%, 5%, and 10% level.

Table 13 Three-Stage Least Square Regressions (Option Grants as Value)

		Underpricing-1d		Underpricing-1w		Price Update		Performance-6m		Performance-1y	
Dependent Variable	Independent Variable	Coef.	P>|z|	Coef.	P>|z|	Coef.	P>|z|	Coef.	P>|z|	Coef.	P>|z|
Pre-IPO own	Intercept	52.82	0.00***	56.34	0.00***	53.85	0.00***	54.99	0.00***	55.16	0.00***
	Quality	0.44	0.88	-0.58	0.85	1.42	0.64	0.30	0.92	-0.06	0.99
	Size	-0.04	0.05**	-0.01	0.55	-0.03	0.12	-0.04	0.08*	-0.04	0.11
	Age	0.42	0.29	0.30	0.46	0.47	0.33	0.38	0.35	0.35	0.39
	Founder	3.95	0.25	4.30	0.22	2.06	0.58	2.56	0.46	2.70	0.46
	CEO Tenure	0.69	0.19	0.49	0.36	0.80	0.20	0.84	0.12	0.85	0.12
	1997	2.90	0.66	0.02	1.00	-2.12	0.75	-2.23	0.72	-2.24	0.73
	1998	4.95	0.39	2.44	0.68	4.90	0.41	1.55	0.78	-0.06	0.99
	1999	3.18	0.51	-0.27	0.96	1.55	0.75	1.48	0.76	1.55	0.76
	2000	5.37	0.30	1.69	0.76	1.58	0.77	3.01	0.56	3.34	0.54
Option	Intercept	-454,000,000	0.00***	-557,000,000	0.01***	-456,000,000	0.01***	-404,000,000	0.00***	-457,000,000	0.00***
	Quality	-3,150,000	0.76	4,750,000	0.70	-6,190,000	0.56	-1,230,000	0.89	702,000	0.95
	Pre-IPO own	7,190,000	0.00***	7,870,000	0.00***	6,480,000	0.00***	6,130,000	0.00***	7,230,000	0.00***
	Size	371,000	0.00***	178,000	0.06*	288,000	0.00***	306,000	0.00***	374,000	0.00***
	Venture-backed	-10,200,000	0.12	-9,050,000	0.27	-41,000	0.99	-4,400,000	0.33	-3,430,000	0.43
	Underwriter Rep	8,750,000	0.01***	11,900,000	0.07*	11,300,000	0.03**	7,100,000	0.01***	5,550,000	0.02**
	Age	-3,330,000	0.03**	-2,370,000	0.13	-3,510,000	0.04**	-2,660,000	0.04**	-2,960,000	0.05**
	Founder	-39,400,000	0.01***	-45,300,000	0.01***	-26,800,000	0.06*	-26,600,000	0.02**	-31,500,000	0.03**
	Board Size	5,520,000	0.08*	8,620,000	0.15	5,770,000	0.16	5,720,000	0.09*	6,850,000	0.06*
	CEO Tenure	-4,460,000	0.04**	-3,290,000	0.15	-4,050,000	0.10*	-4,450,000	0.03**	-5,370,000	0.02**
	1997	-20,000,000	0.42	3,220,000	0.90	20,000,000	0.39	14,300,000	0.48	15,700,000	0.51
	1998	-40,800,000	0.09*	-26,100,000	0.32	-35,400,000	0.14	-13,100,000	0.48	-2,440,000	0.91
	1999	-24,200,000	0.23	-3,700,000	0.86	-11,300,000	0.54	-9,930,000	0.54	-13,600,000	0.49
	2000	-40,600,000	0.09*	-20,000,000	0.42	-13,200,000	0.52	-20,300,000	0.28	-29,000,000	0.20
Underpricing	Intercept	11,624.55	0.88	-738.78	0.70	-230.72	0.62	-9,676.48	0.67	-7,530.93	0.62
	Option	2533.00	0.87	-75.10	0.86	-22.90	0.75	-189.00	0.70	-151.00	0.68
	Pre-IPO own	-93.57	0.90	7.60	0.62	1.12	0.79	84.49	0.63	75.50	0.55
	Market Return	-57,917.32	0.88	4,239.62	0.81	4,981.11	0.04**	28,322.64	0.90	27,756.36	0.87
	Size	-22.98	0.87	0.89	0.82	0.24	0.74	17.46	0.69	17.43	0.66
	Venture-backed	236.25	0.84	17.87	0.74	9.66	0.33	90.23	0.81	219.00	0.68
	Nasdaq	-2.13	0.87	0.09	0.81	0.04	0.47	1.57	0.72	1.35	0.71
	Underwriter Rep	-967.32	0.87	42.89	0.78	19.81	0.56	697.86	0.69	470.66	0.66
	Age	252.22	0.88	-12.45	0.77	-3.09	0.75	-205.52	0.66	-188.53	0.63
	Founder	3,012.10	0.87	-123.05	0.80	-39.94	0.67	-2,225.06	0.68	-1,969.34	0.64
	1997	588.04	0.90	-29.67	0.81	-5.20	0.82	-0.06	1.00	-17.25	0.99
	1998	1,965.97	0.88	-45.51	0.85	-22.42	0.69	-872.19	0.75	-372.47	0.83
	1999	2,503.62	0.87	-62.30	0.88	-47.34	0.46	-1,375.16	0.76	-1,174.43	0.76
	2000	5,973.41	0.87	-219.47	0.82	-103.20	0.49	-4,119.12	0.72	-3,825.59	0.70

***, **, * Denote significance at the 1%, 5%, and 10% level.